SERVICE BULLETIN SB 3068
Rev. D 5/15

Balcrank®

true blue
DEF Turbine Meter

MODEL# 3120-119

Thoroughly read and understand this manual before installing, operating or servicing this equipment.

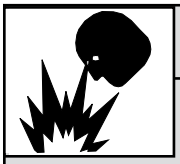
Operation, Installation, Maintenance and Repair Guide

GENERAL SAFETY

Caution:
1) Always read and follow the fluid manufacturer's recommendations regarding the use of protective eye wear, clothing, gloves, and other personal equipment.
2) Never alter or modify any parts of this product; doing so may cause damage and/or personal injury.

IMPORTANT

Read these safety warnings and instructions in this manual completely, before installation and use. It is the reponsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the product and void factory warranty.



WARNING

DANGER: Not for use with fluids that have a flash point below 100°F (38°C, examples: gasoline, alcohol). Sparking could result in an explosion which could result in death.

WARNING

Always use the following Pressure Relief Procedure whenever shutting off, cleaning, or in any way checking or servicing the unit:

1) Disconnect compressed air line or turn off power supply at the fluid pump.
2) Point the control handle outlet into a waste container and open trigger to relieve pressure.
3) Open any bleed-type supply air valves and fluid drain valves in the system.
4) Leave the drain valves open until you are ready to re-pressurize the system.

WARNING

Do not use compressed air to clean or otherwise rotate the internal turbine. Excessive rotation will cause damage to the meter and will void warranty.

CAUTION

Maximum Fluid Pressure 145 PSI. Under no circumstances should the dispensing nozzle be aimed at any person or your own body at anytime. Personal injury may result.

CAUTION

Diesel Exhaust Fluid pumps and crystallization

Diesel Exhaust Fluid is considered in the industry as a "creep" product. This simply means that Diesel Exhaust Fluid will find its way through every possible opening. Once Diesel Exhaust Fluid is exposed to air, the water will evaporate leaving behind a "crystallized" white powdery residue. This residue can be cleaned with de-ionized water and a bit of scrubbing. As you can imagine, allowing the Diesel Exhaust Fluid to "crystallize in a pump is not a good idea. It can lead to premature pump failure.

Here are some best practices to follow:

- Don't allow the barrel, tote, or tank to run dry. This introduces air into the pump and will cause "crystallization"
- If at all possible, the pump should be used regularly to keep "crystallization" to a minimum.
- If the Diesel Exhaust Fluid pump will not be used for an extended period of time, it should be flushed with de-ionized water to prevent 'crystallization"
- If "crystallization" has occurred in your pump, don't try and pump it out. Open the pump and clean it with de-ionized water
- Following these practices will ensure that your True Blue pump will last and deliver Diesel Exhaust Fluid as expected.

GENERAL

The electronic digital meter features a turbine measurement system, designed for precise metering of low viscosity fluids. The meter body is made of non-conductive plastic and is designed to be used with Diesel Exhaust Fluid (DEF).

TECHNICAL SPECIFICATIONS

Measurement System		Turbine
Resolution (Nominal)	Hi Flow	0.003 Gal/pulse
	Low Flow	0.001 Gal/pulse
Flow Rate (Range)		1.3 to 26.4 (Gal/min) For Diesel Exhaust Fluid
Operating Pressure (Max)		145 psi (10 bar)
Bursting Pressure (Min)		580 psi (40 bar)
Storage Temperature (Range)		-4 to 158 (°F)
Storage Humidity (Max)		95 (%RU)
Operating Temperature (Range)		14 to 122 (°F)
Flow Resistance		4.35 psi @ 26.4 Gallons per min
Viscosity (Range)		2 to 5.35 cSt
Accuracy		+/- 1% after calibration within 2.6 to 23.7 (Gallons/min) range
Reproductability (Typical)		+/- 0.3 (%)
Screen		Liquid Crystal Display (LCD). Features: - 5 figure partial - 6 figure reset total plus x10 / x100 - 6 figure non-reset total total plus x10 / x100
Power Supply		2 x 1.5v alkaline batteries size AAA
Battery Life		18 to 36 months
Weight		0.55 lbs. (including batteries)
Protection		IP65

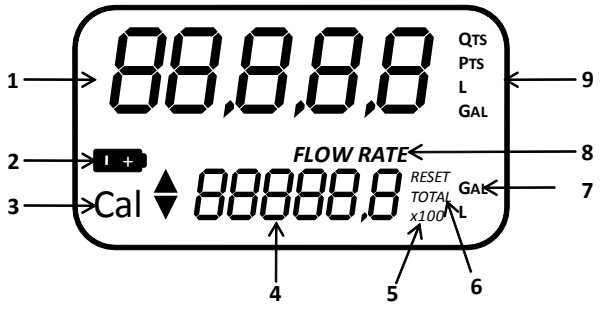
INSTALLATION

The meter features 1" Male BSPP (1" GAS) inlet and outlet. It has been designed to be easily installed in any position: fixed in-line or mobile on a dispensing nozzle. The LCD display can be rotated to allow easy reading in any positiion. This can be done by removing the four screws on the front of the meter, slipping the card from the boot, rotating the display to the desired position, then reinstalling the boot and the four screws taking care that the battery wires do not get pinched or interfere with the read sensor in the center of the card.

OPERATION

The Liquid Crystal Display (LCD) of the meter features two numerical registers and several indicators that are only displayed when the meter is in the applicable mode. This is detailed in Figure 1 below.

Figure 1



1. Partial register (5 numeric display with moving comma from 0.1 to 99999) indicates the volume dispensed since the reset button was last pressed.
2. Battery condition indicator.
3. Calibration mode indicator.
4. Total Register (6 numeric display with moving comma from 0.1 to 999999). Indicates two types of Totals:
   - General Total that cannot be reset (TOTAL).
   - Resettable Total (Reset TOTAL).
5. Multiplication factor for total register (x10 / x100).
6. Total type indicator (TOTAL / Reset TOTAL).
7. Unit of measure indicator for total (Gal=Gallons, L=Liters).
8. Flow rate mode indicator.
9. Unit of measure for partial register (Qts=Quarts, Pts=Pints, L=Liters, Gal= Gallons).

BUTTONS

The meter features two buttons (RESET and CAL) which individually perform two main functions and together, other secondary functions. The main functions are:

- RESET for resetting the partial register and the resettable total (reset total).
- CAL for entering flow rate mode and calibration mode.

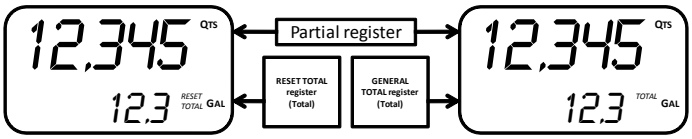
Used together, the two keys permit entering configuration mode for changing the unit of measure and modifying the calibration factor.

DAILY USE

The only operations that need be performed for daily use are resetting the partial and/or the resettable total registers. At times the meter may need to be re-calibrated or the desired unit of measure may need to be changed. Refer to the ***Calibration*** section or the ***Configuration*** section of this service bulletin for instructions on calibration or changing the unit of measure.

Figure 2 below shows the two typical normal operation displays. The display on the left shows the partial and resettable totals and the one on the right shows the partial and the general total. To display the resettable total, momentarily press the RESET button and the resettable total will be displayed. After approximately five seconds, the display will automatically switch back to the General total. Switch over time between the two displays is automatic, factory set and cannot be changed.

Figure 2



NOTE: 6 digits are available for Totals along with two icons: x10 and x100. The increment sequence is as follows: [0.0 to 99999.9 to 999999, 100000 x10 to 999999 x10, 100000 x100 to 999999 x100.]

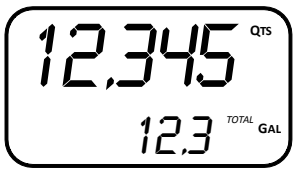
MODES OF OPERATION

Normal mode is the standard dispensing mode. While the meter is counting, the partial and resettable totals are displated at the same time (see Figure 3 below).

If one of the keys is accidentally pressed it has no effect on dispensing or the partial or resettable totals. A few seconds after dispensing is complete, the lower register will switch from the resettable total to the general total. The word reset above the word total disappears, and the resettable total is replaced by the general total in the display (See Figure 4 below). This is called standby mode and remains on the display while the meter is not in use.

Figure 3

Figure 4



Partial Register Reset

The partial register can be reset by pressing the RESET button when the meter is in standby mode, meaning when the the word “TOTAL” is in the display (See Figure 5 below).

Once the reset button has been pressed, all digits in the display will momentarily light up (See Figure 6 below) and then the display will blank out momentarily. When the display comes back on, the partial total and the resettable totals will be shown in the display (See Figure 7). After approximately 5 seconds the resettable total will revert to standby mode (See Figure 8).

Figure 5

Figure 6

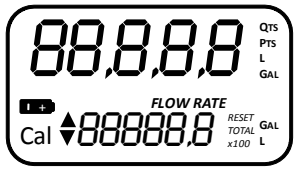


Figure 7

Figure 8

Resetting the Resettable Total

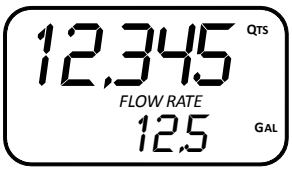
The resettable total can only be reset after resetting the partial register. To reset the resettable total, press the RESET button once to reset the partial total. When the display comes back on (See Figure 7 above), press and hold the RESET button until all digits in the display light up then blank out momentarily. When the display re-illuminates, the resettable total will read 0.0 (See Figure 9 on page 4).

Figure 9

Flow Rate Mode

The meter also features a FLOW RATE mode which can be displayed during dispense. Flow rate is displayed in units per minute, for example if the partial register is set to meter in quarts, the flow rate will be in quarts per minute (See Figure 10 below).

Figure 10



To enter FLOW RATE mode:

- With the remote display in standby mode (See Figure 5),
- Press and release the CAL button
- Start dispensing

The flow rate is updated every 0.7 seconds. Consequently, the flow rate display could reletively be unstable at low flow rates. The higher the flow rate the more stable the display. The flow rate only registers while fluid is passing through the meter. Once the flow of fluid stops, the flow rate will return to zero. To return to standby mode, press and release the CAL button.

CONFIGURATION - Unit of Measure

The meter has four possible combinations of units of measure that can be set based on the table below.

Partial Register	Totals Register
Liters (L)	Liters (L)
Gallons (Gal)	Gallons (Gal)
Quarts (Qts)	Gallons (Gal)
Pints (Pts)	Gallons (Gal)

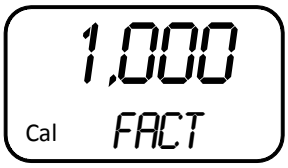
To change between these combinations, the meter must be in standby mode (See Figure 5). With the meter in standby mode, press and hold the RESET and CAL buttons simultaneously. The word “Unit” will appear in the display. You can then change the unit of measure by pressing the RESET button until the desired combination of units of measure is displayed. To save the new unit of measure, press and hold the CAL button. The meter will momentarily show all of the display digits lit up (See Figure 6), will go through its startup cycle then will go to standby mode.

CALIBRATION

The meter allows for precise calibration by modifying the calibration factor (k factor).

To display the current k factor, press and hold the CAL button when the display is in standby mode and the current k factor will be displayed. If the k factor has never been modified, the factory k factor is displayed. If you are using the meter with the “factory k factor”, the display will appear as shown (See Figure 11 below).

Figure 11



If the k factor has been modified, the word “USER” will appear in the display below the k factor (See Figure 12 below).

Figure 12

There are two ways to perform calibration of the meter:

- **Field** calibration, performed by dispensing while in “Field” calibration mode.
- **Direct** calibration, performed by directly modifying the calibration factor.

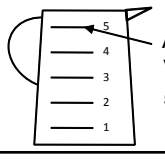
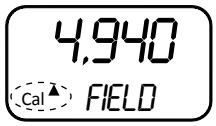
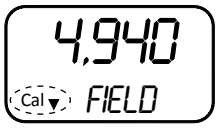
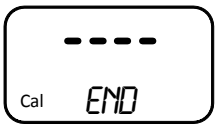
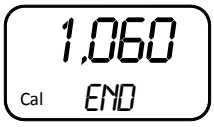
⚠ NOTE

For proper calibration is is important to:

- completely eliminate air from the system
- use an accurate sample container not less than 5 quarts
- during calibration, ensure dispensing is done at a contant flow rate equivalent to normal dispensing until the container reaches the 5 quart mark. You may start and stop the flow but do not “trickle” flow
- after dispensing wait a short period to ensure any air bubbles have dissipated

Field Calibration

The table below lists the steps for Field calibration.

Action		Meter Display
1	Meter in standby mode	
2	Press & hold CAL button, current k factor is displayed. The words “FACT” and “USER” indicate which of the two factors is currently in use.	
3	Press & hold RESET button. Meter enters FIELD calibration mode.	
4	Dispense into sample container. Dispensing can be interrupted and started again at will. Continue dispensing until the level of the fluid in the sample container has reached the graduated area. There is no need to reach a preset quantity.	 Indicated value  Actual Value 5.0
5	Press & release the RESET button once. An “up” arrow will appear in the bottom left of the display. In the example, the meter value is below the actual value. Press the CAL button to adjust the meter value to match the actual value. You may either press & release the CAL button which will advance the meter value by one or press & hold the CAL button for more rapid adjustment. If the meter value is higher than the actual value, press & release the RESET button again and the “up” arrow will change to a “down” arrow. You can then use the CAL button to lower the meter value. If you go over (or under) the desired value while adjusting the meters k factor, press and release the RESET button again to change the arrow direction.	 
6	Once the k factor has been adjusted to match the actual value, press and hold the RESET button to end calibration. This stores the new k factor, which will be displayed momentarily after which the meter will return to standby mode.	 

Direct Modification of k factor

Direct modification of the k factor is useful to correct a “mean error” based on serveral dispenses. If normal meter operation shows a mean percentage error, this can be corrected by applying a percentage correction factor to the current k factor. The percentage correction of the k factor must be calculated using the formula below:

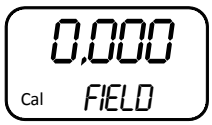
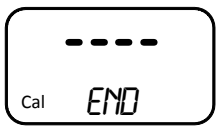
$$\text{New k factor} = \text{Old k factor} \times \left(\frac{100 - E\%}{100}\right)$$

Example:

Error percentage found E%	-0.9%
Current k factor	1,000
New User k factor	1,000 * [(100-(0,9))/100]= 1,000 * [(100+0,9)/100]=1,009

If the meter indicates less than the actual amount dispensed (negative error), the new k factor must be higher then the old k factor as shown in the example. The opposite applies if the meter shows more than the actual amount dispensed (positive error).

The table below lists the steps for Direct modification of the k factor.

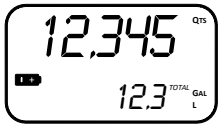
Action		Meter Display
1	Meter in standby mode	
2	Press & hold CAL button, current k factor is displayed	
3	Press & hold RESET button. Meter enters FIELD calibration mode.	
4	Press & hold the RESET button a second time. Meter enters DIRECT calibration mode. The current k factor is displayed & an "up" arrow appears in the lower left of the display. Press & release the CAL button to increase the k factor (negative error). If the k factor needs to be decreased (positive error), press & release the RESET button to change to the "down" arrow.	 
5	Once the k factor has been adjusted to match the actual value, press and hold the RESET button to end calibration. This stores the new k factor, which will be displayed momentarily after which the meter will return to standby mode.	 

NOTE: Replacing the batteries will not affect the k factor.

MAINTENANCE

The meter is designed to be virtually maintenance free. The only maintenance required is periodic battery replacement.

The meter comes complete with two 1.5 V size AAA alkaline batteries. There are two low-battery alarm levels shown below.

Alarm		Meter Display
1	When the battery voltage falls below the first level, the fixed battery symbol appears on the display. In this condition, the meter will continue to operate correctly but it is advisable to replace the batteries as soon as possible.	
2	If the meter has continued to operate without changing the batteries, the second flashing battery alarm will appear. Once this alarm is displayed, the meter will no longer operate and the battery alarm icon will be the only part of the display in operation. At this point, the batteries must be replaced prior to continuing proper meter operation.	

BATTERY REPLACEMENT

To change the batteries:

- Press the RESET button to update all totals
- Remove the four screws on the back cover
- Remove the cover
- Remove the old batteries
- Place new batteries in the meter
- Replace the cover and screws
- Meter will switch on automatically & normal operation can be resumed

The meter will display the same Resettable Total, the same Total and the same Partial indicated before the batteries were changed. After changing the batteries the meter ***does not*** need to be recalibrated.

⚠ WARNING

Do not use compressed air to clean or test the turbine. Doing so will cause excessive rotation and will void warranty.

For Warranty Information Visit:
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Revision Log:

Rev. A - Release 8/09
Rev. B - Updated to meter body only, 832773
Rev. C - Added caution about DEF equipment and crystallization
Rev. D - Updated product photo and model number