

CAPACITANCE LEVEL TRANSMITTER

MODEL NO.: SC/L-700



INSTRUCTION & MAINTAINANCE MANUAL

⚠ CAUTION

Users are advised to strictly follow the Installation & Operating Instructions provided by **Spink Controls**. Failure to comply may result in personal injury and/or damage to the instrument. **Manufacturer** shall not be held responsible for any consequences arising from improper installation, operation, or maintenance.

⚠ WARNING

All **Spink Controls** instruments are designed to operate within the specified pressure and temperature limits. Exceeding these limits may lead to equipment failure or unsafe conditions.

Prior to installation and commissioning, carefully review the Instruction Manual. Proper handling and storage guidelines must also be followed when the instrument is not in service.

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Section 1: Handling, Unpacking & Storage Guidelines

1.1 – Unpacking & Handling:

- Inspect package for damage before opening.
- Follow all package markings and instructions.
- Unpack in a clean, dry area using proper tools.
- Handle carefully; avoid shock, impact, or stress on display.
- Verify contents with delivery note; report shortages/damage immediately.
- Retain original packing for future use.
- Spink Controls is not responsible for damage due to improper handling/unpacking.

1.2 – Storage & Preservation:

- Store in a clean, dry, vibration-free, and non-corrosive environment.
- Protect from moisture, dust, sunlight, and harsh conditions.
- Seal cable entries to prevent moisture ingress.
- Use original packing wherever possible.
- For long-term storage: inspect periodically and re-verify calibration before installation.

Section 2: Overview

SC/L-700 Model Series Spink Controls' Capacitance Level Transmitter provides a high-performance solution for liquid level measurement across a variety of industries. Its wide measurement range, precision, and robust design make it a valuable tool for operations requiring reliable and accurate level control.

2.1 – Features:

- Measures wide range from 100 mm to 15000 mm
- Capable for measuring level of both conductive & non-conductive liquids
- High accuracy & performs well in extreme temperatures, high-pressure environments, and corrosive conditions.
- Customized sensor selection based on liquid type

2.2 – Working Principle:

The principle of capacitive level measurement is based on change of capacitance. An insulated electrode acts as one plate of capacitor and the conductive liquid (or reference electrode in a non-conductive liquid) acts as the other plate. The capacitance depends on the fluid level. An empty tank has a lower capacitance while a filled tank has a higher capacitance.

Section 3: Technical Specification

3.1 – Standard Technical details:

Resolution	: 2 mm
Accuracy	: +/- 0.25 % of FSR
Response time	: < 2 seconds
Pressure rating	: 6 bar-g
Temperature rating	: -20 to 100°C Above 100 °C to 250 °C - Heat Sink required
Connection type	: Flanged , Threaded (BSP or NPT), Sanitary fitting/ Tri clover end
Mounting	: Top
Liquid type	: Total Conductive or Total Non-Conductive
Measuring range	: 100 – 2000 mm for rugged type, 1500 – 15000 mm for flexible type

TRANSMITTER DETAILS

Transmitter type	: Loop Powered
Supply Voltage	: 24 V DC
Output signal	: 4 – 20 mA
Permissible load	: 600 Ω @ 24 VDC
Permissible Load	: 720 W
Indication	: 4-DIGIT, 7-SEGMENT LED

ENCLOSURE DETAILS

Material	: Die cast Aluminium epoxy coated
Certificates	: 1) Weatherproof - IP – 68 2) Flameproof - Ex db IIA / IIB T6 Gb IP 67
Cable Entry	: ¾" ET

3.2 – Special Case:

Heat Sink	: Above Temperature of 100 °C
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ACCESSORIES

Remote Indication	: Digital Process Controller Model No.: SC / L - 1101 / DPC 965M
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3.2 – Model Selection based on Application:

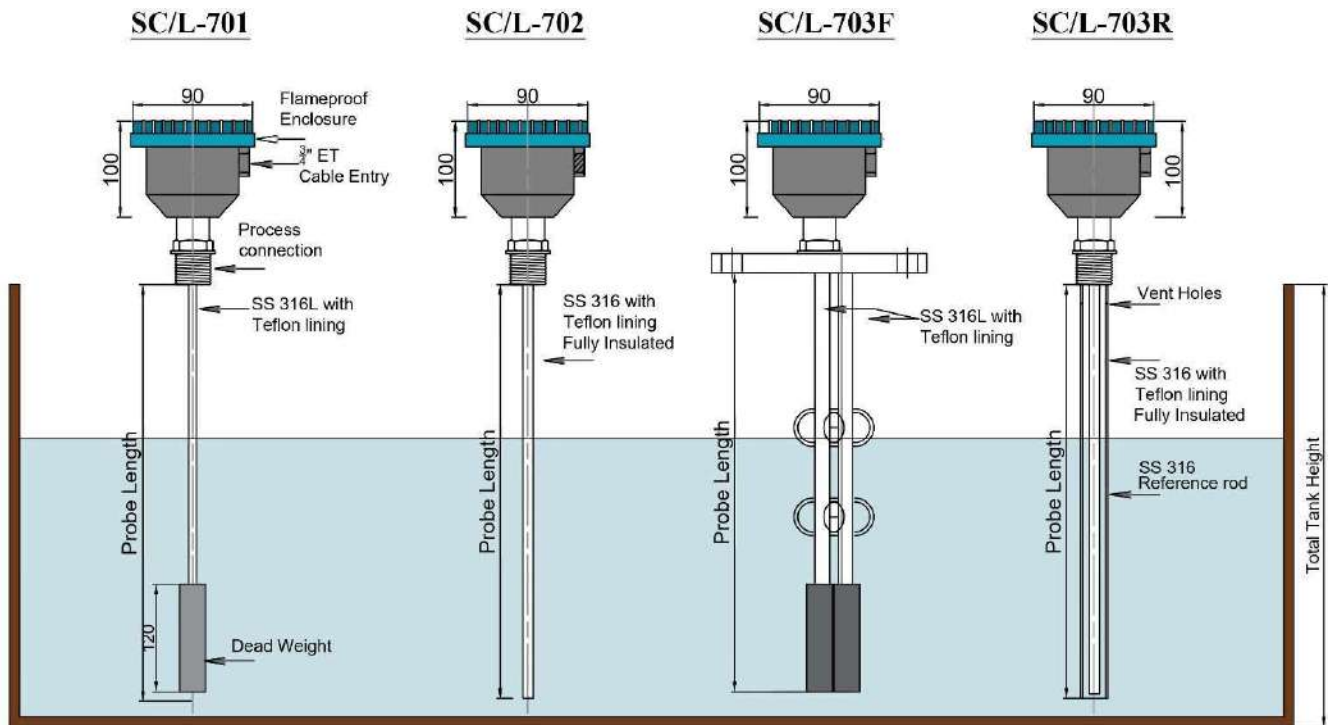


Fig.3.3 Model Selection

Flexible Type ELTRAN (SC/L-701)	Rugged type ELTRAN (SC/L-702)	ELTRAN with Reference Probe (SC/L-703F & SC/L-703R)
Simplest model with range 1500mm to 15000mm for conductive liquids in conductive tanks.	Strong and durable model for harsh environments with level range up to 2000mm.	Designed to provide stable grounding and accurate readings for non-conductive liquids (e.g., fuels) or non-conductive tanks (e.g., plastic, FRP) Available in both: ➤ Flexible Type (SC/L-703F) ➤ Rugged Type (SC/L-703R)

3.3 – Model Coding:

Suffix Code	1	2	3	4	5	6	7	8	9	10	11	12	13	Parameters
Model	L-701													Flexible probe
	L-702													Rugged probe
	L-703F													Flexible with reference probe
	L-703R													Rugged with reference probe
Conductivity	A													Conducting
	B													Non-Conductivity (Reference probe)
Digital Indication	IN													With display
	INX													Without display
Electrical Housing	1													Die-cast aluminum: Ex db IIA / IIB T6 Gb IP 67
	2													Die-Cast aluminum: IP 68
Sensor Probe MOC	SS													SS316 with Teflon Line
	AL													Aluminum (Only for Diesel/ Oil application)
Process Connection	TC													Tri Clover End
	F													Flanged ANSI B16.5
	TH													Threaded (BSP or NPT)
	SF													Special Bottom Fitting Plate (Only for Diesel/Oil Application)
Process Connection size	XX													On request (15 - 100 NB)
Process Connection MOC	C1													SS304
	C2													SS316
	C3													SS316L
	C4													PP
	C5													MS
	C6													SS316 WITH PTFE coated
	XX													Other on Request
Dead Weight (for SC/L-701 Only)	29													29 mm
	34													34 mm
	-													Not Applicable
Power Supply& Output	SO1													24VDC & 4-20mA Output
	SO2													24VDC & 0-5 VDC
	SO3													24VDC & 0-10 VDC
	SO3													24 VDC Supply & RS 485
	SO5													24VDC & RS232 (TTL)
Probe Length	XX													100 - 1500mm (Rugged),1500-15000mm (Flexible)
Heat sink (Above 100 Deg. C)	HS													with Heat Sink
	WH													Without Heat Sink
Digital Process Controller for Remote indication (SC/L- 1101) - Optional	WD													Required
	WO D													Not required

For Eg. : SC/L-701 – A – IN – 1 – SS – TC – 25 – C2 – 29 – SO1 – 1500 – WH – WOD

3.4 – Tri – clover end sizes:

TC SIZE	OD
15 NB	50.5 mm
20 NB	50.5 mm
25 NB	50.5 mm
40 NB	50.5 mm
50 NB	64.0 mm
65 NB	77.5 mm
80 NB	91.0 mm
100 NB	119.0 mm

Section 4: Installation

Note:

- Inspect the instrument upon receipt for any transit damage. Report immediately to the Spink Controls service department if any issue is observed.
- Refer to Section 1 (Handling & Storage) before installation.
- Installation, commissioning, and maintenance must be carried out only by trained and authorized personnel who have read and understood this manual.

4.1 – Installation Guidelines:

- Unpack the level indicator carefully.
- Fix the probe unit to the tank with necessary gasket & bolts.
- Connect the level transmitter as per the wiring code given.
- Input power : Connect the power of 24 VDC to the respective polarity(+ ve and - ve)
- Output: This is loop powered transmitter which can be connected to the PLC or the process controller; however the output can be checked by connecting the multimeter in series as shown below.

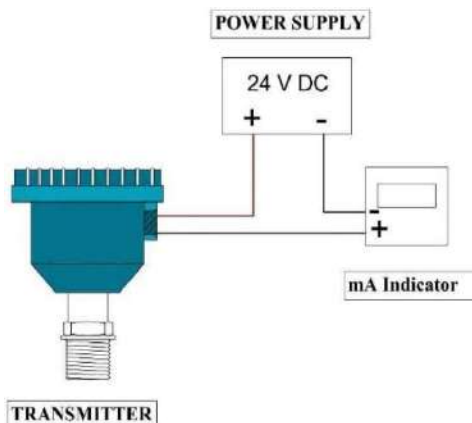


Fig. No.: 4.1 – Electrical connection

Section 5: Testing & Calibration

5.1. – Basic Calibration:

The capacitance level transmitter must be calibrated periodically to ensure measurement accuracy. Calibration frequency depends on the application but should typically be performed at least annually.

Zero Calibration

- Empty the tank or lower the liquid level to the **lowest point** the transmitter is designed to measure.
- Adjust the transmitter output to **4mA** (or the equivalent zero value for digital output) to reflect the minimum level condition.
- Verify using a reference standard if available.

Span Calibration

- Fill the tank to the highest point the transmitter is designed to measure.
- Adjust the transmitter output to 20mA (or the equivalent maximum value for digital output) to reflect the maximum level.
- Ensure that the readings match the actual liquid level or the reference standard.

Recalibration after Maintenance or Replacement

If any part of the transmitter or probe is replaced, recalibrate the unit following the same zero and span calibration procedure

5.2. – Advance Calibration:

Calibration Principle

The transmitter follows a two-point linear calibration method.

A straight-line relationship is established between two calibration points, and the transmitter extrapolates this line across the full measuring range.

- Calibration points (Low & High) can be set anywhere between 0% (empty) and 100% (full).
- The Low point must always be below the High point.
- For optimum accuracy, select calibration points as far apart as possible.

Calibration is achieved by adjusting the output current corresponding to the actual liquid level at two reference points.

Basic Requirement:

- Install the transmitter on the tank.
- Connect an Multimeter (0 – 20 mA range) in series with the loop.

Key Functions:

- **H / ▲** → Increase / High Set
- **L / ▼** → Decrease / Low Set

A. Range Setting

Range selection depends on probe length and dielectric constant of the liquid.
Standard Ranges (Water Application)

Range No.

- 1 0 – 160 mm
- 2 160 – 320 mm
- 3 320 – 640 mm
- 4 640 – 1280 mm
- 5 1280 – 2560 mm
- 6 2560 – 5120 mm
- 7 5120 – 10240 mm

Procedure

1. Press and hold both keys for
2. 5 seconds → Enter Range Set Mode.
3. LED indicates current range by number of flashes.
4. Adjust range using:
 - H / ▲ → Increase
 - L / ▼ → Decrease
5. Do not press any key for 4 display cycles → Setting is automatically saved.
6. Transmitter returns to RUN mode (LED blinking).

Note: Range is factory configured. Reset only if probe or liquid changes.

B. Low Point Calibration (L-Set)

1. Fill tank to 0%–30% level.
2. Measure actual level and calculate expected current:
$$I = ((\text{Actual Level} \div \text{Full Scale Level}) * 16) + 4$$
3. Press L / ▼ for 5 seconds → Enter LOW SET mode.
 - LED: Steady ON
 - Output: 8 mA
4. Adjust current:
 - Press L / ▼ → Decrease
 - Press H / ▲ → Increase
5. Coarse adjustment:
 - 0.1 mA step every 0.4 sec
6. Fine adjustment:
 - 5 µA per key press
7. When current matches expected value:
 - Wait 10 seconds → Value is stored
 - Transmitter returns to RUN mode

C. High Point Calibration (H-Set)

1. Fill tank to 70%–100% level.
2. Calculate expected current (same formula as above).
3. Press H / ▲ for 5 seconds → Enter *HIGH SET mode*.
 - LED: Steady ON
 - Output: 16 mA
4. Adjust current using keys:
 - L / ▼ → Decrease
 - H / ▲ → Increase
5. Perform:
 - Coarse adjustment (0.1 mA steps)
 - Fine adjustment (5 μ A steps)
6. Once matched:
 - Wait 10 seconds → Setting saved
 - Transmitter returns to RUN mode (LED blinking)

Section 6: Maintenance & Troubleshooting

6.1 – Maintenance Guidelines:

- Periodically inspect the transmitter and probe for any physical damage.
- Keep the sensing probe clean and free from deposits or scaling.
- Check that all electrical connections are secure and free from corrosion.
- Verify the 24 V DC power supply and 4–20 mA output during routine maintenance.
- Ensure the transmitter is properly grounded for stable operation.
- Recalibrate the transmitter if measurement deviation is observed or after probe replacement.

6.2 – Troubleshooting Guidelines:

Problem	Possible Causes	Solutions
Erratic/Fluctuating Signal	Electrical interference, loose wiring, improper grounding, or unclean probe.	Check wiring connections and grounding. Clean the probe and inspect for damage.
No Signal Output	Power failure, damaged transmitter, or incorrect wiring connections.	Verify power supply. Check wiring and replace faulty components.
Incorrect Reading	Calibration drift, probe coating or buildup, or environmental changes.	Recalibrate the transmitter. Clean the probe. Ensure operating conditions are within specifications.
Signal Always at Maximum	Circuit failure or liquid levels beyond measurement range.	Contact manufacturer. Ensure liquid levels are within the measurement range.
Signal Always at Zero	Circuit failure or damaged probe or insufficient liquid level.	Contact manufacturer. Verify liquid levels.
Slow Response	Clogged or coated probe, or electronic circuit malfunction.	Clean the probe. Contact manufacturer.

6.3 – Probe Replacement:

If the probe shows signs of damage, wear, or corrosion that impacts performance, follow these steps for replacement:

- **Power Off and Isolate:** Ensure the transmitter is powered off and isolated from the process.
- **Remove Old Probe:** Disconnect the probe wiring and unscrew or unbolt the probe from its mounting location.
- **Install New Probe:** Install the new probe, ensuring correct alignment and positioning in the tank. Tighten mounting bolts or screws securely.
- **Reconnect Wiring:** Reconnect wiring to the new probe, ensuring correct polarity and tight connections.
- **Calibrate the Transmitter:** After installation, perform zero and span calibration to ensure proper operation.

6.4 – Routine Maintenance:

6.4.1 – Safety Precautions

Before performing any maintenance, ensure that the system is **de-energized** and follow all safety protocols, including:

- 7.1.1.1 Turn off power supply and isolate the system.
- 7.1.1.2 Depressurize and drain the tank if necessary.
- 7.1.1.3 Wear appropriate Personal Protective Equipment (PPE).
- 7.1.1.4 Follow the site's safety procedures, especially when working in hazardous environments (e.g., chemicals, corrosives, or high-pressure areas).

6.4.2 – Routine Maintenance Checklist

a. Visual Inspection

- Inspect the transmitter and probe for any visible signs of damage, corrosion, or wear.
- Check for **loose connections** in wiring and terminal blocks.
- Ensure that the probe is securely mounted and aligned properly.
- Confirm that the sealing and housing (IP rating) are intact to prevent ingress of moisture, dust, or chemicals.

b. Cleaning Process

- If the probe is exposed to harsh chemicals, sticky or viscous liquids, or environments where material build-up is likely, periodically clean the probe to remove any accumulation.
- Use a soft brush or cloth with a mild cleaning solution to remove deposits from the probe.
- Avoid using abrasive materials that could scratch or damage the probe surface.
- Ensure that no foreign materials are lodged between the probe and the reference electrode or tank wall.

c. **Inspection of Cable and Connectors**

- Inspect all electrical connections and cables for signs of wear or damage. Replace any frayed or exposed cables immediately.
- Check that all connectors are properly tightened and secured.
- Ensure that grounding is properly maintained to avoid electrical interference.

d. **Inspection of Cable and Connectors**

- Monitor the output signal (e.g., 4-20mA) for fluctuations or instability.
- If the signal is unstable, perform a **zero and span check** to verify proper calibration.

Section 8 : Manufacturer Details

SPINK CONTROLS

Office Address : 303, Siddharth Towers,
G.P. pai road, Kopri, Thane (E) - 400603

Plant : Gala No.F-4, A- Wing, Udyog Bhavan No.-2,
Plot No.K-3, Additional Ambernath Industrial Area,
near Anand Nagar, MIDC., Ambernath, Dist. Thane - 421 506.

Plant 2 : Plot No. : MS 114/115, Ambernath Industiral Area ,
Chikhloli MIDC , Ambernath(W) , Thane :421501

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