



TLC2

Capacitance Type Level Transmitter

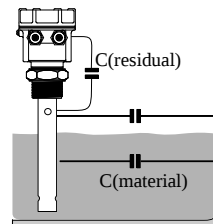
Technical Specification



Product Overview

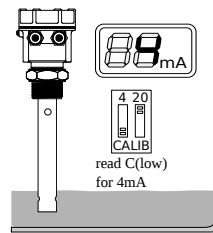
Trumen two wire capacitance type level transmitter model TLC2 is suitable for liquid & solid application like powder, slurry, chemical, edible oil etc. Trumen TLC2 is a fully, partially PTFE & ceramic insulated and used as a robust rod probe and flexible rope probe for level detection.

Operating Principle



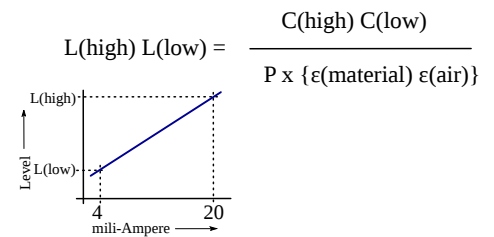
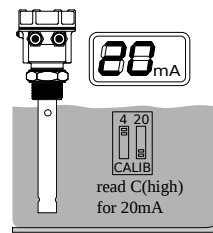
The probe forms a capacitance with the metallic tank-wall. The capacitance is total sum of three capacitance:-
 $C(\text{air}) = \epsilon(\text{air}) \times P \times (H-L)$
 $C(\text{material}) = \epsilon(\text{material}) \times P \times L$
 $C(\text{residual})$ is due to device itself.

Where $\epsilon(\text{air})$ is the dielectric constant of air ≈ 1 .
 $\epsilon(\text{material})$ is dielectric constant of material.
 P is the constant of probe and installation,
 H is the active length of probe and L is the level of material.



Capacitance to level translation is performed with the aid of on-site calibration also called "wet-calibration".

The device stores a low level capacitance as level for 4mA and high level capacitance as level for 20mA as defined by the user. Using these values and following equation

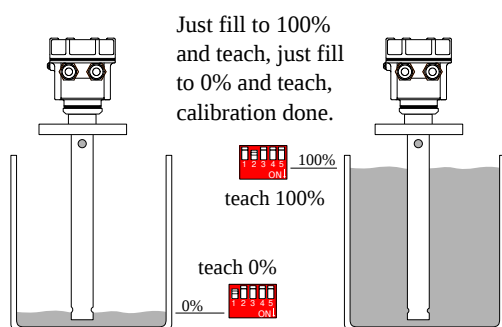


device creates a chart of level to 4-20mA translation.

Applications

- Capacitance level transmitter probe is used in different applications like
 - Oil
 - Water
 - WFI
 - DM/DI water
 - Corrosive liquids
 - Wheat flour
 - Rice paddy
 - Granuels
 - Chemical
 - WTP
 - STP
 - Cement
 - Steel
 - Food & Beverages
 - Diesel

Easy Calibration



Features

- Compact size
- Fast response time
- Compensation against material build-up
- Easy calibration via DIP switch
- Suitable for top mounting
- Fluid Turbulation Stability
- 4-20mA isolated output or 1-5V & 2-10V output
- Ingress protection: IP 67/68 (as per IS/IEC 60529:2001)
- Process temperature max 300°C
- Process pressure max. 20 bar
- Threaded / Flanged / customized process connections
- Rigid rod / flexible rope probe version
- Remote electronics with as standard 2 meters cable length

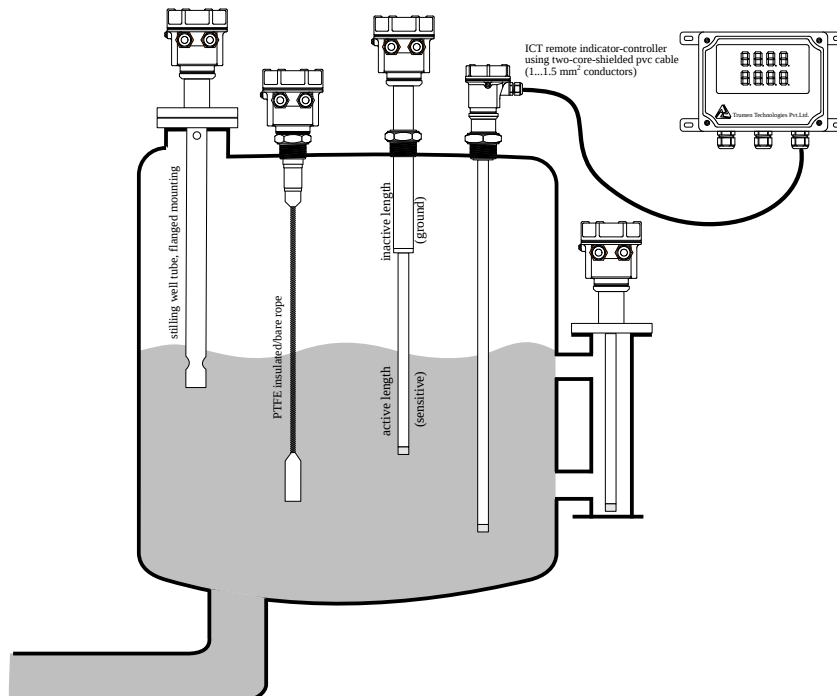
TLC2: Capacitance Type Level Transmitter

Performance Specifications

Parameter	Description
General	
Min. Dielectric Constant	1.8 (non-hygroscopic)
Maximum measured error	Max. ± 1 mm (at reference operating conditions)
Repeatability	1 mm
Accuracy	$\pm 1\%$
Hysteresis	Approx. 2 mm
Influence of medium temperature	Max +2 to -3 mm (-20 to +150 °C)
Influence of medium pressure	Max 0 to -3 mm (-1 to 20 bar)
ICT to TLC cable	Shielded 2 Core PVC cable with 1 to 1.5 mm ² conductors cross section
Process	
Ambient Temperature	-20°C ... 70°C (-4°F ... 158 °F)
Process Temperature	-20°C ... 100°C (-4°F ... 212 °F)
Extended Process Temperature	PTFE Insulation: -30°C ... 250°C (-22 °F ... 482 °F), *Ceramic Insulation: -30°C ... 300°C (-22°F ... 572°F), (extensions & heat sinks required) (*Note- Ceramic part insulation probe suitable for non-conductive or low dielectric material only)
Process Pressure	absolute / max. 20 bar (for ceramic insulation : 1 atm)
Physical Specifications	
Wetted Parts	SS 304, SS 316, SS 316L, PTFE, Part Ceramic
Process Connections	NPT / BSP 1", 1-1/4", 1-1/2", 2" & TC 1-1/2", 2" & Flanged ANSI / JIS / DIN / ASA / custom
Probe Insertion Length	Rigid Rod Probe: 50mm to 3,000mm, Flexible Rope Probe: 100mm to 20,000mm
Approvals & Certifications	
ISO Certification	ISO 9001:2015
CE Certification	All product comply as per directives 2014/35/EU Low Voltage Directive & 2014/30/EU Electromagnetic Compatibility Directive
RoHS Certification	RoHS Compliance as per RoHS Directive (2011/65/EU); Certificate No. RoHS-TTPL-2021-0305
Ingress Protection	IP67/68 as per IS/IEC 60529:2001
Ex-proof (Ex d T6 IIC)	Flameproof as per IS/IEC 60079-1:2014, Ingress Protection (IP-67) as per IS/IEC 60529:2001 Suitable for Gas Group: IIC, Suitable for Zone 1 & 2 atmospheres and Dust hazardous area Zone 21 & 22
Ex-ia Approval	Intrinsically safe according to the requirement of IS/IEC 60079-0:2011, IS/IEC 60079-11:2006 & IS/IEC 60529: 2001
EMC Certification	EMC Certified as per Standard IEC 61000-4-3, IEC 61000-4-2, IEC 61000-4-6, IEC 61000-4-29, IEC 61000-4-4, IEC 61000-4-5, CISPR 11
Vibration Test Certificate	Vibration complied as per IEC 60068 part 2-6 sinusoidal, 10-55Hz, 0.15mm

Specifications are subject to change without prior notice

Typical Installation



TLC2: Capacitance Type Level Transmitter

Performance Specifications

Parameter	Description	Electrical Connection
Electrical		
EIL Supply Output Loop Resistance	Integral Electronics Two-wire Loop Powered 15-60 VDC 4-20mA Loop powered / 1-5V DC / 2-10V DC Error output 21mA Maximum 500 Ohm @ 24VDC supply	
EIM Supply Interface/Output	Integral Electronics Three/Four wire (negative common) 10-30 VDC ModBus-RTU / complementary 0-5V output suitable for >20K Ohm Calibration/configuration available through ModBus as well as without using DIP switches	
EIV Supply Output	Integral Electronics three wire system 15-60 VDC 0-10V/2-10V/0-5V/1-5V field selectable outputs	
EIR	Blind Integral Electronics suitable for Trumen ICT series Remote Indicator-Controller-re-Transmitter units using ordinary 2-core shielded inter-connection cable with 1...1.5 sq mm conductors	
TLC2 Capacitance Level Transmitter with Remote Indicator Controller Model-ICT		
Specifications	ICT provides numerical LED indicator, control logic with relay outputs and re-transmission over galvanically isolated 4-20mA output & 24VDC Transmitter power supply	<p>For AC supply connection</p>
Power Supply	SA : 80-260VAC, 50/60Hz for AC version SD : 18 to 32VDC for DC version	
RSx Relay Rating	SPDT 5A each @ 24VDC or 220VAC (3 SPDT relays in IP65, max 6 SPDT relays in IP40 metal sheet enclosure)	
RKx Relay Rating	Contactors with 2NO/2NC rated at (1, 2 or 3 contactors, only in IP40 metal sheet enclosure)	
Transmitter Power Supply	Isolated loop supply 24V +/- 4V Suitable for maximum 25mA load for transmitter	<p>For DC supply connection</p>
Re-Transmission	4-20mA, Error@21mA, galvanically isolated loop powered section for use with either integrated ICT Isolated Loop Supply or any external DC supply within range 16 to 50VDC	

*Note:- If 4 relay required 4-20mA O/P not available

Ordering Information

TLC **Hxx** - **Tx** - **Rx** - **Sx** - **Ix** - **Gx** - **Wx** - **Px** - **Cx** - **Exxx** - **Lxxxx**

Enclosure

HAN: Aluminum Non-Hazardous IP-67/68
HAX: Aluminum Flameproof Iia, Iib and Iic
HSN: Stainless steel
HES: Specially designed as per customer requirement

Material Temperature

T1: max 80°C
T2: max 200°C
T3: max 250°C
T4: max 300°C
TS: Customer Specified Special designed

Sensor rigid / flexible type

RD1: Single Rigid Rod Probe
RD2: 2 in 1 Rod Probe
RP1: Single Flexible Rope Probe for Solids (6/12mm)
RP2: 2 in 1 Rope Probe
RL1: Single Flexible Rope Probe for Liquids (5mm)
RL2: 2 in 1 Rope
RS: Specially designed probe

Sensing Surface Material

S4: SS 304
S6: SS 316
SL: SS 316L
SS: Special Surface

Insulation type

I0: None
IP: Partly PTFE insulated
IT: Full PTFE insulated
IC: Partly ceramic insulated

Inactive Length or Sensor

Extension Material
G0: None
G4: SS 304
G6: SS 316
GL: SS 316L
GS: Special material

Insertion Length

Rigid Rod Probe:
 50mm to 3,000mm
Flexible Rope Probe:
 100mm to 20,000mm

Electronics (Refer page 3 for detail description)

EIL: 4-20mA Loop powered O/P
EIV: 0-10V/2-10V/0-5V/1-5V O/P
EIM: ModBus-RTU O/P
EIR: Integral Electronics with ICT

Process Connection Material

C4: SS 304
C6: SS 316
CL: SS 316L
CS: Special Material

Process Connection Type

PB1: 1" BSP
PB2: 1-1/2" BSP
PB3: 3/4" BSP
PB4: 1-1/4" BSP
PB5: 2" BSP
PB6: 1/2" BSP
PN1: 1" NPT
PN2: 1-1/2" NPT
PN3: 3/4" NPT
PN4: 1-1/4" NPT
PN5: 2" NPT
PN6: 1/2" NPT
PT1: 1-1/2" Triclover/Triclamp
PT2: 2" Triclover/Triclamp
PFL: Flanged Type (Fxxx)
F001: 1/2" B16.5 ANSI/ASA 150#RF
F002: 3/4" B16.5 ANSI/ASA 150#RF
F003: 1" B16.5 ANSI/ASA 150#RF
F004: 1-1/4" B16.5 ANSI/ASA 150#RF
F005: 1-1/2" B16.5 ANSI/ASA 150#RF
F006: 2" B16.5 ANSI/ASA 150#RF
F007: 2-1/2" B16.5 ANSI/ASA 150#RF
F008: 3" B16.5 ANSI/ASA 150#RF
F009: 4" B16.5 ANSI/ASA 150#RF
F010: 5" B16.5 ANSI/ASA 150#RF
F011: 6" B16.5 ANSI/ASA 150#RF
PCS: Special Process Connection

Stilling Well Material

W0: None
W4: SS 304
W6: SS 316
WL: SS 316L
WS: Special material