



## T21 Thermal Differential Detector for Detection of Level and Flow

Form 1021

### The Model T21 Point Level Detector

uses a thermal differential technique to measure liquid flow, level or interface by sensing changes in the thermal heat transfer characteristics of the media where it is located. The sensor consists of a pair of matched Resistance Temperature Detectors (RTDs) encased in twin 316 series stainless steel tubes. One RTD is self heated using a constant DC current. The other sensor is unheated and provides an accurate ambient process temperature reference. The thermal differential created between the heated and reference RTD pair is a function only of the media with which the sensor is in contact. The differential is greatest when no liquid is present (dry condition) and decreases as liquid quenches the detector sensors (wet condition).



Hydrocarbons generally have lower heat transfer characteristics than aqueous-based materials so liquid-liquid interface detection is possible. In general, any two media will exhibit some difference in heat transfer characteristics. Thus, this detector can be calibrated to detect the interface between two immiscible liquids. Solid state electronics transform the temperature differential into a voltage that is compared to a control voltage to actuate a relay and indicate a change in state (wet vs. dry). The instrument head at the top of the unit contains the detector electronics board which is easily removed from the instrument head so that field wiring can be connected to the field terminal block.

### Applications



#### Low-Flow Alarm Detecting

Steel processors use water to cool bearings on the rollers of their continuous casting machines. If the casting machine loses water flow, the bearings will fail. Alarms are required to notify casting machine operators of this crucial loss of flow condition. The T21 flow detector is installed in each cooling water line to ensure this critical low-flow alarm.

The T21 can be used to monitor lube oil on bearings and gears in rolling mills; and since a single gear costs several hundred thousand dollars, its protection is vital to the operation of the plant.

The T21 can also monitor the flow of cooling water on pump seals in steel plants and furnaces.



### Low-Flow Monitoring

In food processing plants, there is a need to blend different ingredients. If one of the blending lines becomes clogged, the final product can be ruined due to improper blend balance. The T21 is perfect for this low-flow application. It monitors the flow and shuts down the blending system if an improper blending mix is about to occur. The highly reliable T21 has no moving parts and can be steam cleaned.



### Waste Gas Burn-Flow Monitoring

Remote pumping stations are often used in gas pipeline applications. In upset conditions, relief valves will open and the pumping station will produce waste gas as part of the pumping/compression operation. Waste gas is burned by the use of an auto-ignition flare. The EPA requires an alarm to sound if the flare does not ignite when gas flow is present. The T21 is directly mounted in the line to the flare, and determines when flow is present to provide the indication for the required alarm.



### Vapor Recovery

#### Hose Hook-Up Verification

The T21 flow/level detector has the ideal features required to monitor vapor control in rugged environments. Mounted in the hard piping of the vapor recovery system, this detector detects the flow of vapors from the truck as loading begins. If the vapor hose connects properly, loading is allowed to continue. If the vapor hose does not properly connect, no flow is detected by the T21 and the loading process aborts. Finding reliable technology with low-flow sensitivity and fast response is critical for accurate monitoring of industrial emissions.



### Monitoring Product Flow through Heat Exchangers

The T21 flow detector can be utilized to protect heat exchangers in much the same way they are incorporated into pump systems. By monitoring the flow of product and actuating shut-off circuitry at a specified low-flow (or no-flow) point, the instruments can effectively prevent equipment and product damage caused by overheating.

### Features and Benefits

- Wide operating process temperature range of -100 to 392°F
- Removable, plug-in electronics board
- Free of all moving parts that can stick, coat or fail
- Self-heating sensor design
- Application flexibility
- Simplifies wiring
- High reliability
- Improves response time and sensor durability

### Agency Approval

Agency	Approval
CSA	Class I, Groups B, C, & D; Class II, Groups E, F, & G; Class III; Divisions 1 & 2



### Product Specifications

Input Power	24 volt, 50/60 Hz 24 VDC (nominal)
Output Type	5A DPDT @ 24 volt
Humidity	99% Non-condensing
Accuracy	+0.5% of set point - 50°F range
Set Point Range (Flow)	Gases 0.5 to 500 feet/second Liquids (Increasing) 0.01 to 5 feet/second (Decreasing) 0.01 to 2.5 feet/second
Repeatability	±1.0% of set point
Response Time	0.5 to 10 seconds
Sensor Length	2 inches to 120 inches*
Enclosure Environmental Rating	NEMA 4
Conduit Connection	3/4" NPT(F)
Stability	Temperature compensated over entire range
Ambient Temperature Range	-40 to 140°F (-40 to 60°C)
Process Temperature Range	-100 to 392°F (-70 to 200°C)
Process Pressure Range	Vacuum to 3000 psig

\*Sensor lengths longer than 10", please consult the factory.

*Design and specifications are subject to change without notice. For latest revision, see [www.sorinc.net](http://www.sorinc.net).*

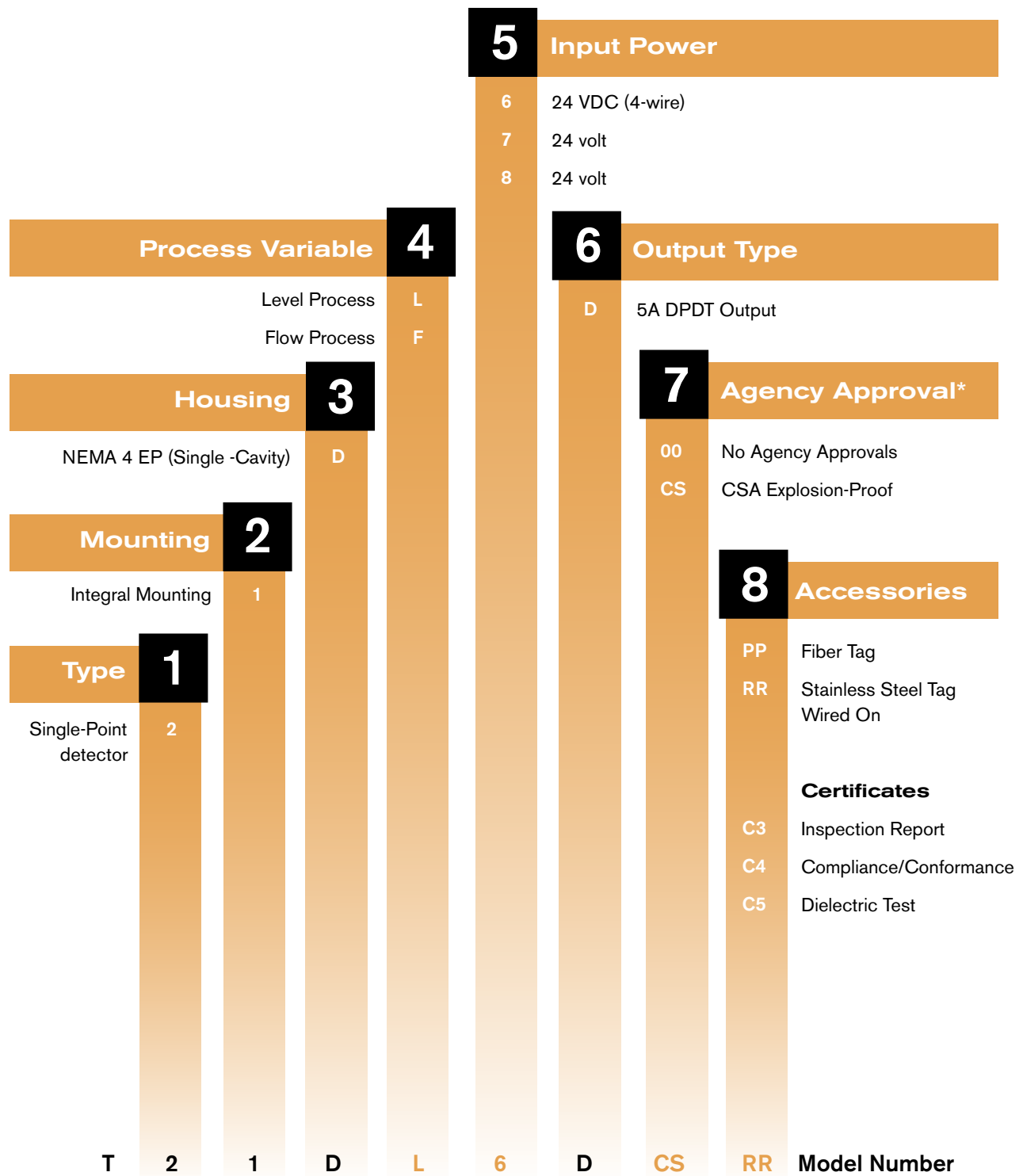
# T21 Thermal Differential Detector

How to Order

## Model Number System

### T21 - DL6D-CS-RR

T21 thermal differential single point detector, integral mounting, NEMA 4 EP (single cavity) housing measuring overall liquid level, 24 VDC (4-wire) input power, 5-amp DPDT output, CSA explosion-proof, stainless steel tag wired to housing.



\*Match sensor approvals to electronics approvals to maintain the agency listing integrity.

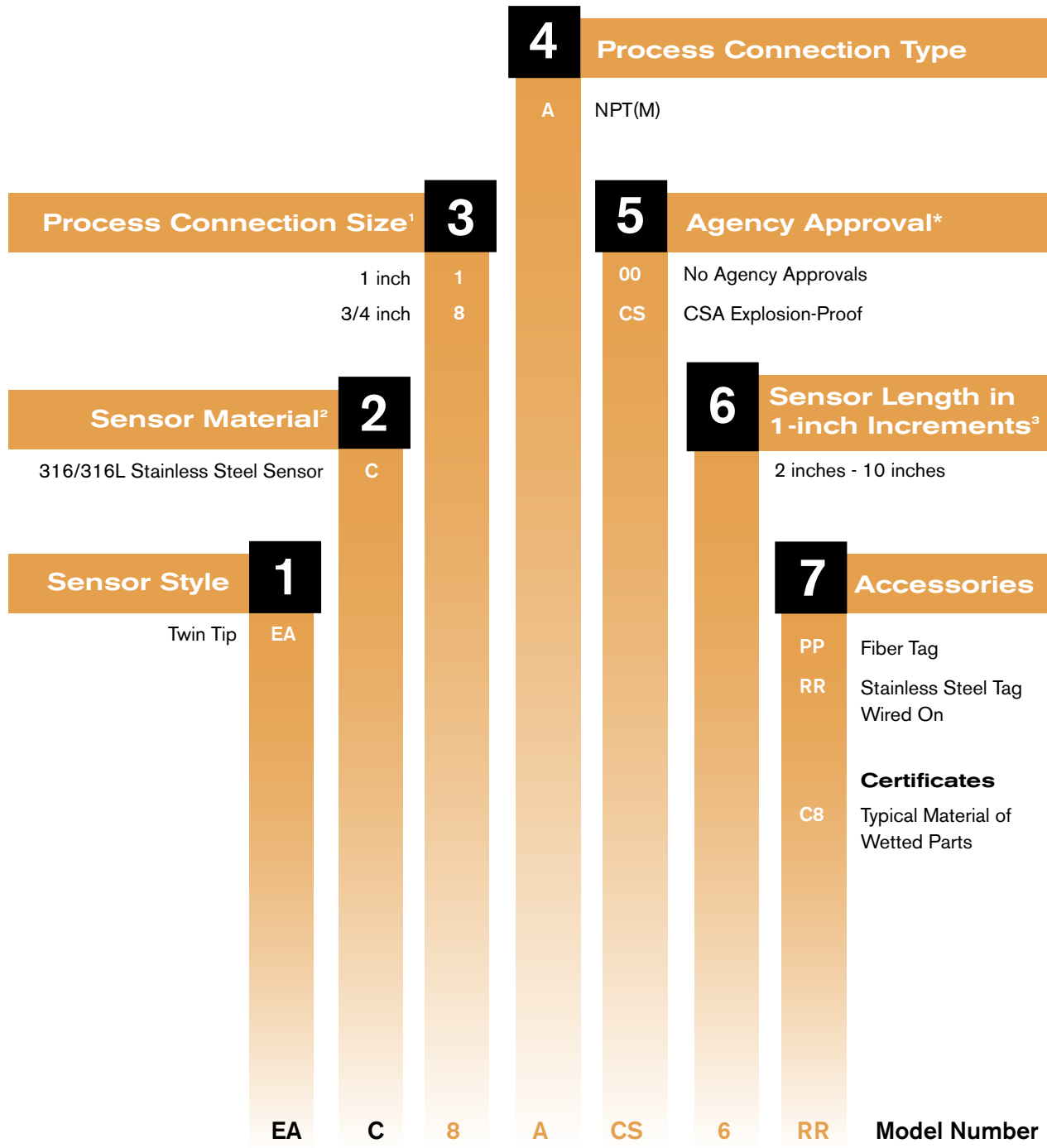
# T21 Thermal Differential Detector

How to Order

## Model Number System

### EAC-8A-CS-6-RR

Twin tip, 316/316LSS sensor, 3/4 inch NPT(M) process connection, 6 inches in length, stainless steel tag wired to sensor.



\*Match sensor approvals to electronics approvals to maintain the agency listing integrity.

<sup>1</sup>Other process connections are available. Consult the factory.

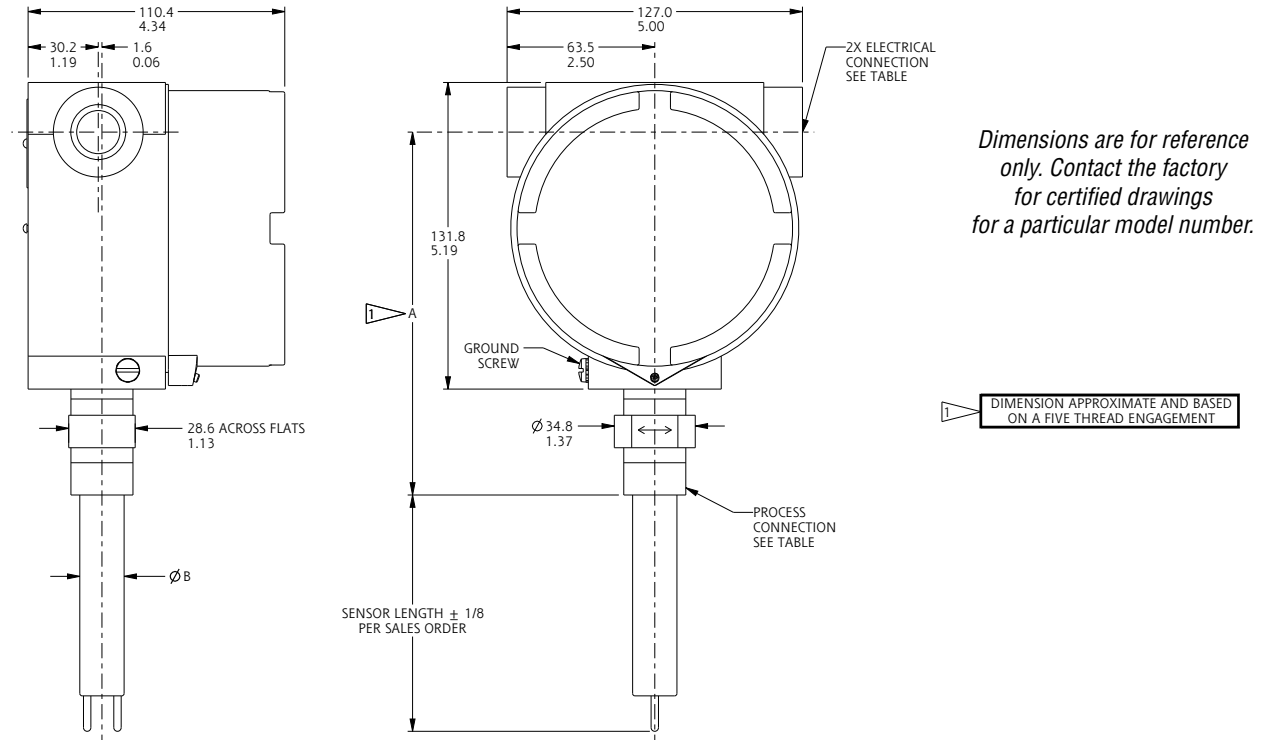
<sup>2</sup>Other materials are available. Consult the factory.

<sup>3</sup>Longer lengths are available. Consult the factory.

# T21 Thermal Differential Detector

## Dimensions

Dimensions in this catalog are for reference only. They may be changed without notice. Contact the factory for certified drawings for a particular model number. Dimensions in this catalog are expressed as millimeters over inches. (Linear = mm/in.)



\* Dimension is approximate and is based on a five-thread engagement.

**Drawing 0390596**



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