

# HEATEC TEC-NOTE

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## Resetting Siemens Pressure Transmitters Used on Heatec Fuel Tanks

This document provides information on resetting Siemens pressure transmitters used on Heatec fuel tanks (**Figure 1**). It applies to Siemens Sitrans P, Series DSIII transmitters (**Figure 2**). The transmitters indicate the *level* of fuel in the tanks. This document also provides information on determining the volume of fuel in tanks and allowing for expansion.

This document is furnished with all Heatec fuel tanks equipped with the Siemens transmitters. Siemens User's Manual UMSITRPDS3-1 is also furnished.

The information in these two documents should enable users of Heatec tanks to reset the transmitters in the field. Although the transmitters are preset at the Heatec factory before the tanks are shipped, users may need to change their settings for different fuels.

### NOTICE

This document supplements the Siemens manual and should always be used along with the Siemens manual. Be sure to read all appropriate warnings and precautions in the Siemens manual before doing any work on Siemens transmitters. The following statement appears in the front of the Siemens manual and should be followed:



Figure 1. Heatec fuel tank.



Figure 2. Siemens Pressure Transmitter Sitrans P.



Figure 3. Display on transmitter.

## Qualified Persons

The described equipment should be installed, configured, operated, and serviced only by qualified persons thoroughly familiar with this User’s Manual. A copy of this manual accompanies the equipment. The current version of the manual, in Portable Document Format (PDF), can be downloaded from [www.sea.siemens.com/ia/](http://www.sea.siemens.com/ia/).

## FACTORY SETTINGS

Each transmitter is normally set at Heatec to display fuel level in *feet* (**Figure 3**). This setting *cannot* be changed in the field by plant personnel.

However, the *specific gravity* of fuel can be changed in the field by plant personnel.

Heatec normally sets the transmitter for a specific gravity of 0.880 before the tank is shipped. This is the specific gravity of waste oil. Other fuel oils have somewhat different specific gravities.

If the specific gravity of actual fuel in your tank is higher than 0.88 the *transmitter* will indicate a fuel level that is *higher* than it really is. But if the specific gravity of actual fuel in your tank is lower than 0.88 the *transmitter* will indicate a fuel level that is *lower* than it really is. Incorrect indications can either lead to overflowing the tank when it is being filled or unintentionally running out of fuel.

Specific gravity is the weight of fuel compared to an equal volume of water at the same temperature. Pure water weighs 8.333 pounds per gallon and has a specific gravity of 1.000. Thus, the specific gravity of fuel equals the weight of fuel divided by the weight of water.

## DETERMINING SPECIFIC GRAVITY

If you don’t know the specific gravity of the fuel you use, ask your supplier. If the supplier doesn’t know, its easy to make your own determination. Here’s how:

Fill a container with fuel oil and weigh it. Then fill the same container with water and weigh it. (Both fuel and water should be at approximately the same temperature.) Weigh the container empty and subtract its weight from each of the other two weights. Now, divide the weight of the fuel by the weight of the water. The result is the

specific gravity of your fuel. For better accuracy, use a fairly large container, such as an empty 55-gallon drum.

Example: Suppose that 55 gallons of your fuel weighs 442.3 pounds, whereas 55 gallons of water weighs 458.3 pounds. 442.3 divided by 458.3 equals 0.965, which is the specific gravity of the fuel in this example. (This is the specific gravity of No. 6 fuel oil.)

Commercial fuels	Specific Gravity at 60 degrees F	Transmitter Full Scale Blind Settings (Mode 6)
	0.970	450.1
No. 6 oil	0.965	447.8
	0.960	445.4
	0.955	443.1
	0.950	440.8
No. 5 oil	0.945	438.5
	0.940	436.2
	0.935	433.8
	0.930	431.5
	0.925	429.2
	0.920	426.9
	0.915	424.6
	0.910	422.2
	0.905	419.9
No. 4 oil	0.900	417.6
	0.895	415.3
	0.890	413.0
	0.885	410.6
Waste oil	0.880	408.3
	0.875	406.0
	0.870	403.7
	0.865	401.4
	0.860	399.0
	0.855	396.7
No. 2 oil	0.850	394.4
	0.845	392.1
	0.840	389.8
	0.835	387.4
	0.830	385.1

## RESETTING THE TRANSMITTER

If you have fuel with a specific gravity different from 0.880 you should change the specific gravity setting of the transmitter.

**NOTE:** you cannot directly enter the numerical value for fuel specific gravity when resetting the transmitter. The numbers you actually set on the transmitter are the numbers shown in **Figure 4** for the **Full scale blind setting**.

If you need to change the transmitter setting, compare the specific gravity of *your* fuel with those shown in **Figure 4**. Choose the specific gravity with a value closest to that of *your* fuel. Use the Full Scale Blind Setting shown for that value as the new setting of your transmitter.

The transmitter has a display window (**Figure 3**) and a set of magnetic pushbuttons (**Figure 5**). Use the magnetic pushbuttons on the transmitter to reset the transmitter.

First use pushbutton M to cause Mode 6 to show in the display window. Then use the other two pushbuttons to set the appropriate number from **Figure 4**. Press pushbutton M again to save your settings.

The only configuration parameter that you can use to reset fuel specific gravity is Full scale “blind setting” or Mode 6. *Do not change any other parameter!*

## FUEL LEVELS Vs. GALLONS

As already noted the transmitter indicates fuel levels in feet. You may need to know how many gallons of fuel that various levels represent.

Heatec furnishes a computer printout showing the gallons for every inch of distance from the bottom of the tank. However, the pressure transmitter is set up to indicate levels in feet *above the point where the transmitter is installed*.

The transmitter is installed 1.333 feet (16 inches) above the bottom of the tank. (This distance may vary plus or minus 1/4-inch.) Consequently, the



Figure 5. Magnetic pushbuttons.

Distance above bottom (inches)	Distance above bottom (feet)	Gallons (from bottom)	Transmitter Display (feet)	Gallons above Transmitter
420	35.0	24692	33.667	23751
390	32.5	22928	31.167	21987
360	30.0	21164	28.667	20223
330	27.5	19401	26.167	18460
300	25.0	17639	23.667	16698
270	22.5	15873	21.167	14932
240	20.0	14110	18.667	13169
210	17.5	12346	16.167	11405
180	15.0	10582	13.667	9641
150	12.5	8818	11.167	7877
120	10.0	7055	8.667	6114
90	7.5	5291	6.167	4350
60	5.0	3527	3.667	2586
30	2.5	1764	1.167	823
16	1.3	941	0.000	0
0	0.0	0		

Note: The volumes shown are for single wall tanks. Volumes are approximately 4% less for tanks with double walls.

transmitter indicates zero feet when the fuel level is at the same height as the transmitter. So there are approximately 941 gallons of fuel in the tank when the transmitter indicates zero.

**Figure 6** shows gallons of fuel for distance above the bottom of the tank as well as gallons above the transmitter. This figure is applicable for Heatec

fuel tanks with capacities up to 25,000 gallons (without heating coils). The information shown in **Figure 5** is based on fuel at a temperature of 60 degrees F.

### EFFECTS OF TEMPERATURE

The volume of fuel in your tank will change when the fuel expands or contracts as a result of temperature variations. Temperature of the fuel will vary with the ambient temperature. Its temperature can also change if a fuel pre-heater is used and heated fuel is returned to the tank.

You should make allowances for changes in volume due to temperature, *especially when filling the tank*. Accordingly, you should allow about 10 percent for expansion. **Figure 7** shows the maximum fill levels for Heatec fuel tanks with an allowance of 10 percent for expansion.

Most ambient temperature fluctuations during a 24 hour period will have very little effect on a full tank of fuel. The temperature of the fuel will probably remain close to an average of the ambient temperatures over 24 hours. However, fuel temperatures are apt to change to a greater extent over several weeks or months, when the weather changes from one season to another.

**Figure 8** shows how changes in fuel temperature affects its volume. The volumes shown for 60 degrees F correspond to the capacities of standard

Heatec tanks. The temperatures should be regarded as average temperatures over a period of 24 hours.

### TROUBLESHOOTING TRANSMITTERS

Pockets of air or trash trapped in the pipe where the transmitter is connected to the tank will cause erratic level readings. When filling an empty tank be sure to bleed the pipe connection at the transmitter to avoid this problem. Also bleed the connection if the tank is refilled after it was drained below the 16-inch level.

### INSTALLING A NEW TRANSMITTER

All new transmitters must be programmed at the Heatec factory using special Siemens software configured for Heatec tanks.

Only two settings can be reset in the field. One is the Full Scale Blind setting, which should be set according to the specific gravity of the fuel as explained earlier.

The other is the zero setting. This setting corrects for transmitter tilt. The transmitter is normally tilted upwards for easy reading when it is installed on the tank at Heatec. If you change this tilt, you should reset the zero setting according to instructions in the Siemens manual, under the heading **6.2.5 Zero Adjustment (Position Correction)**.

Tank Capacity (gallons)	Tank Height (feet)	Maximum fill level (feet)
6500	10	9.0
13000	20	18.0
20000	30	27.0
23000	35	31.5

30 Deg F	40 Deg F	50 Deg F	60 Deg F	70 Deg F	80 Deg F	90 Deg F	100 Deg F
6442	6461	6481	6500	6520	6539	6559	6578
12883	12922	12961	13000	13039	13078	13117	13157
19821	19880	19940	20000	20060	20120	20181	20241
22794	22862	22931	23000	23069	23138	23208	23277