

SSI Technologies - Application Note DT-AN8

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

With 4-20mA Electrical Output, 2" NPT or ¾" 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 (≤ 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 ¾" NPS opening
 - **Dead Band:** 6" from top of barrel when using the optional ¾" 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 $\leq 10\%$ 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.

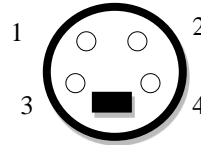


Figure 1 DFT-220 Connector

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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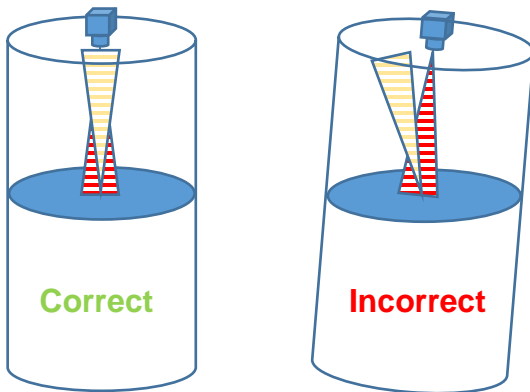
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Mounting

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 = $3.4375 \times (\text{Current} - 4)$
30 gallon	Gallons = $1.875 \times (\text{Current} - 4)$
15 gallon	Gallons = $0.9375 \times (\text{Current} - 4)$

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).

- After you have selected the proper units and drum size for your application, **Press and release the Refresh/Select button.**
- 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**.
- The DFT-220 continuously monitors the media in the vertical drum for 7 seconds and then displays this liquid level.
- 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.

- 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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