

# SSI Technologies - Application Note DT-AN8

## Digital Fluid – Trac™ (DFT-220) – Multi-Unit Drum Gauge

### With 4-20mA Electrical Output, 2" NPT or 3/4" NPS



#### Product Description

Digital Fluid-Trac™ Model DFT-220 multi-unit drum gauge is a cost competitive non-contact liquid level drum gauge with 4-20 mA output. The unit has 2.5% accuracy over its output range.

The DFT-220 drum gauge was designed for usage on standard ANSI MH2-2004 vertical drums ( $\leq 32$  inch depths). The DFT-220 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

#### 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 24Vdc Supply** - Continuous level monitoring display and 4-20mA current output
    - **Stand Alone two 9-Volt batteries** – user initiated 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-220 has no components to protrude into the drum.
  - **Standard:** Fits 2" NPT opening or 3/4" NPS opening
  - **Dead Band:** 6" from top of barrel when using the optional 3/4" adaptor
  - **More Reliable:** No components to chemically corrode inside liquid media.
  - **Chemical compatibility:** Digital Fluid-Trac™ DFT-220 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-220 drum level gauge is NOT intended for use with gasoline or other volatile liquids that produce a vapor pressure under normal operating temperature (0°C - 50°C).

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#### Measurement Technology

The Digital Fluid-Trac™ DFT-220 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-220 has a LCD which displays the liquid level pictorially as well as in gallon (or liter) units.

When externally powered by 24Vdc, the DFT- 200 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 using two 9-volt batteries momentarily depressing the Refresh/Select button will initiate a level measurement. This measurement is then displayed for 5 minutes then the DFT-210 goes into battery power saver mode and shuts off.

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

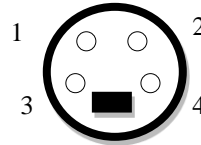
*Note: The Refresh/Select button has to be depressed again to come out of the battery power saver mode.*

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-220 drum gauge can be powered by either 24Vdc 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-220 Connector**

**Table 1 DFT-220 Interface Harness**

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

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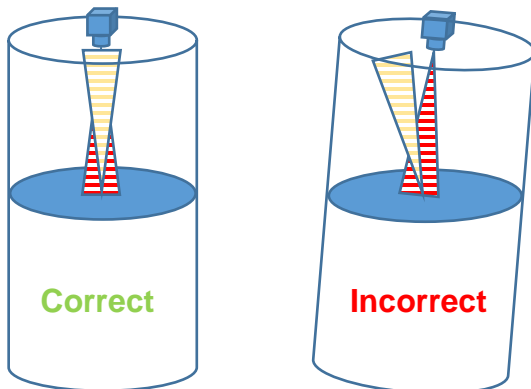
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#### Mounting

Digital Fluid-Trac™ DFT-220 works well on ANSI MH2 standard drums as it mates on top with closed-head standardized 2” bunghole. An optional ¾ inch NPS threaded adaptor is shipped with product.

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-220 Setting

- 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.
- 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-220 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).

- 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-220 will be in test mode.

- Switch the Desired Units:** Press and release the Refresh/Select button to switch between the units.
- 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.
- Switch the Desired Drum Size:** Press and release the Refresh/Select button to switch between the drum sizes.
- 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.
- Return to Test Mode:** Press and hold the button until 8.8.8. is displayed – this indicates test mode.

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#### DFT-220 Operation with External Supply

When the DFT-220 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 units will continuously monitor 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-220 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-220 Operation with 9 Volt Batteries

When the DFT-220 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-220'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-220 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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#### Electrical Specifications

Resolution (Gallons) **	0.5 gallons
Resolution (Liters) **	1 Liter
Accuracy (Current Output) **	2.5% of current output span
Input Supply Voltage	18Vdc - 26Vdc
Total Current Draw	Minimum = 60mA Maximum = 100mA
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 dependent 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)

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