

# Liquid-Check Levelsensor



Technical manual

Installation  
Safety  
Programming  
Handling

## Congratulations

Congratulations on your purchase of this electronic level sensor "**Liquid-Check**" of the highest quality and thank you for your trust.

The level sensor "**Liquid-Check**" is designed to measure and transfer level levels of liquids in pressureless containers of all kinds.

The measuring range (container height) is 0 - 5 meter.

Before commissioning the device, we recommend this operating manual carefully read through.

Please also refer to the instructions on the use, the connection, as well as the safety and setting instructions.

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# Preliminary

## Delivery

1. Plug power supply 5 volt /1A with microUSB plug
2. Measuring module "Liquid-Check"
3. Fixing material
4. Measuring hose and hose weight (Optional)

When unpacking, check the kit for completeness.

## Intended use

The intended use is to accurately measure a level of liquids in pressureless containers. E.g. water cisterns, tank contents, etc.

Liquid-Check was developed on the basis of the valid safety guidelines and built for use in European countries.

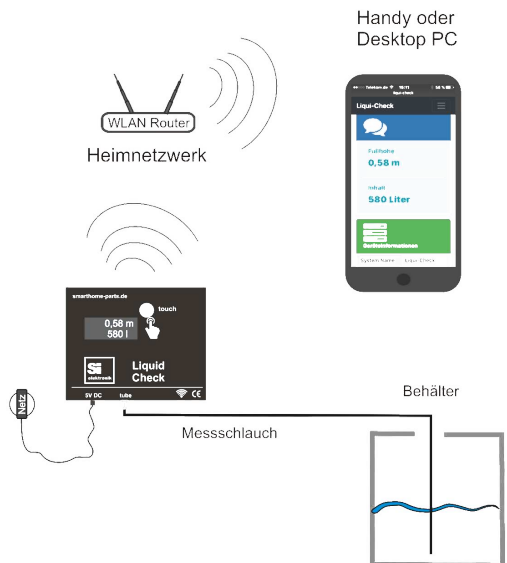
The electronic measuring system "**Liquid-Check**" allows the measurement of liquid levels. By specifying the shape of the container and the dimensions, the conversion into litres is also carried out. The main useful values are therefore, among other indications, the level of the liquid in metres and the amount of liquid in litres. The measured values are displayed via the digital display on the device as well as via a Wi-Fi connection via a PC or a mobile phone. Since the device has a local web page, the values can also be integrated into SmartHome systems that support reading values from web pages or HTTP-requests. A program module (see page 12) is available for the open source SmartHome system "FHEM".

## Design of the device

The complete measuring unit including the LCD display and the W-Lan radio module are located in a small wall housing that is easy to assemble. The electronic components have no connection to the measuring medium.

The system is bundled with the container by a thin hose. The recommended measuring hose is available as an accessory and is made of polyurethane. An examination of the material compatibility with the measuring medium is recommended. Measurement hoses made of other materials can optionally be used for non-suitable measuring media.

The power supply for the system is supplied by a 5Volt plug-in power supply. For applications without available power supply, operation is possible, for example, via a solar-charged battery module.



## How does Liquid-Check work?

The measurement method is based on a hydrostatic measurement of the liquid level in a container. Due to gravity, a liquid exerts pressure on the measuring hose positioned at or above the bottom of a container, depending on its specific density. By building up a back pressure, Liquid-Check can determine the corresponding value without being directly in or on the measuring object. Measurements based on the "hydrostatic principle" always determine the level of the liquid. Using the specified container shape parameters, Liquid-Check can also determine the volume content. Liquid-Check does not have to be attached directly to the container to be measured, but can be mounted for example in the nearby technical room. For the measurement, only a thin hose connection to the container or tank is required. The end of the hose must be positioned by a weight on or above the bottom of the container.

More information on Wikipedia:

[https://de.wikipedia.org/wiki/Pneumatische\\_Füllstandmessung](https://de.wikipedia.org/wiki/Pneumatische_Füllstandmessung)

## Liquid-Check offers the following features:

1. Accurate measurement absolutely
2. Accurate repetition measurement
3. Installation not necessary directly on the container/tank
4. No calibration required
5. Good Wi-Fi connection, as in-house assembly
6. Good power supply, as in-house assembly
7. Connection to the Wi-Fi network via the router's WPS button
8. Setting all parameters via local website
9. Responsive display on mobile phone
10. No separate app required
11. Setting different container shapes and dimensions
12. Entering a bearing table for complex container shapes
13. Measuring interval adjustable
14. Specific density of the liquid adjustable
15. Offset for measuring position (hose position above the ground)
16. Direct replacement of existing pump tank watches
17. Integration into smart home systems possible
18. FHEM - Module for integration into the open source SmartHome system available
19. Low acquisition costs

# Installation of the Liquid-Check

## Installation

1. Find a suitable assembly place  
Since the device is designed for indoor use, it is important to select a position from which you can establish a hose connection to the measuring object (tank). As a rule, there is already a pipe or hose connection from the house to a cistern or an earth tank, through which one can establish a corresponding connection. Measuring hose lengths up to 50m should not be a problem. A power outlet for the plug-in power supply should be in the immediate vicinity. You should also be able to connect to the W-Lan router from the installation site (See page 7). In advance, you can also check the Wi-Fi connection to your router with your mobile phone.
2. After a good position has been found, mount the Liquid-Check module with the enclosed fastening material.  
**When drilling the dowel holes, pay attention to any cables or pipes that may be laid in the wall. Use a wire tester or have the module mounted by a specialist.**
3. Route the hose connection from the measuring module to the corresponding tank. Plug the hose on the measuring module onto the hose connector (4mm), which is outstanding at the bottom, and fix the hose with the enclosed cable tie. **To make it easy to attach the hose, it is recommended to heat it with a hair dryer.**

**Attention: Do not bend the hose.**

**Avoid abrasion points, possibly protect with protective tube.**

**Always use a protective tube for wall bushings.**

In order to measure the correct filling height, the end of the hose must be guided to the bottom of the tank in question and fixed there. This can be achieved, for example, with a rod or with a weight at the end of the hose. Tanks that have an old measuring clock with hand pump already have a submersible pipe up to the tank bottom, which can be used accordingly. If the hose or the immersive tube does not end up to the bottom, but with a little distance above the bottom of the container, this can be taken into account in the settings of the liquid check.

4. **Note**  
Otherwise, no special requirements are placed on the installation. Height differences are not noticeable in the measurement result. The hose should not be left unnecessarily long, this will prolong the pumping cycle of the performed during a measurement.

## Electrical connection of the Liquid-Check

The Liquid-Check is powered by a plug-in power supply, which is included in the scope of delivery. The power supply has a micro-USB connector, which is plugged into the bottom of the case.

## Overview Operating functions

Since all parameters of the liquid check are set and read via the local web interface, the module itself has only the most necessary operating functions.

### 1. WPS-Button

Small hole to the right of the power plug

- show IP-address - short press
- activate WPS - > 3 Sek. press until display show „WPS...“
- WLAN-Standard reset - > 10 Sek. press

Resets the parameters to: SSID : Gast  
Password : 12345678  
Hostname : Liquid-Check

### 2. Touch-Button

Sensor button on the front

- Trigger measurement - approx. 1 sec. touch

## Connecting to Wi-Fi

### Connection to the W-Lan via WPS function

Wi-Fi Protected Setup (WPS) is a feature that makes it very easy to connect to Wi-Fi. Two Wi-Fi-enabled devices are connected at the touch of a button. The cumbersome entry of a password via a configuration menu is no longer necessary. To do this, the following 2 operations must be performed.

#### Activating on the Wi-Fi router

To integrate Liquid-Check into the existing network, the WPS button must first be pressed on the W-Lan router or the WPS function must be activated in the setting interface of your router. If several WPS methods are available then select the push button method without PIN. If necessary, refer to your router's instructions under the "WPS" key point. Then, within 2 minutes, press the WPS function of the Liquid Check.

#### Activate at The Liquid Check:

To the right of the power supply plug is a small hole behind which there is a button (WPS button). For example, press the button with a curved paper clip for about 3 seconds to activate the WPS function. Once the display shows "WPS . . . / 120 sec." release the button again. The "#" icon will now flash until the WPS connection is successful or after 2 minutes the connection is canceled. By short pressing the WPS button, the device displays its received IP address.

## Connection with the "guest" W-Lan

If a WPS connection with the WLAN router is not possible or desired, then there is the possibility to connect Liquid-Check to a guest (Gast) WLAN. The following connection parameters are already preset in the delivery state: Wi-Fi Name (SSID): **Gast** , Wi-Fi Password: **12345678**

Therefore, you must configure a Wi-Fi router with these parameters, then Liquid-Check automatically connects to the network after plugging in the power supply. Now also connect your mobile phone to the Wi-Fi "Guest" . You can then access the Liquid-Check setting menu via the mobile phone's web browser and manually set and save the desired connection data to your Wi-Fi router.

Instead of providing the WLAN via a router, a mobile phone can also be used, with which one unlocks a WLAN for other devices via the function "personal hotspot" (iPhone) or "Tethering+mobile hotspot" (Andriod).

Example setting on an Android phone

Below is a short Step by Step guide to activate the Wi-Fi hotspot on your phone.

1. Settings  
Symbol „Gearwheel“ icon or simply pull down the top of the image on the right
2. More  
Select „Tethering + mobile Hotspot“
3. WLAN Hotspot  
Set up Wi-Fi hotspot: network name: Gast, password: 12345678, security: WPA2

Now Liquid-Check can log in to the Wi-Fi of the mobile phone and gets a corresponding IP address.

**Note for iPhone:** Set the iPhone Name under <settings/general/info> temporarily to „Gast“

**Note:** If other connection data is already stored in the device, liquid check can be reset to the connection parameters set in the delivery state. Pressing the WPS button (> 10 sec.) to set the connection parameters in the delivery state.

Connecting to the Liquid Check

After successful WPS or guest (Gast) login, you can connect to the web interface of the Liquid-Check via a popular internet browser (e.g. Goggle-Chrom, Firefox, MS-Edge, Opera, Safari). If your router supports a name resolution such as the Fritz-Box 7390 then you can connect directly to the following input:

<http://liquid-check>

If you cannot connect by name, you have the option to display the IP address on the liquid check. To do this, press the WPS button (button behind the hole) on the liquid check only shortly. The IP-Adr. enter in the browser search box: e.g. <http://192.168.x.x>

## Note

A prerequisite for both connection variants is that the router assigns the IP address via DHCP. This type of address assignment is usually the default and can only be changed by manually changing the router.

In order for other WLAN devices to connect to a mobile phone or tablet PC with Liquid Check, for example, the router must allow wi-Fi devices to connect to each other and also allow new Wi-Fi devices. For example, for a Fritz box, this option is enabled by default. You can find the setting there under Wi-Fi/Security

- Die angezeigten WLAN-Geräte dürfen untereinander kommunizieren
- Alle neuen WLAN-Geräte zulassen
- WLAN-Zugang auf die bekannten WLAN-Geräte beschränken

(The displayed WLAN devices are allowed to communicate with each other)  
(Allow all new Wi-Fi devices)


The guest Wi-Fi may have its own radio button to activate these functions.



## Browser View


## Desktop view

Liqui-Check   Übersicht   Einstellungen   Aktualisieren   Mehr ▾



Füllhöhe  
**0,33 m**


Inhalt  
**590 Liter**



**Geräteinformationen**

System Name	Liqui-Check
Revision	A1
Firmware Version	1.00
Systemlaufzeit	0 Tage, 15 Std., 58 Min., 24 Sek.
IP-Adresse	192.168.179.47
Gateway	192.168.179.1
MAC	30:AE:A4:0E:E1:64
RSSI	-78 dBm

## View on your phone



Füllhöhe  
**0,33 m**

Inhalt  
**590 Liter**



**Geräteinformationen**

System Name	Liqui-Check
Revision	A1
Firmware Version	1.00
Systemlaufzeit	0 Tage, 16 Std., 4 Min., 20 Sek.
IP-Adresse	192.168.179.47
Gateway	192.168.179.1
MAC	30:AE:A4:0E:E1:64
RSSI	-76 dBm

# Setting/viewing the parameters

Under the heading <Einstellungen> various parameters can be entered. These are:

Wi-Fi connection data:

Access data to the Wi-Fi network and the host name that the module can usually use to access the module by pre-http:// in the web browser.

Tank: (Shape-parameters)

The length, height or diameter of the container to be measured, these are usually self-explanatory.

Messen: (Measure)

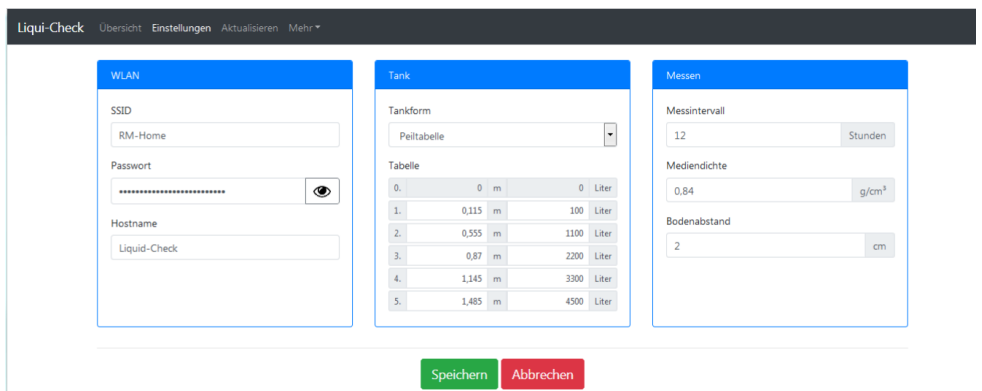
Measuring interval: At what time interval a measurement is performed. The display always shows the last reading.

Media density: Water has a density of 1 g/cm<sup>3</sup>, heating oil (HEL) has a range of 0.82 -0.86 g/cm<sup>3</sup>. On average, therefore, about 0.84 g/cm<sup>3</sup>

Bodenabstand: (Distance to the tank bottom)

Correction value, how much cm the measuring hose (or measuring tube) is positioned above the ground.

**Note:** If a web browser does not accept the number entry with comma (,), try it with a point (.)



Speichern Abbrechen

Save / Cancel

## WLAN Parameter

WLAN

SSID

Password

Hostname

# Tank-Shapes

From the measurement of the height of the liquid, the volume can be determined in litres. To do this, the tank shape used and the corresponding dimensions must be entered.

The screenshot shows a software interface for selecting a tank shape. The title bar is blue and labeled 'Tank'. Below it, the label 'Tankform' is followed by a dropdown menu. The menu is open, showing a list of options: 'Keine', 'Quader', 'Kugel', 'Zylinder stehend', 'Zylinder liegend', and 'Peiltabelle'. The 'Quader' option is currently selected and highlighted in blue.

## Standard tank shapes

Various geometric shapes are available here.

- Box
- Ball
- Cylinder standing
- Cylinder lying
- Bearing table

Here you can specify the dimensions for the selected tank shape.

The screenshot shows the 'Tank' form with 'Zylinder liegend' selected in the 'Tankform' dropdown. Below this, there are two input fields for dimensions. The first is labeled 'Durchmesser' (Diameter) and has the value '1,5' with a unit 'm' dropdown. The second is labeled 'Länge' (Length) and has the value '2' with a unit 'm' dropdown.

The screenshot shows the 'Tank' form with 'Peiltabelle' selected in the 'Tankform' dropdown. Below this, there is a table labeled 'Tabelle' (Bearing table) with 6 rows and 4 columns. The columns represent height, diameter, length, and volume. The first row is a header row with empty cells. The subsequent rows contain numerical values for each parameter.

0.	0	m	0 Liter
1.	0,115	m	100 Liter
2.	0,555	m	1100 Liter
3.	0,87	m	2200 Liter
4.	1,145	m	3300 Liter
5.	1,485	m	4500 Liter

## Bearing table for complex tank shapes

A bearing table is provided by most tank manufacturers. Up to 10 values can be preset.

## Measurement settings

### Measuring interval

Here, for example, every 12 hours  
The shortest interval is 1 hour

### Media density

Here, for example, light heating oil HEL  
It is in the range of 0.82 - 0.86

### Bodenabstand (Ground distance)

The end of the hose hangs here in the example  
2cm above the tank bottom.

Messen

Messintervall

 Stunden

Mediendichte

 g/cm<sup>3</sup>

Bodenabstand

 cm

## Example: FHEM SmartHome

For integration into the open source SmartHome system "FHEM" a finished module with download and installation instruction is published under "Github":

<https://roma61.github.io/Liquid-Check/>

Example of the integration of the measured values in an FHEM dashboard

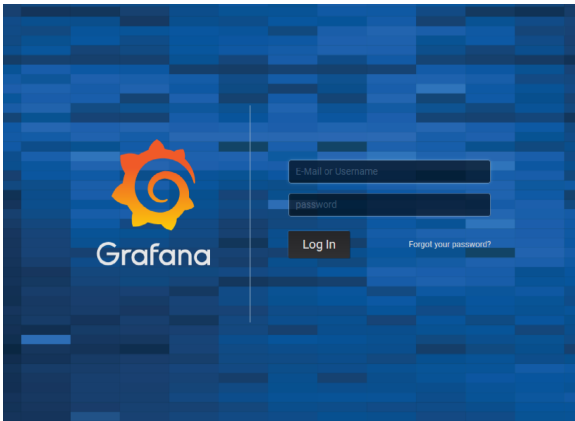
The dashboard features a navigation bar with the following buttons: Rollo, Rollo-Settings, Rollo-Timer, Rollo\_Beschattung, and Fuellstand. The main content area displays the 'Fuellstand Liquid-Check' widget, which is divided into two sections:

Item	Height (m)	Quantity (L)	Percentage (%)
Tank	0.86	6.8	68
Wasser Zisterne	0.86	6.8	34

# Liquid-Check Cloud

Liquid-Check powered by Grafana

For recording your readings, "Liquid-Check" has an interface to our web portal. Our server uses the visualization software "Grafana". Here your levels and quantities can be stored and displayed graphically (see picture). With your personal login, you have the possibility to monitor the graphics in another location via PC web browser or mobile phone. An alarm level can also be defined, which takes place when the level is exceeded or fallen below. Then it sends a notification by mail.



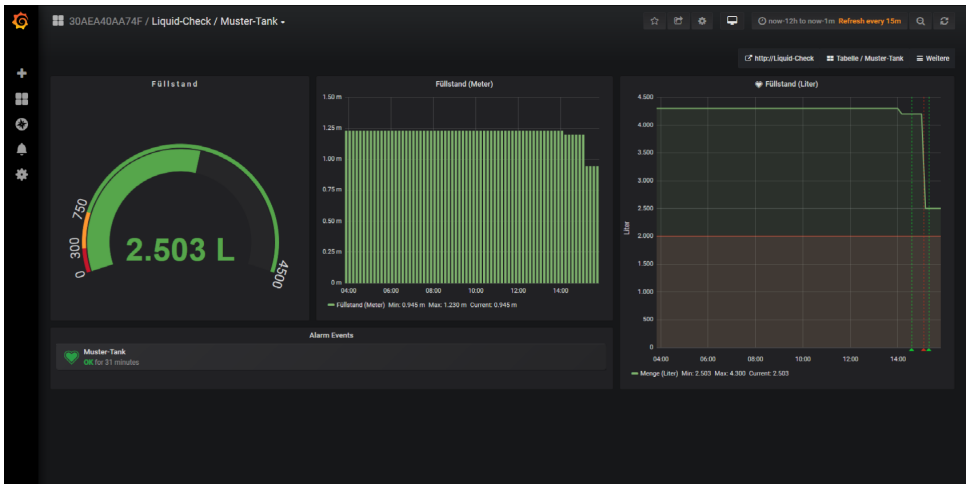
When you activate the cloud function on the setup page of the Liquid Check, you will receive the access data to the web portal.

Your data is protected by an https connection, as well as by an individual security key.

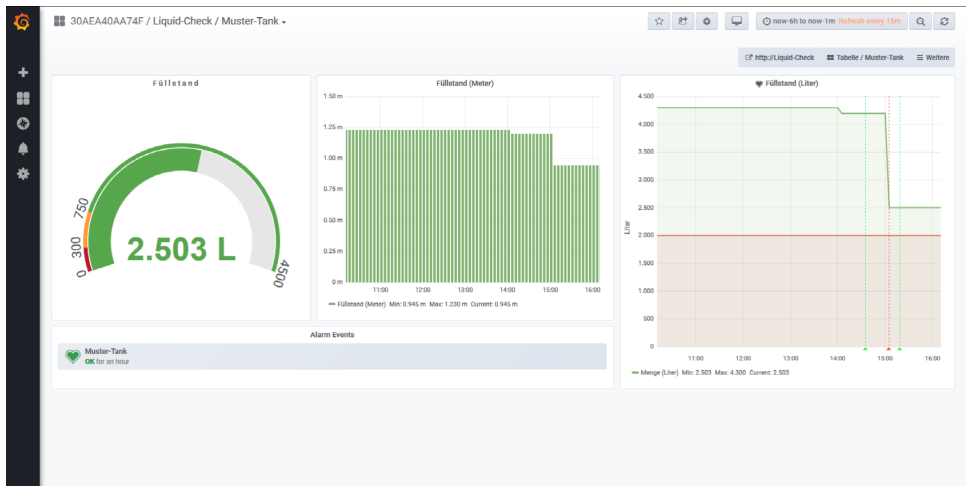
Link to the login page:

<https://liquidcheck.si-elektronik.de>

View of the graphic in the "Dark" style



## View of the graphic in the "Light" style



Once the cloud function is activated, Liquid-Check sends its last measurement to the portal cyclically every hour. In addition, the data is sent to the portal immediately if the measurement is manually activated.

The following data is required for activation:

E-Mail : User's e-mail address  
Größe : Maximum amount of filling of the container to be measured  
Bezeichnung : Short description of the container e.g. cistern garden

Optionally:

Alarmwert : Filling quantity at which a notification should be made  
Benachrichtigung : Notification when the value is above or below

Multiple devices can be managed by activating with the same <e-mail> in one account.

If the cloud function is deactivated in the "Liquid Check" setup page, measurement data will no longer be sent to the web portal. The data that has already been stored is retained in the cloud.

Deleting the cloud account on the "Liquid Check" setup page causes the account to be completely deleted, as well as the recorded measurement data.

## Technical data

Power supply	:	5 V DC / 1 A Plug power supply, microUSB
Power consumption	:	0,3 W Normal / 3 W active measurement cycle
Pump Pressure Max	:	0,5 BAR
Weight	:	0,2 kg
Dimensions L/B/H	:	131mm x 90mm x 48mm
Device installation position	:	Any
Accuracy	:	+/- 1cm
Temperature range	:	-5/+45°C
Protection class	:	IP30
Supported web browsers	:	Goggle-Chrom, Firefox, MS-Edge, Opera, Safari
Recommended measuring hose:		Polyester-Polyurethan 6 x 4, •small bending radius due to special flexibility •very good refrigeration flexibility and reset properties •kink- and abrasion-resistant •resistant to aliphatic hydrocarbons and most lubricants

TX Frequenz	Wi-Fi: 2412-2472/2422-2462 MHz
RX Frequenz	Wi-Fi: 2412-2472/2422-2462 MHz
ITU Klassifizierung	G1D, D1D, F1D
Ausgangsleistung	Wi-Fi: 16,62 dBm (802.11b), 16,23 dBm (802.11g) 16,45 dBm (802.11n20), 16,02 dBm (802.11n40)
Modulation	Wi-Fi: DSSS, OFDM
Antenne	PCB Antenne, 2.0 dBi

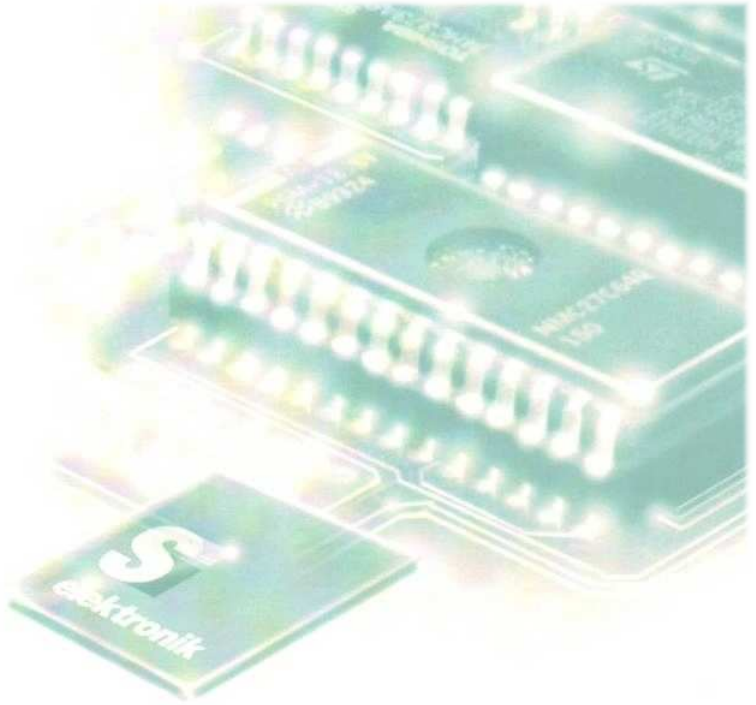
## EG-conformity



Produktname : Liquid-Check  
 Typ : LC1

Complies with the provisions of the EC directives listed.

Requirement	Standard, Testreport Number, Date & Laboratory
Radio Spectrum	EN 300 328 V2.1.1 (2016-11) Test Report RKS170508002-00A issued on 2017-05-10 by BACL, Kunshan EN 300 328 V2.1.1 (2016-11) Test Report RKS170508002-00B issued on 2017-05-10 by BACL, Kunshan EN 300 328 V2.1.1 (2016-11) Test Report RKS170508002-00C issued on 2017-05-10 by BACL, Kunshan
EMC	EN 301 489-1 V2.2.0 (2017-03), EN 301 489-17 V3.2.0 (2017-03) Test Report RKS170508002-00E issued on 2017-05-18 by BACL, Kunshan
Safety	EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 Test Report RKS170508002-03 issued on 2017-05-18 by BACL, Kunshan
Health	EN 62311:2008 Test Report RKS170508002-00D issued on 2017-05-18 by BACL, Kunshan



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