

# SSI Technologies - Application Note DT-AN7

## Digital Fluid-Trac™ (DFT-210) – Multi-Unit Drum Gauge With 4-20 mA Electrical Output, 3/4" NPS



### Product Description

Digital Fluid-Trac™ Model DFT-210 multi unit drum gauge is a cost competitive non-contact liquid level drum gauge with 4-20 mA output. The output has 2.5% accuracy over its output range.

The DFT-210 drum gauge was designed for usage on standard ANSI MH2-2004 vertical drums (32 inch depths). The DFT-210 drum gauge allows the user to easily select between the following vertical drum settings:

- 15 gallon
- 30 gallon
- 55 gallon
- 57 liter
- 114 liter
- 208 liter

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### Product Features

- **Multiple Selectable Units:** 15, 30, 55 gallons or 57, 114, 208 liters
- **Display Resolution:** +/- 0.5 gallon or +/- 1 liter\*
- **4-20 mA output accuracy:** +/-2.5% of current output span\*
- **Two Modes of Level Measurement:**
  - **External 24 Vdc Supply** - Continuous level monitoring display and 4-20mA current output
  - **Stand Alone 2 9-Volt batteries** - Point level monitoring display
- **NEMA 4 Packaging**
- **Low Level Warning Light:** A red LED will flash once every second when the volume is at 10% or below the maximum volume.
- **Easy to install:** Digital Fluid-Trac™ DFT-210 has no components to protrude into the drum.
- **Standard:** Fits 3/4" NPS opening
- **Dead band:** 6" measured from top of barrel
- **More Reliable:** No components to chemically corrode inside liquid media.
- **Chemical compatibility:** Digital Fluid-Trac™ DFT-210 drum gauge works with a wide variety of media such as water, waste water, motor oil, hydraulic fluid and diesel fuel.
  - \* Outside of stated dead band.

The Digital Fluid-Trac™ DFT-210 drum level gauge is NOT intended for use with gasoline.

SSI can customize the drum level gauge for other sizes for large volume OEM orders.

**Contact SSI Technologies at (608) 758-1500.**

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Revision 1



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### Measurement Technology

The Digital Fluid-Trac™ DFT-210 drum level gauge uses ultrasonic technology to generate a high-frequency sound wave and measures the time for the echo to reflect off the target fluid's surface and return. The distance from the Digital Fluid-Trac's sensor to the liquid is calculated based on the speed of sound.

The Digital Fluid-Trac™ DFT-210 has a LCD which displays the liquid level pictorially as well as in gallon (or liter) units.

When externally powered by 24Vdc, the DFT- 210 will continuously monitor the drum's liquid level and report the level readings in two forms – LCD digital display and 4-20 mA current output. The 4-20 mA electrical output can be used to interface to external controllers and test equipment.

When powered only by two 9-volt batteries, the DFT-210 will continuously monitor the liquid level after the Reset/Select button is depressed for 7 seconds. After 7 seconds, the DFT-210 will display that point level reading for 5 minutes. After 5 minutes, the battery power saver mode will shut the unit off.

*Note: The 4-20mA output does not function when the unit is operating on the 9V batteries.*

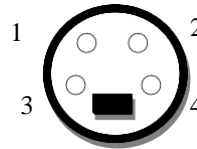
*Note: The Reset/Select button has to be depressed again to come out of the battery power saver mode.*

A low level warning light (red LED located on the bottom left of the LCD display), will flash once every second when the liquid level is <= 10% the maximum volume.

### Electrical Interface

The Digital Fluid-Trac™ DFT-210 drum gauge can be powered by either 24 Vdc external power supply or by 2 9-Volt batteries.

The 4-20 mA electrical output can be interfaced to external controllers and test equipment. Refer to the figure and table below for harness connections.



**Figure 1 DFT-210 Connector**

Pin Number	Harness Color	Interface Signal
1	White	DC Power (18-26 Vdc)
2	Black	Ground
3	Blue	No Connection
4	Brown	4-20 mA Output

**Table 1 DFT-210 Interface Harness**



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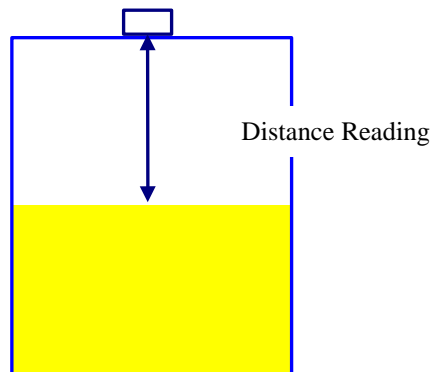
## Digital Fluid-Trac™ (DFT-210) – Multi-Unit Drum Gauge

### With 4-20 mA Electrical Output, 3/4" NPS

#### Mounting

Digital Fluid-Trac™ DFT-210 works well on ANSI MH2 standard drums as it mates on top with standardized 3/4" bunghole.

When using the Digital Fluid-Trac™, it is important to keep the mounting perpendicular to the liquid level by storing the drums in an upright position.



#### Displaying the DFT-210 Setting

- a) **Press and hold the Refresh/Select button down for 7 seconds.** The drum size will be displayed. And the selected units (Liter or Gallon) will be flashing.
- b) **Release the Refresh/Select button** and the unit will automatically go back into test mode (indicated by 8.8.8) in 20 seconds.

#### Selecting the Display Units

The Digital Fluid-Trac™ DFT-210 multi-unit drum gauge can be set to display the level reading in one of six different configurations - gallons (15, 30, 55) or liters (57, 114, 208).

- b) **Enter the Select Mode:** Press and hold the Refresh/Select button down for 7 seconds to enter the Select Mode. The unit will display Liter and Gallon. One of the units will be flashing.

*Note: If you release the button too soon, the DFT-210 will be in test mode.*

- c) **Switch the Desired Units:** Press and release the Refresh/Select button to switch between the units.
- d) **Select the Desired Units:** When the units (Liter or Gallon) desired is flashing, press and hold the Refresh/Select button for 7 seconds to select the units. The units will stop flashing and the drum size will start flashing.
- e) **Switch the Desired Drum Size:** Press and release the Refresh/Select button to switch between the drum sizes.
- f) **Select the Desired Drum Size:** When the drum size desired is flashing, press and hold the Refresh/Select button for 7 seconds to select the drum size. The drum size will stop flashing.
- g) **Return to Test Mode:** Press and hold the button until 8.8.8. is displayed – this indicates test mode.

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## Digital Fluid-Trac™ (DFT-210) – Multi-Unit Drum Gauge

### With 4-20 mA Electrical Output, 3/4" NPS

#### DFT-210 Operation with External Supply

When the DFT-210 is powered by an external 24 Vdc power supply, the display and 4-20 mA output are operational.

At power on, the back-light is illuminated and 8.8.8. is displayed for 4 seconds to indicate the unit is in test mode. The unit will continuously monitors the media in the vertical drum until the 24 Vdc supply is turned off.

A low level warning light (red LED located on the bottom left of the LCD display), will flash once every second when the liquid level is  $\leq$  10% the maximum volume.

*Note: It is recommended to leave batteries out of the unit when powering with a 24 Vdc supply.*

If batteries are installed and the external supply shuts off – the unit will go into battery operation mode. The unit will display the last liquid level reading with no valid 4-20 mA output. After 5 minutes, the battery saver mode will turn the DFT-210 off. The Refresh/Select button must be depressed again to get out of battery saver mode.

Current to Volume Conversion Formulas

Drum Setting	Current Conversion
55 gallon	Gallons = 3.4375 x (Current – 4)
30 gallon	Gallons = 1.875 x (Current – 4)
15 gallon	Gallons = 0.9375 x (Current – 4)

#### DFT-210 Operation with 9 Volt Batteries

When the DFT-210 is powered by the 9 Volt batteries, only the display is operational (no 4-20mA output).

- a) After you have selected the proper units and drum size for your application, **Press and release the Refresh/Select button.**
- b) The DFT-210's back-light is illuminated and 8.8.8. is displayed for 4 seconds to indicate the unit is in **test mode.**
- c) The DFT-210 continuously monitors the media in the vertical drum for 7 seconds and then displays this liquid level.
- d) **Battery Saver Mode:** 20 seconds after the button was pressed, the back-light is shut off. The static liquid level reading will be displayed for 5 minutes before the unit turns off.

*Note: This liquid level displayed is a static value. You must depress the Refresh/Select button to update the liquid level reading.*

- e) A **low level warning light** (red LED located on the bottom left of the LCD display), will flash once every second when the liquid level is  $\leq$  10% the *maximum volume.*

*Note: This warning light does not operate once the unit has powered down in battery saver mode.*



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## Digital Fluid-Trac™ (DFT-210) – Multi-Unit Drum Gauge

### With 4-20 mA Electrical Output, 3/4" NPS

#### Electrical Specifications

Resolution (Gallons)**	0.5 gallons
Resolution (Liters)**	1 Liter
Accuracy (Current Output)**	2.5% of current output span
Input Supply Voltage	18 - 26 Vdc
Operating Temperature	0°C to 50°C
Battery Life*	6 months (Alkaline) 1 year (Lithium)
Low Level Warning Activation (Red LED)	<= 10 % Max Volume
Low Battery Level (LoB)	<= 14.2 Volts combined
Continuous Monitoring Mode Update Rate	4 seconds

\* Battery Life will vary dependant on operator's usage. Battery specification is based on two level readings per day.

\*\* Outside of stated dead band

If the battery life is low (voltage is below 14.2 volts combined), "LoB" will continuously flash to notify the user to replace the batteries.

#### Material Specifications

Description	Material
Display housing / threaded adaptor (blue plastic)	PBT (Polybutylene terephthalate), 15% glass filled
Transducer housing (black plastic inside threaded adaptor)	HDPE (High Density Polyethylene)

