

# FCI Aerospace Division

## Liquid Level Transmitter Series: Model AS-LLT

### Aerospace and Military Applications



### FCI'S Thermal Dispersion Technology (TDT) Advantage

FCI has established an unmatched record of superior performance and reliability in the toughest applications. FCI's unique Thermal Dispersion Technology (TDT) provides exceptional reliability and repeatability for measuring liquid level/ interface elevation in reservoirs, vessels and tanks. The typical continuous level sensing element contains two linear Resistance Temperature Detector arrays (Balco RTDs) protected by a rugged stilling well. When the liquid level element is installed in the process, the reference RTD measures the temperature of the surrounding fluid, while the active RTD is heated by an adjacent heater to a higher temperature than the fluid. The temperature difference between the two RTDs is related to the depth of the RTD immersion in the process medium. Deeper immersion causes proportionally increased cooling of the heated RTD and a reduction of the temperature difference between it and the reference RTD. Less fluid immersion causes proportionally less cooling of the heated RTD and an increase in the temperature difference between it and the reference RTD.

A microprocessor-based electronic control circuit supplies heater current to the heated RTD and converts the RTD temperature difference into a linear voltage or milliamp signal output that is directly proportional to the immersion depth of the level element into the process liquid. A process temperature output signal can also be provided. These electronics are equipped with built in test features that assure continual accurate performance of the liquid level sensor.

### FCI Liquid Level Transmitter Applications

- » Potable Water
- » Fuel
- » Hydraulic Fluid
- » Refrigerant
- » Liquid Oxygen or Hydrogen

### FCI Liquid Level Transmitters

FCI provides liquid level transmitters for military/aerospace applications with a unique set of performance features unavailable in other liquid level sensing instrumentation. FCI's thermal mass liquid level transmitters measure liquid level directly and do not require the pressure and temperature corrections necessary with other liquid level measurement methods. The liquid level transmitter system typically consists of a liquid level element that is inserted into the customer's process and a control unit that is mounted remotely. Integrally mounted electronics are available as an option. The wetted portion of the liquid level element may be hermetically sealed and made of Stainless Steel parts joined by gas tungsten arc weld or nickel braze; or optional titanium or alloy construction, or the element may be constructed of plastics compatible with the liquid to be measured. The liquid level element construction provides excellent corrosion resistance that can withstand up to 2000 psig in vessel pressure. The liquid level element is available with either a flanged or threaded mounting to connect with the process vessels. Electrical connection is made with pigtail flying leads, or a variety of commercial or military connectors. The measurement depth may be up to 40" or greater and is specified by the customer.

The electronics are mounted in an environmentally sealed enclosure with a gasket sealing the cover. Power input is 22-29VDC per MIL-STD-704. The electronics provide a constant power to the active RTD and heater. The temperature difference between the active and reference RTDs ( $\Delta T$ ) is proportional to the liquid level. The relationship between the  $\Delta T$  and the liquid level is processed by the electronics and converted to a 0-5 VDC or 4-20 milliamp output. Special (nonlinear) analog outputs are also available. Because the  $\Delta T$  is directly related to liquid level, FCI liquid level transmitters provide remarkably linear outputs, with repeatability of  $\pm 1\%$  full scale and accuracy of  $\pm 2\%$  full scale. Each liquid level transmitter is factory calibrated at FCI's on-site calibration laboratory to provide the greatest accuracy for the customer's services. FCI's design team is available to assure that the liquid level transmitter is effectively applied to the customer's service requirement.

### FCI's Liquid Level Element Features

- » No moving Parts
- » High Reliability
- » Light Weight, Rugged Construction
- » Continuous Liquid Level Sensing
- » Linear Level Voltage or Current Output
- » Process Temperature Output
- » Simple Installation
- » Durable Sensor Solution
- » Real time Temperature Compensation
- » Maintenance Free

Visit FCI Aerospace Division on the Web: [www.fluidcomponents.com](http://www.fluidcomponents.com)

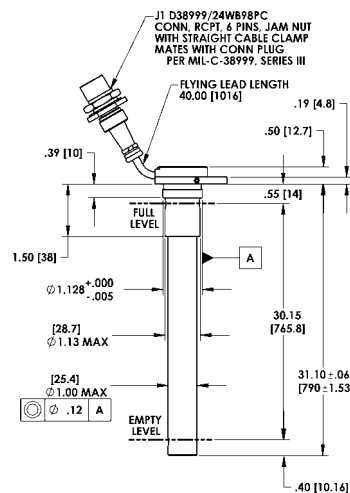
1755 La Costa Meadows Drive, San Marcos, California 92069 USA Phone 760-744-6950 800-854-1993 Fax 760-736-6250  
European Office: Persephonestraat 3-01 5047 TT Tilburg The Netherlands Phone 31-13-5159989 Fax 31-13-5799036

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## Liquid Level Transmitter Series: Model AS-LLT

### Specifications

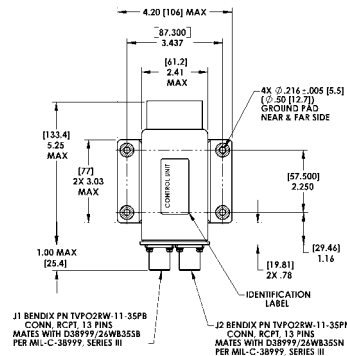
- Service:** Continuous liquid level measurement.
- Material:** Level Element: 316 Stainless Steel mounting connection with PVC stilling well structure and Kapton polyimide RTD elements. All 316 Stainless Steel Liquid Level Element with brazed or all welded construction optionally available.
- Control Unit Enclosure:** Aluminum Alloy painted lusterless black per MIL-C-83286. Integral control unit enclosure optionally available.
- Electrical Connection:** Liquid Level Element: Connector on flying lead or element-mounted connector optionally available.  
Control Unit Enclosure: Connector.
- Process Connection:** Mounting flange available per customer requirement or threaded connection optionally available.
- Sensing Level Depth:** Up to 40" + as specified by customer.
- Signal Output:** 0.5 to 4.5 VDC (0% to 100% immersion)  
0.25VDC, 4.75 VDC Built in Test (error conditions);  
0-20 milliamp, 600 ohm impedance optionally available.
- Power Input:** 28VDC nominal per MIL-STD-704.
- Liquid Level Elements per System:** Up to three (3) elements may be connected to one (1) controller.
- Weight:** Level Sensor: 1.0 to 2.0 lb., depending on length.  
Remote Control Unit Enclosure: 1.5 lb.
- Proof Pressure:** Up to 300 psig for PVC stilling well and Kapton polyimide RTD design option of Level sensor. Up to 2000 psig as required by application, with all welded 316 Stainless Steel construction.
- Operating Temperature:** Liquid Level Element: -65 to +158°F (PVC/Kapton Polyimide Design), -65 to 650°F (316 Stainless Steel Design); Control Unit: -40 to 131°F
- Calibration:** Output calibrated to customer specified range in actual process media.
- Accuracy:** Liquid Level: ± 2% full scale  
Temperature: ± 1% full scale
- Repeatability:** Liquid Level: ± 1% full scale  
Temperature: ± 1% full scale
- Typical Time Response Constants:**  
Dry to Wet: 5 seconds  
Wet to Dry: 120 seconds
- Options:** All welded 316 SS construction  
Integral Control Electronics  
Threaded connections  
Calibration and/or material certificate.
- Qualifications:** MIL-STD-810 and RTCA/DO-160
- Qualify Systems Approval:** ISO 9001, AS 9000



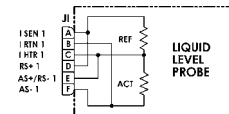
LIQUID LEVEL PROBE

CONTROL UNIT, LIQUID LEVEL		J1
+28 VDC (-)		1
V OUT 1		2
V OUT 3		3
+28 VDC (+)		4
V OUT 2		5
CHASSIS GND		6
V OUT (-)		7
RS+ 1		8
AS+/RS- 1		9
AS- 1		10
RS+ 2		11
AS+/RS- 2		12
AS- 2		13
		J2
I RTN 1		1
I RTN 3		2
I HTR 1		3
I SEN 2		4
SPARE		5
I RTN 2		6
I HTR 3		7
I SEN 3		8
I HTR 1		9
I SEN 1		10
RS+ 3		11
AS+/RS- 3		12
AS- 3		13

CONNECTOR PIN-OUT



LIQUID LEVEL CONTROL UNIT



WIRING DIAGRAM



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