

## LCS3050

### Low Water Level Switch for two probes

#### Installation and Maintenance Instructions

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1. Safety information
2. General product information
3. Mechanical installation
4. Electrical installation
5. Commissioning
6. Fault finding
7. Technical information
8. Technical assistance



# 1. Safety information

Water level limiters are safety devices and must only be installed, wired and commissioned by qualified and competent staff. Incorrect installation, wiring or commissioning can impact the safe operation of the device.

Retrofitting and maintenance work must only be performed by qualified staff who – through adequate training – have achieved a recognised level of competence.



## Danger

The terminal strips of the equipment are live during operation! There is a risk of serious injury due to electric shock!

Always cut off the power supply to the equipment before installing, removing or connecting terminal strips!



## Important

The name plate specifies the features of the equipment. Do not commission or operate any item of equipment that does not have its own specific name plate.

## 1.1 Directives and Standards

### Pressure Equipment Directive (PED) 2014/68/EU

Water level limiters are safety accessories as defined in the Pressure Equipment Directive (PED). The level switch LCS3050 in conjunction with level probe LP40 are EU type approved according to EN 12952/EN 12953. These Directives state, among other things, the requirements made on limiting systems and equipment for steam boiler plants and (pressurised) hot-water installations.

### Functional Safety acc. to IEC 61508

The level switch LCS3050 is certified acc. to IEC 61508 only if used in combination with level probe LP40. This standard describes the functional safety of safety-related electrical/electronic/programmable electronic systems.

The equipment combination LP40 + LCS3050 corresponds to a type B subsystem with Safety Integrity Level (SIL) 3.

### VdTÜV Bulletin “Wasserstand 100” (Water Level 100)

The level switch LCS3050 in conjunction with the level probe LP40 is type approved according to the VdTÜV Bulletin “Water Level 100”.

The VdTÜV Bulletin “Wasserstand (Water Level) 100” specifies the requirements made on water level control and limiting equipment for boilers.

### LV (Low Voltage) Directive and EMC (Electromagnetic Compatibility)

The level switch LCS3050 meets the requirements of the Low Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EU.

### ATEX (Atmosphère Explosible)

According to the European Directive 2014/34/EU the level switch LCS3050 must not be used in potentially explosive areas.



## Note

The level probe LP40 is a simple item of electrical equipment as specified in IEC 60079-11:2023 section 5.5. According to the European Directive 2014/34/EU the equipment must be equipped with approved Zener barriers if used in potentially explosive areas. Applicable in Ex-zones 1, 2 (1999/92/EC). The equipment does not bear an Ex marking.

**Note:** The requirements of the IEC 61508 are not met if the LP40 + Zener barriers + LCS3050 are interconnected!

## 1.2 Functional Safety according to IEC 61508

### Safety characteristics of the subsystem LP40/LCS3050

The level switch LCS3050 is certified acc. to IEC 61508 if used in combination with level probe LP40.

The combination LP40/LCS3050 corresponds to a type B subsystem with Safety Integrity Level (SIL) 3. Type B means that the behaviour under fault conditions of the used components cannot be completely determined. The functional safety of the equipment combination refers to the detection and evaluation of the water level and, as a consequence, the contact position of the output relays.

The design of the equipment combination LP40/LCS3050 corresponds to the architecture 1oo2. This architecture consists of two channels that detect and diagnose faults in each other.

The installation, commissioning and wiring according to the manual are essential for the safety characteristics.

If a fault is detected, the equipment combination LP40/LCS3050 will go to the safe state, which means that the contacts of both output relays will open the safety circuit.

Table 1

Safety characteristics	SIL	Architecture	Lifetime (a)	Proof Test Interval (a)
General	3	1oo2	20	20
	SFF	PFDav	PFHav	$\lambda$ DU
Level switch LCS3050 in conjunction with one or two level probes LP40	>90%	$<5 \times 10^{-4}$	$<5 \times 10^{-8}$	$<10 \times 10^{-8}$

# 1.3 Terms and abbreviations

**Table 2**

Terms/Abbreviations	Description
Safety Integrity Level/SIL	Classification of the Safety Integrity Level acc. to IEC 61508
Lifetime (a)	Functional safety: Lifetime in years
Safe Failure Fraction/SFF	Percentage of failures without the potential to put the safety-related system into a dangerous state
Probability Failure per Demand (Low Demand)/PFDav	Average probability of failure on demand for low demand mode (once a year)
Probability Failure per Hour/PFHav	Probability of failure per hour
$\lambda$ DU	Failure rate for all dangerous undetected failures (per hour) of a channel of a subsystem

## Determination of the Safety Integrity Level (SIL) for safety-related systems

Level probe, level switch and actuators (auxiliary contactor in safety circuit) are subsystems and together constitute a safety-related system that executes a safety function.

The specification of the safety-related characteristics Table 1 refers to the level probe and the level switch including the output contacts. The actuator (e. g. an auxiliary contactor in the safety circuit) is installation specific and, according to IEC 61508, must be considered separately for the whole safety-related system.

Table 3 shows the dependence of the Safety Integrity Level (SIL) on the average probability of failure on demand of a safety function for the whole safety-related system (PFDsys). The “Low demand mode” is here considered for a water level limiter, which means that the frequency of demands for operation of the safety-related system is no greater than one per year.

**Table 3**

Low demand mode PFDsys	Safety Integrity Level (SIL)
$\geq 10^{-5} \dots < 10^{-4}$	4
$\geq 10^{-4} \dots < 10^{-3}$	3
$\geq 10^{-3} \dots < 10^{-2}$	2
$\geq 10^{-2} \dots < 10^{-1}$	1

Table 4 indicates the attainable Safety Integrity Level (SIL) as a function of the Safe Failure Fraction (SFF) and the Hardware Fault Tolerance (HFT) for safety-related systems.

**Table 4**

Hardware Fault Tolerance (HFT) for type B			Safe Failure Fraction (SFF)
0	1	2	
	SIL 1	SIL 2	< 60 %
SIL 1	SIL 2	SIL 3	60 % - < 90 %
SIL 2	SIL 3	SIL 4	90 % - < 99 %
SIL 3	SIL 4	SIL 4	$\geq 99$ %

## 2. General product information

### 2.1 Intended use

The level switch LCS3050 is used in conjunction with level probe LP40 as a low water level limiter system to turn off the heating and open the safety circuit when a predetermined low water level is reached in steam boilers and (pressurised) hot-water plants.

### 2.2 Function

The level switch LCS3050 is designed for connecting one or two level probes. See section 4.2 Schematic representations of arrangements.

When the water level falls below the low level the level probes are exposed and a low level alarm is triggered in the level switch.

This switchpoint is determined by the length of the probe rod (level probe LP40).

After the de-energizing delay has elapsed, the two output contacts of the level switch will open the safety circuit for the heating.

The switching-off of the heating is interlocked in the external safety circuit and can only be deactivated when the level probe enters the water again.

In addition, two signal outputs for external signalling devices close instantaneously.

An alarm will also be raised if a malfunction occurs in the level probe and/or the electrical connection.

An automatic self-testing routine monitors the safety functions in the level switch and the level probes.

In the event of a malfunction the safety circuit opens instantaneously and switches the heating off.

Alarm and error messages are indicated by LEDs and a signal output for each level probe is energized without delay.

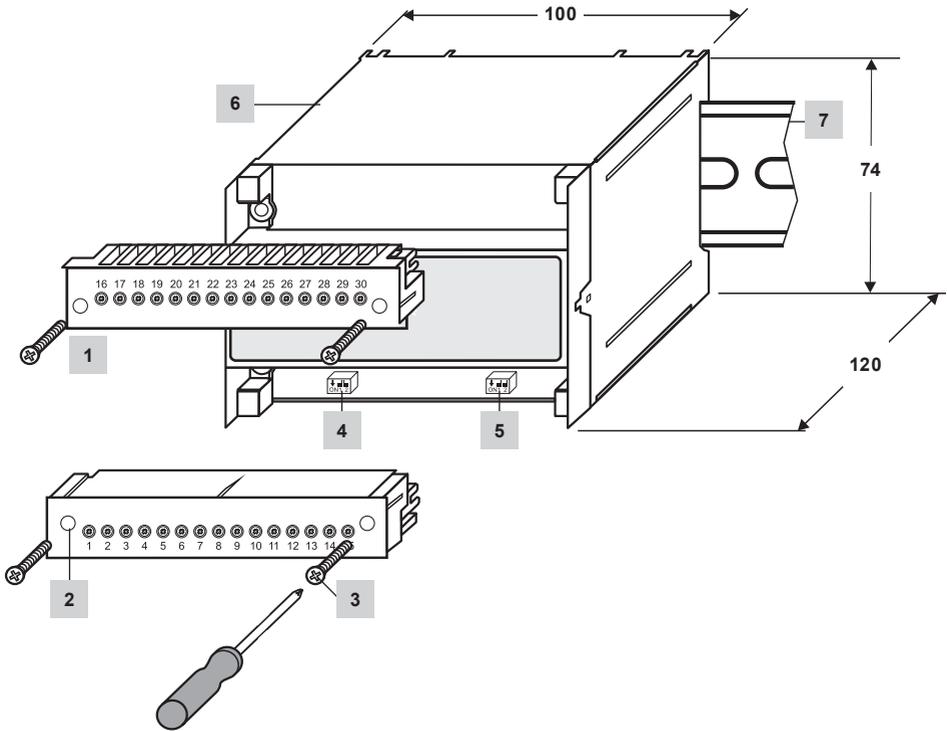
An alarm can be simulated by pressing the test button.



Fig. 1

# 3. Mechanical installation

## 3.1 Dimensions (approximate) in mm



Item	
1	Upper terminal strip
2	Lower terminal strip
3	Fixing screws (cross recess head screws M3)
4	Code switch for switching on/off level probe 1/2
5	Code switch for switching on/off level probe 1/2
6	Enclosure
7	Supporting rail type TH 35, EN 60715

Fig. 2

The code switches are accessible after removing the lower terminal strip. The terminal strips can be unplugged after undoing the right and the left fixing screws.

### 3.2 Installation in control cabinet

The level switch LCS3050 is clipped onto the support rail 7 type TH 35, EN 60715 in the control cabinet.



**In some regions, for safety reasons, the control cabinet door is not allowed to be open if the electrical supply is active.**

**Auxiliary indication must be provided so that the operation of the level switch can be observed from the outside of the control cabinet, particularly for the commissioning and regular maintenance of the system**

#### Name-plate

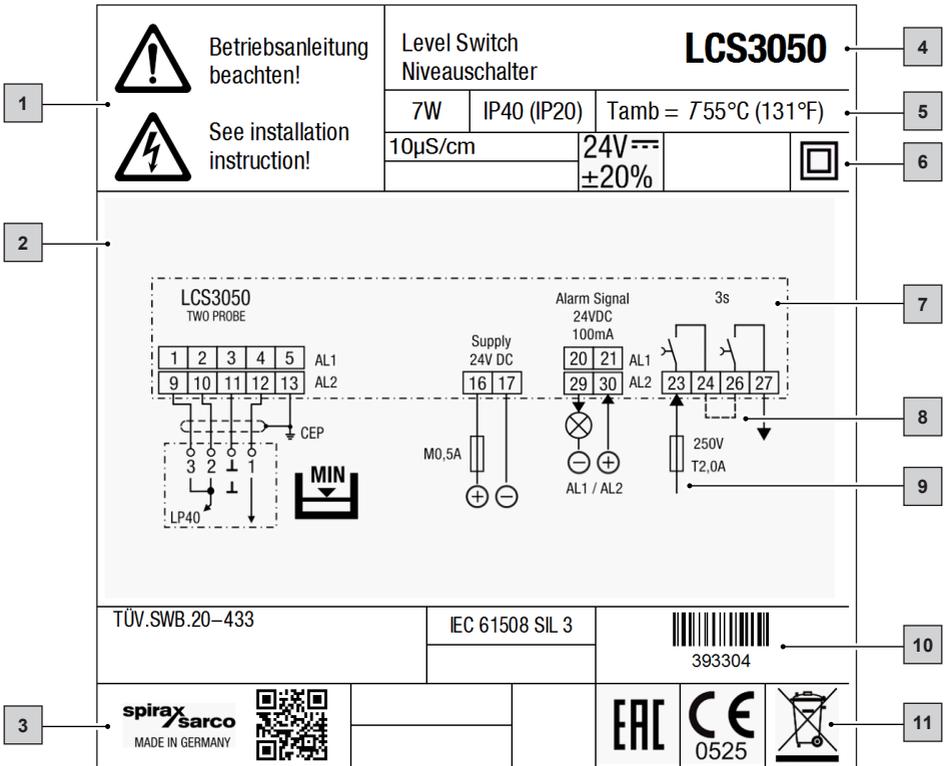


Fig. 3

1	Safety note
2	Wiring diagram
3	Manufacturer
4	Type designation
5	Supply voltage/Protection
6	Ambient temperature / sensitivity
7	Safety circuit
8	Wire link, provided on site
9	Fuse, provided on site
10	Type approval no.
11	Disposal note

### 3.3 Installation in a control cabinet door.

The BHC Panel Adaptor Large is available which enables the controller to be installed in a control cabinet door.

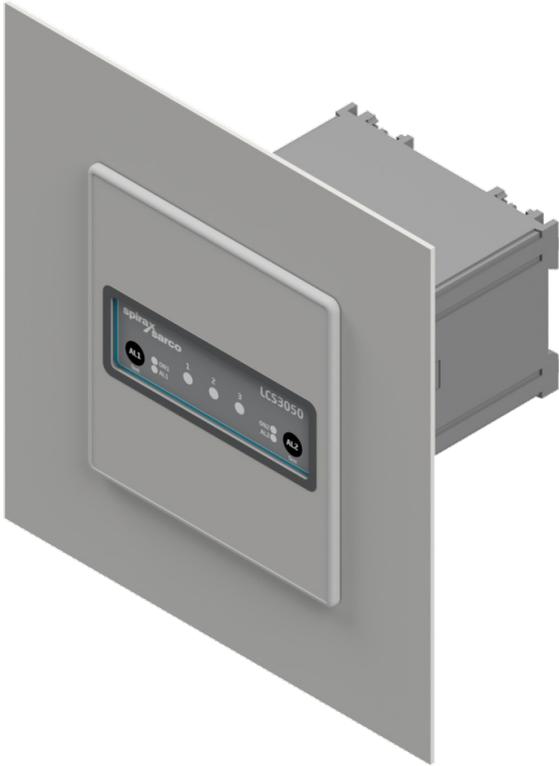
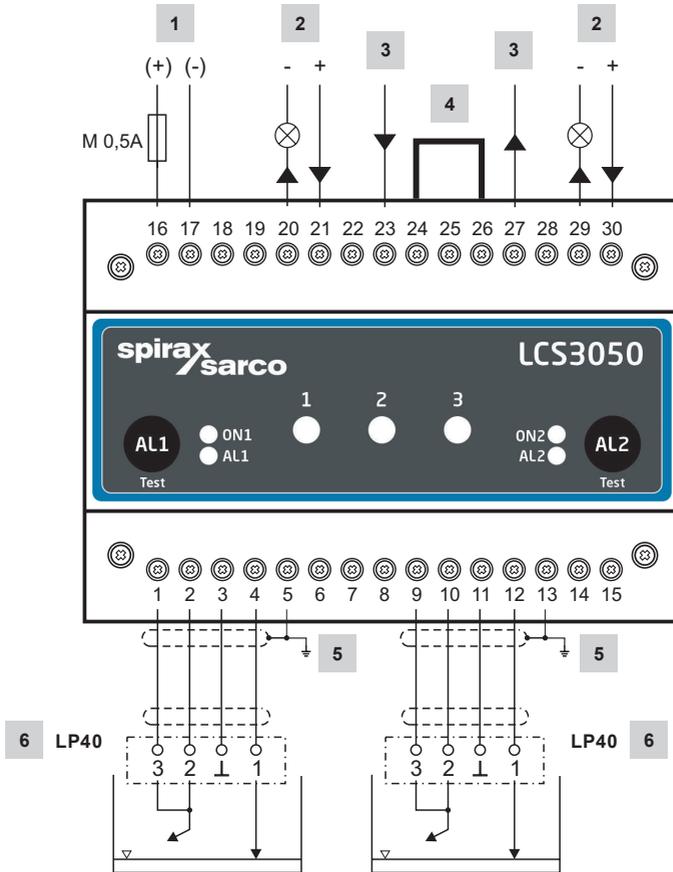


Fig. 4

# 4. Electrical installation

## 4.1 Wiring diagram



Item	
1	Supply voltage
2	Signal output 1/2 for external alarm 24 Vdc, 100 mA (semiconductor output)
3	Safety circuit, input and output
4	Wire link, on site, when used as water level limiter according to EN 12952 / EN 12953
5	CEP Central earthing point in control cabinet
6	Level probe LP40.

Fig. 5

LCS3050 Low Water Level Switch for two probes

## 4.2 Schematic representations of arrangements

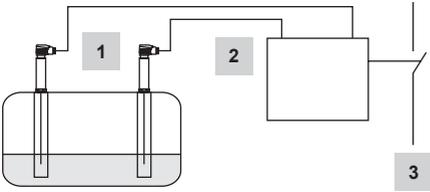


Fig. 6

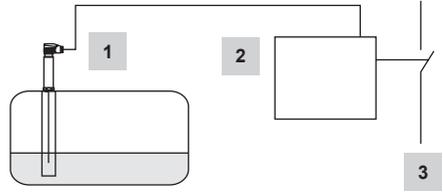


Fig. 7

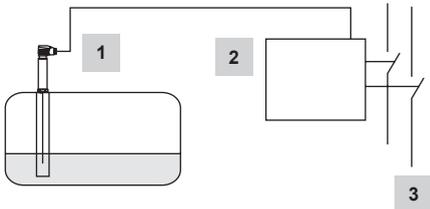


Fig. 8

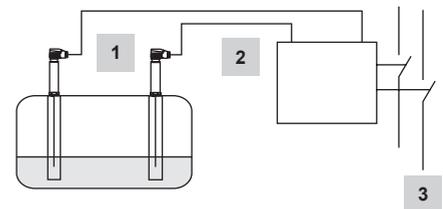


Fig. 9

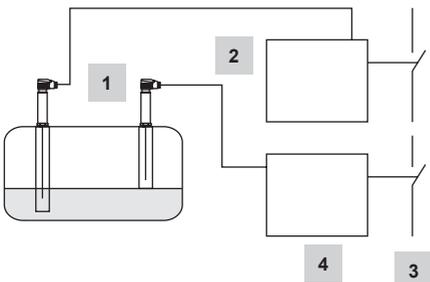


Fig. 10

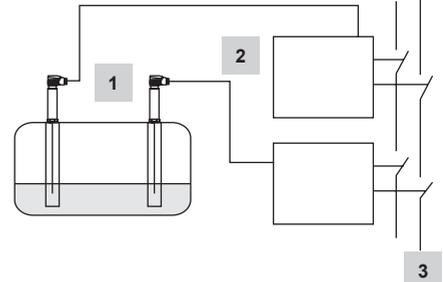


Fig. 11

Item	
1	Level probe(s) LP40
2	Level switch LCS3050
3	Safety circuit
4	Level switch LCS3050 for low-level pre-alarm

### 4.3 Explanatory notes to schematic representations

- Fig. 5** **Steam boiler plants according to EN 12952-07/ EN 12953-06, 72 h operation**  
 Combination consisting of 2 level probes LP40 and 1 level switch LCS3050 as water level limiter. Functional safety IEC 61508, SIL 3. The equipment combination meets the demand for two independent water level limiters.
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- Fig. 6** **(Pressurised) hot-water plants and electrically heated steam boilers according to EN 12953-06. Steam boiler plants with high availability according to EN 12952-07 / EN 12953-06, 72h operation.**  
 Combination consisting of 1 level probe LP40 and 1 level switch LCS3050 as water level limiter. Functional safety IEC 61508, SIL 3. Hot water installations require two independent and separate water level limiters. For this purpose one equipment combination LP40/LCS3050 shall be installed in the hot-water boiler and the second one in the pressure maintaining vessel, the expansion tank or the like (depending on the type of pressurisation). For electrically heated steam boilers one water level limiter is sufficient. To meet the plant operator's demand for a higher level of availability of the steam boiler plant, two (or three) independent equipment combinations LP40/LCS3050 can be installed in the steam boiler.
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- Fig. 7** Combination consisting of 1 level probe LP40 and 1 level switch LCS3050 as water level limiter. The level switch opens two separate safety circuits. Functional safety IEC 61508, SIL 3. Further applications in accordance with national sets of regulations
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- Fig. 8** Combination consisting of 2 level probes LP40 and 1 level switch LCS3050 as water level limiter. The level switch opens two separate safety circuits. Functional safety IEC 61508, SIL 3. Further applications in accordance with national sets of regulations
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- Fig. 9** Combination consisting of 1 level probe LP40 and 1 level switch LCS3050 as water level limiter and 1 level probe LP40/1 level switch LCS3050 as first low-level alarm. Functional safety IEC 61508, SIL 3. Further applications in accordance with national sets of regulations
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- Fig. 10** Combination consisting of 2 level probes LP40 and 2 level switches LCS3050 as water level limiter. The level switch opens two separate safety circuits. Functional safety IEC 61508, SIL 3. Further applications in accordance with national sets of regulations

	<p><b>Note</b></p> <p>Please observe the safety-related characteristics for the equipment combination 1 level probe LP40/level switch LCS3050 and 2 level probes LP40/level switch LCS3050 on Table 1.</p>
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### 4.4 Supply voltage

Provide the level switch LCS3050 with an external semi-delay fuse 0.5 A.

	<p><b>Danger</b></p> <p>For the supply of the level switch LCS3050 with 24 Vdc use a safety extra-low voltage (SELV) power supply unit that must be electrically isolated from dangerous contact voltages and must meet at least the requirements on double or reinforced isolation acc. to EN 50178, EN 61010-1, EN 60730-1, EN 60950-1 or EN 62368-1 (safe isolation).</p>
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## 4.5 Connection of level probe

To connect the level probe please use screened multi-core control cable, min. conductor size 0.5 mm<sup>2</sup>, e.g. LiYCY 4 x 0.5 mm<sup>2</sup>, max. length 100 m.

Wire terminal strip in accordance with the wiring diagram. Fig. 4. Connect screens to terminals 5 and 13 and to the central earthing point (CEP) in the control cabinet.

## 4.6 Connection for signal output

A signal output for the connection of further external signalling equipment is allocated to each monitoring channel in the level switch, max. load 100 mA. For connecting the level switch with the signal output unit use a control cable, 2 x 0.5 mm<sup>2</sup>. In the event of an alarm or error message the signal outputs (terminals 20, 21 and 29, 30) close instantaneously.

## 4.7 Connection of safety circuit

Connect the safety circuit for the heating to terminals 23, 24 and 26, 27. When used as water level limiter according to EN 12952 / EN 12953, connect the output contacts of the two monitoring channels by adding a wire link between the terminals 24 and 26.

Provide the output contacts with a 2 A or 1 A (for 72 hours operation) slow-blow fuse.



### Note

In the event of an alarm the level switch LCS3050 does not interlock automatically. If a lock function is required by the installation it must be provided in the follow-up circuitry (safety circuit). The circuitry must meet the requirements of the EN 50156.



### Important

- Provide the level switch LCS3050 with an external semi-delay fuse 0.5 A.
- Connect screens to terminals 5 and 13 and to the central earthing point (CEP) in the control cabinet.
- To protect the switching contacts provide the safety circuit with a slow-blow fuse 2 A or 1.0 A (for 72 hrs. operation acc. to TRD 604).
- When switching off inductive loads, voltage spikes are produced that may impair the operation of control and measuring systems. Connected inductive loads must be provided with suppressors such as RC combinations as specified by the manufacturer.
- When used as water level limiter according to EN 12952 / EN 12953 connect terminals 24 and 26 by adding a wire link.
- Install connecting lines to level probes and logic unit separated from power cables.
- Do not use unused terminals as support point terminals.

## 4.8 Tools

Screwdriver for slotted screws, size 3.5 x 100 mm, completely insulated according to VDE 0680-1.

# 5. Commissioning

## 5.1 Factory setting

- De-energizing delay: 3 sec (factory set).
- Configuration: Operation with two level probes LP40. S1/S2 of code switches 4 and 5 set to OFF.

	<p><b>Danger</b>          The terminal strips of the LCS3050 are live during operation. This presents the danger of electric shock!          Always cut off power supply to the equipment before mounting, removing or connecting the terminal strips!</p>
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### Changing the function of the level switch

If only one probe is used for operation (e. g. in case of emergency operation) change the settings as follows:

- Switch off supply voltage.
- Unscrew the right and left fixing screws 3 and remove the lower terminal strip 2, Fig. 2.
- Depending on which probe shall be deactivated, set S1/S2 of code switches 4 and 5 to ON.
- Attach lower terminal strip and fasten fixing screws.
- Apply supply voltage, equipment is re-started.

		 <b>4</b> Toggle switch, white		 <b>5</b> Toggle switch, white	
		Code switch 4		Code switch 5	
Level probe 1	Level probe 2	S 1	S2	S 1	S2
Deactivated	Deactivated	Not valid			
Activated	Deactivated	OFF	ON	OFF	ON
Deactivated	Activated	ON	OFF	ON	OFF
Activated	Activated	OFF	OFF	OFF	OFF

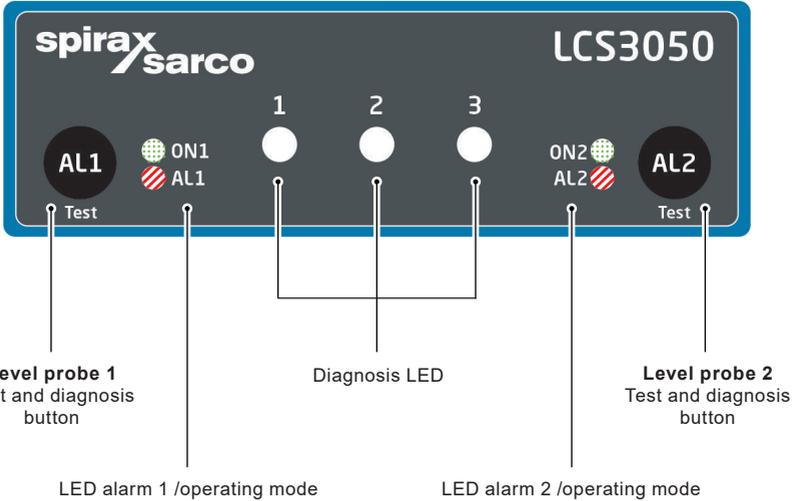
Toggle switch shown ON 

Factory setting

Toggle switch shown OFF 

	<p><b>Note</b>          If only one level probe is switched on, only the LEDs for power and alarm of the corresponding channels will be illuminated.</p>
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## 5.2 Checking switchpoint and function



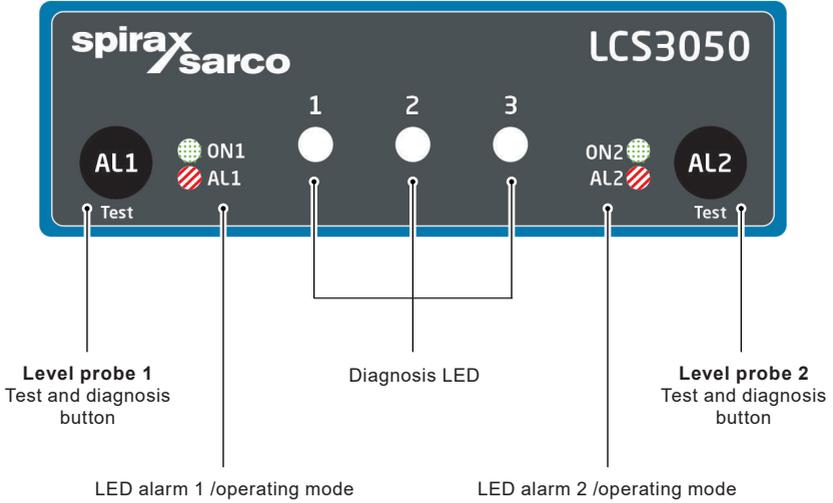
 Green LED

 Red LED

Fig. 12

<b>Start</b>		
<b>Activity</b>	<b>Indication</b>	<b>Function</b>
<b>Apply supply voltage.</b>	All LEDs are illuminated.	System is being started and tested, this takes approx. 10 sec. Output contacts are open. Signal outputs 1 and 2 are closed.
	All LEDs are illuminated for more than 10 sec.	System malfunction. Possible causes: Faulty power supply, level switch defective.
<b>Raise water in boiler until the switchpoint “low water level (LW)” is exceeded. Level probe(s) make(s) contact with the water.</b>	Green ON 1/2 LEDs for level probe 1/2 illuminated.	Output contacts are closed. Signal outputs 1 and 2 open.
<b>Checking switchpoint and function</b>		
<b>Lower water level until it is below the switchpoint “low water level (LW)”. Level probe(s) is/are exposed.</b>	Red LEDs for level probe 1/2 are flashing.	De-energizing delay is running. Signal outputs 1 and 2 are closed instantaneously.
	Red LEDs for level probe 1/2 illuminated.	Delay time has elapsed, output contacts open. Signal outputs 1 and 2 are closed.
<b>Possible installation faults</b>		
<b>Status and indication</b>	<b>Fault</b>	<b>Remedy</b>
<b>Sightglass indicates level below switchpoint “low water (LW)”, red LEDs for level probes 1/2 not illuminated. Safety circuit closed.</b>	Probe rod(s) is/are too long.	Cut probe rod(s) to the length dictated by the switchpoint LW.
	If installed inside the boiler: Upper vent hole in protection tube does not exist or is obstructed.	Check installation of level probe. Make sure that the level in the protection tube corresponds to the actual water level.
	Incorrect Wiring	Check the wiring connections at both the probe and level switch are in-line with the wiring diagrams in this IM and the probe IM-P693-08
<b>Water level sufficient. Red LEDs for level probes 1/2 illuminated! Safety circuit open.</b>	Probe rod(s) is/are too short.	Replace probe rod(s) and cut new rods to the length dictated by the switchpoint LW.
	The earth connection to the vessel is interrupted.	Clean probe threads and ensure excessive PTFE tape has not been applied.
	Electrical conductivity of the boiler water too low.	Correct water conductivity.
	Upper vent hole flooded.	Check installation of level probe. Make sure that the level in the protection tube corresponds to the actual water level.

### 5.3 Operation



 Green LED

 Red LED

Fig. 13

<b>Operation</b>		
<b>Activity</b>	<b>Indication</b>	<b>Function</b>
Level probe(s) submerged.	Green ON 1/2 LEDs for level probe 1/2 illuminated.	Output contacts are closed. Signal outputs 1/2 open.
<b>Alarm</b>		
Level probe(s) exposed, level below low water level (LW).	Red LEDs for level probe 1/2 are flashing.	De-energizing delay is running. Signal outputs 1/2 are closed instantaneously.
	Red LEDs for level probe 1/2 illuminated.	Delay time has elapsed, output contacts open. Signal outputs 1/2 are closed.
<b>Test channel 1 and 2</b>		
<b>During operation:</b> Press key AL1/Test or AL2/Test and hold it down until the end of the test, level switch must react as if there was an alarm.	Red LEDs for level probe 1/2 are flashing.	Alarm simulated in channel 1 or 2. De-energizing delay is running. Signal outputs 1/2 are closed instantaneously.
	Red LEDs for level probe 1/2 illuminated.	Delay time has elapsed, output contacts open. Signal outputs 1/2 are closed. Test finished.

**It is essential that a functional test / checking of switchpoints test\* is carried out following any regional requirements.**

**Refer to section 6.6 and the LP40 Level Probe IM-P693-08.**

**Always check the switchpoints when commissioning the equipment, after replacing the level probe and at regular intervals, or as guided by local regulations .**

**The correct operation of the level switch, including the level switch's LEDs and any auxiliary indications must be observed, refer to Section 6.6.**

**\*In some regions this is called an evaporation test.**



# 6. Fault finding

## 6.1 Display, diagnosis and troubleshooting

	<p><b>Important</b> Before carrying out the fault diagnosis please check:</p>
	<p><b>Supply voltage</b> Is the level switch supplied with the voltage specified on the name plate?</p>
	<p><b>Wiring</b> Is the wiring in accordance with the wiring diagram and the relevant schematic representation of arrangement?</p>
	<p><b>Configuration</b> Are the code switch settings 4 and 5 correct for the number of level probes used?</p>

Fault indication			
Status	Diagnosis	Function	Next activity
Faulty evaluation of level probe 1, channel 1	Diagnosis LED 1 and LED alarm 1 illuminated.	Output contacts are opened instantaneously. Signal output 1 closes instantaneously.	next: Press key AL1.
Faulty evaluation of level probe 2, channel 2	Diagnosis LED 2 and LED alarm 2 illuminated.	Output contacts are opened instantaneously. Signal output 2 closes instantaneously.	next: Press key AL2.
Malfunction in level switch detected.	Diagnosis LED 3 and LED alarm 1 and 2 illuminated.	Output contacts are opened instantaneously. Signal outputs 1 and 2 are closed instantaneously.	next: Press key AL1 or key AL2.

<b>Diagnosis</b>			
<b>Display 1 and activity</b>	<b>Display 2</b>	<b>Fault</b>	<b>Remedy</b>
LED alarm 1 and diagnosis LED 1 illuminated. Press and hold down key AL1.	Diagnosis LED 1 flashing.	Malfunction in level probe 1, malfunction in level switch, faulty wiring, faulty measuring voltage.	<ul style="list-style-type: none"> <li>– check wiring,</li> <li>– measure probe voltages, clean and, if necessary,</li> <li>– exchange level probe,</li> <li>– exchange level switch.</li> </ul>
	Diagnosis LED 2 flashing.	Malfunction in level probe 1, malfunction in level switch, faulty wiring.	
	Diagnosis LED 3 flashing.	Interference voltage causing malfunction, boiler earth without PE	Provide screen and earthing, connect boiler with PE.
LED alarm 2 and Diagnosis LED 2 illuminated. Press and hold down key AL2	Diagnosis LED 1 flashing.	Malfunction in level probe 2, malfunction in level switch, faulty wiring, faulty measuring voltage.	<ul style="list-style-type: none"> <li>– check wiring,</li> <li>– measure probe voltages, clean and, if necessary,</li> <li>– exchange level probe,</li> <li>– exchange level switch.</li> </ul>
	Diagnosis LED 2 flashing.	Malfunction in level probe 2, malfunction in level switch, faulty wiring.	
	Diagnosis LED 3 flashing.	Interference voltage causing malfunction, boiler earth without PE.	Provide screen and earthing, connect boiler with PE.
LED alarm 1 and 2 and Diagnosis LED 3 illuminated. Press and hold down key AL1 or AL2.	Diagnosis LED 1 flashing.	Malfunction in processor	Replace level switch.
	Diagnosis LED 2 flashing.	Internal voltage fault.	
	Diagnosis LED 3 flashing.	Malfunction in relay.	
<p>Once the fault is eliminated, the level switch returns to normal operation.            After elimination of the fault switch off the supply voltage and switch it on again after approx. 5 sec.</p>			

## 6.2 Measuring voltage across level probe

Measure the probe voltage in order to check whether the level probe is immersed or if there is a malfunction. Please observe Figure 14.

2-4/10-12	3-4/11-12 <sup>1</sup>		2-3/10-11 <sup>2</sup>		
	immersed	exposed	immersed	exposed	Malfunction (immersed or exposed)
≈ 0.6 to 1.0V 85 Hz!	< 0.3 to 0.5V	≥ 0.3 to 0.5V	≥ 0.3 to 0.5V	< 0.3 to 0.5V	< 0.3 to 0.5V

### Notes:

The voltages shown are for indication and can vary between applications, voltages measured are Va.c. 1.

1. The measured voltage across terminals 3-4/11-12 should be compared against half of the measured voltage across terminals 2-4/10-12. 2.
2. This could indicate scale, dirt or moisture on the probe.

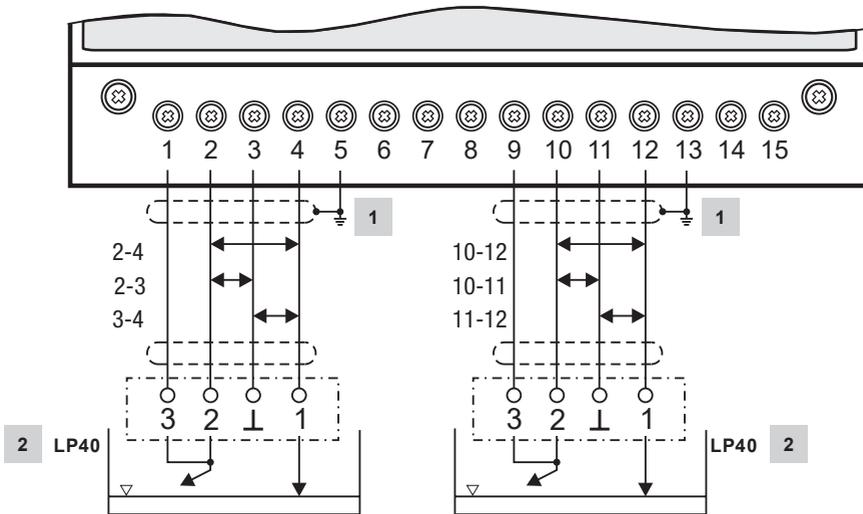


Fig. 14

	<p><b>Note</b></p> <p>The self-checking routine of the level switch LCS3050 reduces 2-4/10-12 to 0 Volt, if executed cyclically.</p>
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### 6.3 Emergency operation for water level limiter

If the level switch LCS3050 is operating with 2 LP40 level probes (water level limiter to EN 12952-07, EN 12953-06), in the event where 1 of the 2 installed level probes fails, the system is permitted to continue in "Emergency Operation Mode" (according to EN 12952, EN 12953) when under constant supervision.

If only one probe is used for operation change the settings as follows:

- Switch off supply voltage.
- Unscrew the right and left fixing screws 3 and remove the lower terminal strip 2. See Figure 2.
- Depending on which probe shall be deactivated, set S1 or S2 of code switches 4 and 5 to ON.
- Attach lower terminal strip and fasten fixing screws.
- Apply supply voltage, equipment is re-started.

		 <b>4</b> Toggle switch, white		 <b>5</b> Toggle switch, white	
		Code switch 4		Code switch 5	
Level probe 1	Level probe 2	S 1	S2	S 1	S2
Deactivated	Deactivated	Not valid			
Activated	Deactivated	OFF	ON	OFF	ON
Deactivated	Activated	ON	OFF	ON	OFF
Activated	Activated	OFF	OFF	OFF	OFF

Toggle switch shown ON



Factory setting

Toggle switch shown OFF





### Important

- Record the beginning of emergency operation in the boiler log.
- An installation operating in emergency mode has to be constantly supervised.
- Immediately replace faulty level probe.
- Record the end of emergency operation in the boiler log.
- When the emergency operation is over, restore original settings.

**If faults occur that are not listed above or cannot be corrected, please contact our service centre or authorized agency in your country.**

## 6.4 Action against high frequency interference

Should sporadic failures occur in installations susceptible to faults (e. g. malfunctions due to out-of-phase switching operations) we recommend the following actions in order to suppress interferences:

- Provide inductive loads with RC combinations according to manufacturer's specification to ensure interference suppression.
- Make sure that connecting cables leading to the level probes are segregated and run separately from power cables.
- Increase the distance to sources of interference.
- Check the connection of the screen to the central earthing point (CEP) in the control cabinet.
- HF interference suppression by means of hinged-shell ferrite rings.

## 6.5 Interlock and interlock deactivation

In the event of an alarm the level switch LCS3050 does not interlock automatically.

If a lock function is required by the installation it must be provided in the follow-up circuitry (safety circuit). The circuitry must meet the requirements of the EN 50156.

## 6.6 Switchpoint/Evaporation test

To check the switchpoint "Low water (LW)"

- Lower the water level until the water level falls below the probe tip.
- The level switch must activate an alarm and the safety circuit must open as soon as the deenergizing time delay has elapsed.
- The switching-off of the heating is interlocked in the follow up safety circuit and can only be deactivated when the level probe enters the water again.
- In this case the LEDs for alarm 1 and 2 (and any external indicators) must be illuminated and no malfunction must be indicated (diagnosis LEDs are not illuminated).
- Return the water level to normal and check LED's for alarm 1 and 2 (and any external indicators) extinguish and that the safety circuit can be reinstated

Always check the switchpoint when commissioning the equipment, after replacing the level probe and at regular intervals, following any regional requirements.

## 6.7 Decommissioning/replacing level switch

- Switch off supply voltage and cut off power supply to the equipment.
- Unscrew the right and left fixing screws 3 and remove the upper and lower terminal strips 1, 2. See Figure 2.
- Release the white fixing slide at the bottom of the equipment and take the equipment off the supporting rail.

## 6.8 Disposal

Please visit the Spirax Sarco product compliance web pages:

<https://www.spiraxsarco.com/product-compliance> for up to date information on any substances of concern that may be contained within this product.

Where no additional information is provided on the Spirax Sarco product compliance web page, this product may be safely recycled and/or disposed providing due care is taken. Always check your local recycling and disposal regulations.

# 7. Technical information

<b>Supply voltage</b>	24 Vdc +/- 20%
<b>External fuse</b>	0.5 A (semi-delay)
<b>Power consumption</b>	7 W
<b>Response sensitivity</b> (Electrical conductivity of water at 25 °C)	> 10 ... < 10000 µS/cm
<b>Electrical connection of level probe</b>	2 inputs for level probe LP40, 4 poles, with screen.
<b>Safety circuit</b>	2 volt-free make contacts, 6 A 250 Vac/30 Vdc cos φ = 1.
	Delay of response: 3 seconds.
	Provide inductive loads with RC combinations according to manufacturer's specification to ensure interference suppression.
<b>Signal output</b>	2 volt-free outputs for instantaneous external signalling, 24 Vdc, max. 100 mA (semiconductor output).
<b>Indicators and adjustors</b>	2 buttons for test and diagnosis,
	2 red/green LEDs for indicating the operating mode and alarm.
	3 red LEDs for diagnosis,
	2 two-pole code switches for setting the number of probes.
<b>Housing</b>	Housing material: base: polycarbonate, black; front: polycarbonate, grey.
	Cross section of connection: 1 x 4.0 mm <sup>2</sup> solid per wire or 1 x 2.5 mm <sup>2</sup> per stranded wire with sleeve to DIN 46228 or 2 x 1.4 mm <sup>2</sup> per stranded wire with sleeve to DIN 46228; terminal strips can be detached
	Fixing of housing: Mounting clip on supporting rail TH 35, EN 60715
<b>Electrical safety</b>	Degree of contamination: 2, overvoltage category III to EN 61010-01.
<b>Protection</b>	Housing: IP 40 to EN 60529
	Terminal strip: IP 20 to EN 60529
<b>Weight</b>	approx. 0.5 kg

<b>Further conditions:</b>	
<b>Ambient temperature</b>	when system is switched on: 0 ° ... 55 °C during operation: -10 ... 55 °C
<b>Transport temperature</b>	-20 ... +80 °C (<100 hours), defrosting time of the de-energized equipment before it can be put into operation: 24 hours.
<b>Storage temperature</b>	-20 ... +70 °C, defrosting time of the de-energized equipment before it can be put into operation: 24 hours.
<b>Relative humidity</b>	max. 95%, no moisture condensation
<b>Site altitude</b>	max. 2000 m
<b>Approvals:</b>	EU type approval PED Pressure Equipment Directive 2014/68/EU EN 12952-11, EN 12953-09: Requirements made on limiting equipment for boilers.
	Functional safety SIL 3 IEC 61508 Functional safety of safety-related electrical/electronic/programmable electronic systems
	TÜV type approval VdTÜV Bulletin "Wasserstand 100" (Water Level 100): Requirements made on water level limiting & control equipment. Type approval no. TÜV · SWB · XX -433 (see name plate)

## Content of package

1 x Level switch LCS3050

1 x Installation manual

## 8. Technical assistance

Contact your local Spirax Sarco representative. Details can be found on accompanying order/delivery documentation or on our web site:

**[www.spiraxsarco.com](http://www.spiraxsarco.com)**

### **Returning faulty equipment**

Return all items to your local Spirax Sarco representative. Ensure all items are suitably packed for transit (preferably in the original cartons).

### **Please provide the following information with any equipment being returned:**

1. Your name, company name, address and telephone number, order number and invoice and return delivery address.
2. Description and serial number of equipment being returned.
3. Full description of the fault or repair required.
4. If the equipment is being returned under warranty, please indicate:
  - a. Date of purchase.
  - b. Original order number.

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LCS3050 Low Water Level Switch for two probes