4. CALIBRATION

Your new CON-E-CO Electronic Water Meter has been factory calibrated to an accuracy of +/- 1% prior to shipment. You will want to verify this accuracy by recalibrating at your job site.

1. **If your meter is connected to a newly installed water line, several hundred gallons of water should be run through the system prior to calibration to insure that all of the air has been purged from the water line.**

2. **The CON-E-CO Electronic Water Meter utilizes a turbine flow meter which requires a nominal calibration factor. This predetermined factor may be found in the upper right hand corner of the serial number plate inside the door of the calibration pulse box (calibration factor on serial number plate shown matches the actual setting on the pulse board). Approximate calibration factors for each size meter are shown in Table I.**

3. **Arrange a suitable method of weighing at least 50 gallons of water. A typical method is to use an open topped 55 gallon drum mounted on a platform scale under the water discharge point. Be sure to tare out the weight of the empty container before metering any water.**

4. **Meter 50 gallons of water into the scale mounted container. Note: One (1) US gallon of water weighs 8.337 lbs., therefore, 50 gallons weighs 416.85 lbs. If the reading on your meter is 50 gallons and the reading on your scale is between 412.68 lbs, and 421.02 lbs., your meter is accurate to within +/- 1%. If this accuracy is satisfactory for your requirements, no further action is required from you. However, if the amount of water metered weighs more or less than it should, see below.**

5. **Error Determination - Before making any calibration adjustments, meter the same amount of water at least four (4) times and record each weight in a table as illustrated in Figure 6.**

FIGURE 7: Example of Calibration Test Run

Meter Run	Weight Observed (Example ONLY)
1	432 lbs
2	437 lbs
3	430 lbs
4	441 lbs
Total Weight	1,740 lbs.

After making four (4) test runs, determine the average weight of the test using the following formula:

$$\frac{\text{Total Weight}}{\text{No. of Runs}} = \text{Average Weight}$$

In our example in Figure 6 the average weight would be:

$$\frac{1740 \text{ lbs.}}{4 \text{ Runs}} = 435 \text{ lbs.}$$

After computing the average weight of the test runs, determine if the error is one of too much or too little water. If delivery is over weight, proceed to Step 6; if under weight, proceed directly to Step 7. Our example in Figure 7 is one of too much water (over weight) since our average for the test was 435 lbs. compared to nominal weight of 416.85 lbs.

CORRECTION OF OVERWEIGHT DELIVERIES

Subtract the nominal weight of 416.85 lbs. from the average weight determined in Step 5. Using our example:

_____lbs. Average Test Weight
- 416.85 lbs. Nominal Weight
lbs. Over Weight
Determine the percent error using the following formula:

$$\frac{\text{Amount Over Weight}}{\text{Nominal Weight}} \times 100 = \text{Percent Error}$$

For Example:

$$\frac{18.15 \text{ lbs. Over Weight}}{416.85 \text{ lbs. Nominal Weight}} \times 100 = 4.35 \text{ Percent Error}$$

Now refer to Table II to determine the correction factor to correspond to the percent error determined in 6.2 above. Following our previous example, the correction factor is determined as follows:

Percent error from 6.2 above: 4.35%
Our calibration example is for a 2" meter. Select the column headed 2" in Table II.
Read down the 2" column to the 4.0 line and read 5.5.
Read down the 2" column to the 0.3 line and read 0.4.
The .05 digit in 4.35 is dropped.
Add 5.5 and 0.4 to obtain 5.9.
5.9 is the total correction factor required to subtract from the existing setting.

You SUBTRACT when OVER-weight, ADD when UNDER-weight.

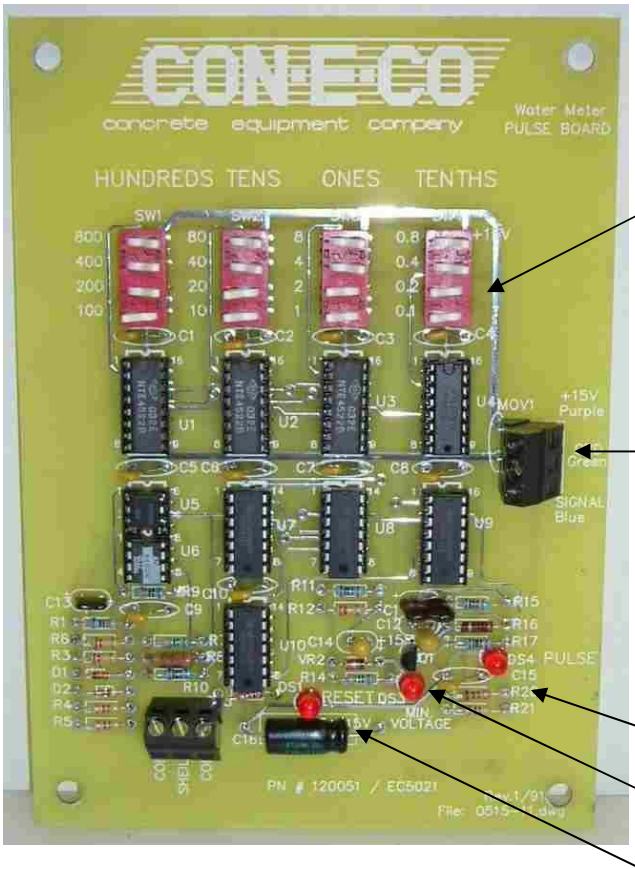
TABLE II Error Correction

PERCENT ERROR	METER SIZE				
	1"	1.5"	2"	3"	
0.1 0.2	1.0 2.1	0.4 0.8	0.2 0.3	0.0 0.0	
0.3	3.2	1.3	0.4	0.1	
0.4	4.2	1.7	0.6	0.2	
0.5	5.3	2.1	0.7	0.2	
0.6	6.6	2.5	0.8	0.2	
0.7	7.4	2.9	1.0	0.2	
0.8	8.4	3.4	1.1	0.3	
0.9	9.5	3.8	1.3	0.4	
1.0	10.5	4.2	1.4	0.4	
2.0	21.0	8.4	2.8	0.8	
3.0	31.5	12.6	4.1	1.2	
4.0	42.0	16.8	5.5	1.6	
5.0	52.5	21.0	7.0	2.0	

Add the values obtained in Table II to arrive at the total correction factor needed.

6.4 Before making <u>any</u> changes, verify that the switch settings match those shown on the serial number plate. Please record the calibration settings as shipped so that you have a base reference. Calibration switches are found at the top of the calibration circuit board inside the calibration box. (See Figure 8.) There are four (4) sets of calibration switches, each set with four (4) individual toggle switches. Moving the individual toggles to the right turns that switch off and indicates a zero setting.

FIGURE 8: Circuit Board



The right most grouping of switches is tenths, the next grouping is ones, the next tens, and the left most grouping hundreds.

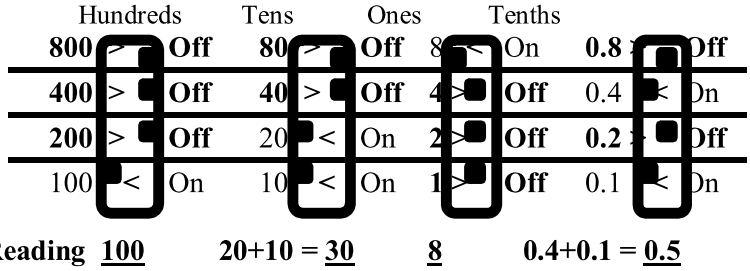
Purple	**wire:**	**15 volt source**
Green	**wire:**	**Ground**
Blue	**wire:**	**Pulsed Signal output**

Pulse LED (flashes light when water is going through meter)

Minimum Voltage LED (lights if power supply is OK)

Reset LED (lights for 2 seconds when power first turned on)

FIGURE 9: Calibration Switches



Reading 100 20+10 = 30 8 0.4+0.1 = 0.5

Total Reading Is 100 + 30 + 8 + .5 = 138.5

PLEASE READ AND RECORD YOUR CALIBRATION SETTING NOW.

6.5 Continuing our example, if your calibration setting was 138.5 and your correction factor is 5.9 for your over weight delivery, the new calibration factor is determined by:

Calibration Factor <u>Minus</u> Correction Factor

or

138.5 - 5.9 = 132.6

6.6 The new calibration factor should now be set into the meter using the appropriate switches. To set 132.6, for example:

Hundreds	**=**	**No Change**
Tens	**=**	**No Change**
Ones	**=**	**Turn Off "8"; Turn On "2"**
Tenths	**=**	**Turn Off "0.1"; Turn On "0.2"; Leave "0.4" On.**

6.7 You are now ready to run.

CORRECTION OF UNDERWEIGHT DELIVERIES

7.1 Subtract the average weight determined in Step 5 from the nominal weight of 416.85 lbs. For example, lets say the average weight of your test runs is 398.7 lbs.

416.85 lbs. Nominal Weight
<u>-398.70 lbs. Average Test Weight</u>
18.15 lbs. Under Weight

7.2 Determine the percent error just as in 6.2 above.
7.3 Determine the correction factor just as in 6.3 above.
7.4 Record preset calibration factor just as in 6.4 above.
7.5 Determine your new calibration factor by the formula:
Calibration Factor <u>Plus</u> Correction Factor

or

138.5 + 5.9 = 144.4

7.6 Set the new calibration factor into the meter just as in 6.6 above, to set in 144.4 for example:

Hundreds	**=**	**No Change**
Tens	**=**	**Turn Off "20"; Turn Off "10"; Turn On "40"**
Ones	**=**	**Turn Off "8"; Turn On "4"**
Tenths	**=**	**Turn Off "0.1"; Leave On "0.4**

7.7 You are now ready to run.