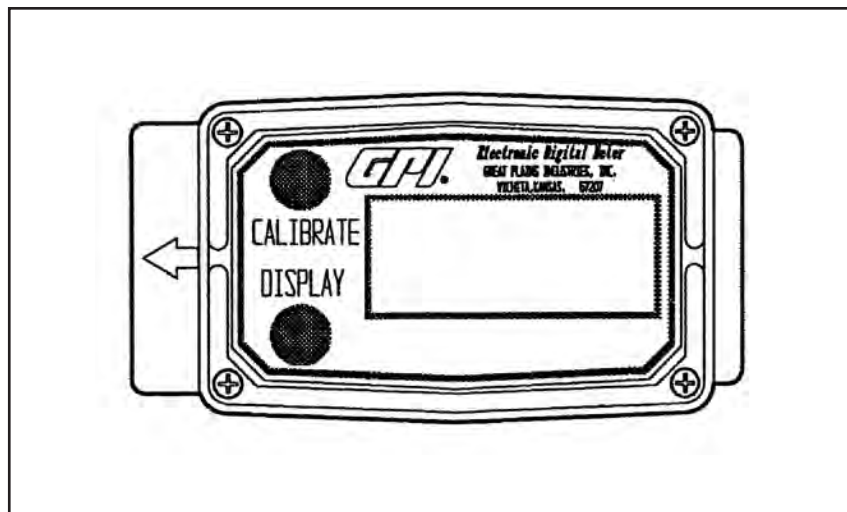


Commercial Grade  
**09 COMPUTER  
ELECTRONICS**  
Owner's Manual



09/11

Rev. D 920787-01

**To the owner . .**

Congratulations on receiving your GPI Commercial Grade Computer Electronics. We are pleased to provide you with a product designed to give you maximum reliability and efficiency.

Our business is the design, manufacture, and marketing of liquid handling, agricultural, and recreational products. We succeed because we provide customers with innovative, reliable, safe, timely, and competitively-priced products. We pride ourselves in conducting our business with integrity and professionalism.

We are proud to provide you with a quality product and the support you need to obtain years of safe, dependable service.

*Grant Witter*  
President

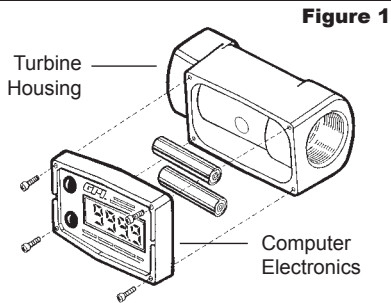
Great Plains Industries, Inc.

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**GENERAL INFORMATION**

This manual will assist you in operating and maintaining the Computer Electronics of the GPI Commercial Grade Meters. (See Figure 1) Calibration details are given in this manual. Information on turbine housings and accessory modules are contained in other manuals. Please reference those as necessary.



**Before Getting Started**

Take the time to fully acquaint yourself with all information about the components of your GPI Electronic Digital Meter. If you need assistance, contact the distributor from whom you purchased your computer.

**!** This symbol is used throughout the manual to call your attention to safety messages.

**! WARNING** Warnings alert you to the potential for personal injury.

**! CAUTION** Cautions call your attention to practices or procedures which may damage your equipment.

**Notes** give information that can improve efficiency of operations.

It is your responsibility to make sure that all operators have access to adequate instructions about safe operating and maintenance procedures.

### Read Me!

For your safety, review the major warnings and cautions below before operating your equipment.

#### **⚠ WARNING**

**The apparatus enclosure may contain aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.**

#### **⚠ WARNING**

**Part of the enclosure is constructed from plastic. To prevent the risk of electrostatic sparking the plastic surface should only be cleaned with a damp cloth.**

1. This equipment is approved to handle only fluids that are compatible with all wetted materials.
2. When measuring flammable liquids, observe precautions against fire or explosion.
3. When handling hazardous liquids, always follow the liquid manufacturer's safety precautions.
4. When working in hazardous environments, always exercise appropriate safety precautions.
5. For best results, always verify accuracy before use.

### Product Description

These computer electronics are designed specifically for use on GPI Commercial Grade Turbine Housings.

The CMOS, microprocessor-based electronics have extremely low power requirements and data retention capabilities in both RAM and ROM. Information is clearly displayed on a large 6-digit LCD readout with two-point floating decimal for totals from .01 to 999,999. All operations are easily accessed with the two buttons on the front panel.

Liquid flows through the turbine housing causing an internal rotor to spin. As the rotor spins, an electrical signal is generated in the pickup coil. This pulse data is translated from the turbine into calibrated flow units shown on the computer's readout.

Upon receipt, examine your equipment for visible damage. The computer is a precision measuring instrument and should be handled as such. If any items appear damaged or missing, contact your distributor.

Make sure your computer model meets your specific needs. Refer to the Specifications Section to confirm required features. The model number of your computer is displayed on the lower side of the computer and also underneath a battery.

### INSTALLATION

If you ordered your computer electronics with a turbine housing, it is installed at the factory.

If you ordered your computer separately from your turbine, simply mount the computer on the turbine with the four screws at the corners of the faceplate. Make sure the seal is fully seated before tightening the screws.

If you ordered the computer with turbine and an accessory module, please review and thoroughly understand all installation instructions before proceeding.

All GPI turbines are designed to measure flow in only one direction. The direction is indicated by the arrow cast-molded in the turbine outlet. If the opposite direction is desired, simply rotate the computer electronics 180 degrees prior to installation.

Avoid electronically “noisy” environments. Install at least 6 inches (15.2 cm) away from motors, relays, or transformers.

All GPI A1 Series meters are Factory Mutual Approved and carry a Class 1, Division 1 Approval for hazardous environments. In addition, GPI meters have NEMA Type 4 enclosures. They are tested and calibrated at the factory using state-of-the-art calibration procedures and testing equipment.

To ensure accurate measurement, remove all air from the system before use.

1. Ensure some back pressure on the turbine.
2. Open the discharge valve or nozzle and allow fluid to completely fill the system. Make sure the stream is full and steady.
3. Close the discharge valve or nozzle.
4. Start normal operations.

It is strongly recommended that accuracy be verified prior to use. To do this, remove all air from the system, measure an exact known volume into an accurate container, and verify the volume against the readout or recording equipment. If necessary, use a correction factor to figure final volume. For best results, accuracy should be verified periodically as part of a routine maintenance schedule.

## OPERATION

### Computer Display

All operations are reflected in the LCD readout. The large center digits indicate amounts, where smaller words or “icons” located above and below indicate specific information regarding totals, flow, calibration and units of measure.

### Activate the Meter

Computer is on continuously and always ready to perform. The computer is powered by field replaceable batteries. When display becomes dim, faded or the low battery message appears (see below), the batteries need to be replaced. Reference the Maintenance Section for details.

**LobAtt**

### Batch and Cumulative Totals

The computer maintains two totals. The Cumulative Total provides continuous measurement and cannot be manually reset. The Batch Total can be reset to measure flow during a single use. The Cumulative Total is labeled TOTAL 1, Batch Total is labeled TOTAL 2 BATCH.

When the Cumulative Total reaches a display reading of 999,999 the computer will highlight an X10 icon. This indicates to the operator that a zero must be added to the 6 digits shown. When the next rollover occurs, the computer will highlight an X100 icon. This indicates to the operator that two zeros must be added to the 6 digits shown.

Press the DISPLAY button briefly to switch between the TOTAL 1, TOTAL 2 BATCH and FLOWRATE (if applicable). Press DISPLAY briefly to display the TOTAL 2 BATCH. Hold the DISPLAY button for 3 seconds to reset the Batch Total to zero.

When fluid is flowing through the meter, a small propeller icon is highlighted.

### **Flowrate Feature** (some models)

To use this feature, press and release DISPLAY button until FLOWRATE icon appears. The factory set time base will be highlighted to the right of FLOWRATE (M = minutes, H = hours, D = days). When FLOWRATE is invoked, the display will be indicating rate of flow.

### **Factory and Field Calibration**

All calibration information is visible to the user as icons on the top line of the display, above the numeric digits.

All units are configured with a “factory” calibration. Both gallons and litres are available (“GL” or “LT” will be displayed). While holding the CALIBRATE button, briefly press DISPLAY to toggle between gallons and litres. This factory calibration (indicated with FAC) is permanently programmed into the computer and is not user adjustable.

NOTE: Your computer may have other units of measure programmed into it. If so, holding the CALIBRATE button and momentarily pressing the DISPLAY button will toggle through all factory set units. Other possible units are: IGL (imperial gallon), QT (quart), CF (cubic feet), CM (cubic meter), BL (42 gal. barrel), CC (cubic centimeter) or OZ (ounce).

Switching between different units will not corrupt the Total's contents. For example, in GL mode, the computer totalizes 10.00 gallons, if the user switches to LT mode, the display will read 37.85 litres (the same volume, different unit).

The “field” calibration may be set by the user, and can be changed or modified at any time using the calibration procedure described in the Calibration Section. Totals derived from the field calibration are invoked when the FAC icon is no longer visible on the top line of the display.

## **CALIBRATION**

### **Verify Accuracy Before Beginning Field Calibration**

For the most accurate results, dispense at a flowrate which best simulates your actual operating conditions. Avoid “dribbling” more fluid or repeatedly starting and stopping the flow. This can result in less accurate calibrations.

Make sure you meet the meter's minimum flowrate requirements:

Low Flow meter	0.3 GPM (1 LPM)
1 inch meter	3 GPM (11 LPM)
2 inch meter	30 GPM (113 LPM)

The use of a uniformly dependable, accurate calibration container is recommended for the most accurate results. For best results, the meter should be installed and purged of air before field calibration.

Due to high flowrate, it is strongly recommended that Field Calibration of two inch meters be completed with a combination of volume and weight using fine resolution scales.

### Field Calibration Necessity

Field Calibration and Factory Calibration are defined in the Operation Section. Factory calibration settings are programmed into each computer during manufacturing, using stoddard text solvent at 70° F (21° C) for Low Flow and one inch meters and water at 70° F (21° C) for two inch meters. Settings are correct for light liquids such as water, gasoline or diesel. Readings using the Factory Calibration (FAC) may not be accurate in some situations, for example, “heavy” liquids such as motor oil and under extreme temperature conditions, non-standard plumbing configurations or with fluids other than mentioned above.

For improved accuracy under such conditions, the computer allows for “field” calibration, that is, user entry of custom calibration parameters. A “single-point” calibration may yield acceptable accuracy when used in a non-standard application.

### Field Calibration Procedures (Correction Factor Method)

1. To calibrate, press and hold the CALIBRATE and DISPLAY buttons for about 3 seconds until you see FLdCAL. Release both buttons and you will see CF - 00.0. You are now in the field calibration mode and values from -99.9% to +99.9% can be entered.
2. The +/- position appears either as an “underscore” character for plus, or as a “hyphen” character for minus. The DISPLAY button selects the position and the CALIBRATE button toggles this character.

3. The DISPLAY button can then be pushed to select the numeric positions. Press the CALIBRATE button to scroll from 0 to 9. Enter the percentage of change you want the display to correct. When satisfied with the value, press both CALIBRATE and DISPLAY buttons simultaneously. CALEnd will be displayed and unit will go back to normal operation, less the FAC (factory calibration) icon.
4. All enabled units-of-measure remain visible and selectable – the entered correction will be applied to all enabled units.
5. To return to factory calibration (FAC), press and hold both CALIBRATE and DISPLAY buttons for about 3 seconds until FACCAL is displayed. Then release buttons. Unit should return to normal operation and FAC icon is visible.

### USER CONFIGURATION

The “09” series GPI display has been programmed with many new features, most of which can be enabled by the end user by way of a configuration process. By disabling “unnecessary” features, day-to-day flowmeter operation can be greatly simplified, making the unit easier to use. There are several features that GPI disables by default when shipping standard meters. (For example, K-Factor Entry Field Calibration, described below.) For more advanced users, it may be desirable to enable ALL possible features. User configurable features include:

- Totalizers/Modes Enabled (Cumulative Total, Batch 2 Total, Flowrate Mode)
- Flowrate Timebase (Minute, Hour, Day)

- Factory Calibration Curve Units Enabled – Gallons, Litres, Imperial Gallons, Quarts, Ounces, Cubic Feet, Cubic Centimeters, Cubic Meters or Barrels (42 Gal.)
- Dispense/Display or K-Factor Entry Calibration

### Changing Configuration Settings

Access to the configuration process is restricted for security until a “password” is entered. Contact your distributor or GPI to get the password and instructions to unlock and reset configuration settings. This information is also available on the GPI Web site. Configurations are entered and stored as six-digit “codes” where each digit represents a setting for one of the configuration options. New configuration settings are stored in the computer’s long-term memory and will not be lost either in OFF mode or during battery change.

### K-Factor Entry Field Calibration

Presently all GPI computers are programmed with three different field calibration methods, only one of which is active, the “correction factor” calibration procedure described above. It is possible to activate “K-Factor entry” or “dispense/display” field calibration by changing configuration settings. Contact your distributor or GPI to get the correct password, configuration code and instructions for this calibration method. This information is also available on the GPI Web site.

## MAINTENANCE

The computer electronics is powered by lithium batteries which provide at least 5 years of use. Removing the

batteries before storing the meter will extend battery life. If the meter’s readout should become dim, blank or the low battery message appears (see below), the batteries need to be replaced. Replacement batteries can be ordered from your distributor or the factory. See details in the Parts Section.



When batteries are disconnected or fail, the Batch and Cumulative Totals will maintain the value they had. Factory and Field Calibration Curves are retained in the meter’s computer when power is lost.

It is strongly recommended that battery check and terminal cleaning be a part of a routine maintenance schedule. Battery terminals should be cleaned annually. Batteries can be replaced without removing the meter from the piping system.

### Replace Batteries

1. Remove the corner screws from the meter face and lift the computer electronics from the turbine.
2. Remove the batteries.
3. Check the battery terminals and remove any corrosion.
4. Install the new batteries and make sure the positive posts are positioned correctly. When the batteries are installed correctly, the computer powers on automatically and the readout displays information.
5. Make sure the seal is fully seated before placing the computer electronics on the turbine. Tighten the four screws.
6. Do not clean exterior of computer assembly with Isopropyl Alcohol.

## TROUBLESHOOTING

Symptom	Probable Cause	Corrective Action
A. METER IS NOT ACCURATE	<ol style="list-style-type: none"> <li>1. Field Calibration not performed properly</li> <li>2. Factory Calibration not suitable for liquid being measured</li> <li>3. Meter operated below minimum flowrate</li> <li>4. Meter partially clogged with dried liquid</li> <li>5. Turbine bearings partially clogged with dried liquid</li> <li>6. Sealant material wrapped around rotor</li> <li>7. Installed too close to fittings</li> <li>8. Installed too close to motors or electrically "noisy" environment</li> </ol>	<p>Field calibrate again or select Factory Calibration.</p> <p>Perform a Field Calibration according to Calibration Section.</p> <p>Increase flowrate.</p> <p>Remove meter. Clean carefully. Make sure rotor spins freely.</p> <p>Remove meter. Clean carefully. Make sure rotor spins freely.</p> <p>Remove meter. Make sure rotor spins freely.</p> <p>Install correctly.</p> <p>Install correctly.</p>
B. READOUT FADED OR BLANK	<ol style="list-style-type: none"> <li>1. Batteries weak, dead or not connected</li> <li>2. Computer defective</li> </ol>	<p>Remove computer, check and replace batteries if necessary.</p> <p>Contact the factory.</p>
C. NORMAL FLOWRATE BUT METER DOES NOT COUNT	<ol style="list-style-type: none"> <li>1. Field Calibration not performed correctly</li> <li>2. Rotor stuck or damaged</li> <li>3. Sealant material wrapped around rotor</li> <li>4. Computer defective</li> </ol>	<p>Field Calibrate again or select Factory Calibration.</p> <p>Remove meter. Make sure rotor spins freely.</p> <p>Remove meter. Make sure rotor spins freely.</p> <p>Contact the factory.</p>
D. REDUCED FLOWRATE AND METER DOES NOT COUNT	<ol style="list-style-type: none"> <li>1. Meter clogged with dried liquids</li> <li>2. Below minimum flowrate</li> </ol>	<p>Remove meter. Clean carefully. Make sure rotor spins freely.</p> <p>Increase flow.</p>
E. CANNOT GET METER INTO FIELD CALIBRATION	<ol style="list-style-type: none"> <li>1. Wrong button sequence</li> <li>2. Computer circuit board defective</li> <li>3. Button defective</li> </ol>	<p>Proceed with calibration according to the Calibration Section.</p> <p>Replace computer. Contact the factory.</p> <p>Replace computer. Contact the factory.</p>



## SPECIFICATIONS

### Standard Features Include:

- 2 Totalizing Registers
- 1 Factory Calibration Curve
- 1 Field Calibration Curve
- Rate of Flow Feature
- Flowrate Time Base in Minutes

### Input Pulse Rate:

Min. Pulse In: DC  
Min. Coil Input: 10 Hz  
Max. Raw: 1,000 Hz

### K-Factor:

Min.: 0.1 pulses/unit  
Max.: > 999,999 pulses/unit

### Field Calibration Correction:

Min.: -99.9%  
Max.: +99.9%

### Readout Totals:

Min. Display: 0.01  
Max. Display: 999,999 (x 100)

### Temperatures:

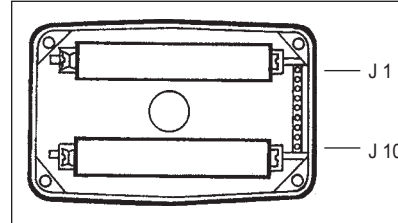
Operational: 0° to +140° F  
(-18° to +60° C)  
Storage: -40° to +158° F  
(-40° to +70° C)

If wider operating temperature ranges are desired, reference information on GPI Remote Kits.

### Power:

Internal  
Power Supply: 2 Lithium  
Batteries at  
3 volts each  
Battery Life: 5 years of use

## Computer Electronics Terminal Connections



### J-1 Reset

Programming interfaces not accessible to user.

### J-2 Pulse Signal Output

This supplies a high-level amplified open collector signal. Output will withstand a maximum open-circuit voltage of 60-volts DC and a maximum closed-circuit of 100 mA.

### J-4 Pulse Signal Input

Requires a sine or square wave with open-circuit voltage of 3-30 volts P-P, a maximum rise/fall rate of 0.01 V/ $\mu$  second and a maximum frequency of 750 Hz.

### J-5 Power Input

When used with Ground (J1-6), this has reverse polarity protection, but no on-board voltage regulation. Supplied voltage must be 5.75-volts DC  $\pm$ 5%.

### J-6 Ground

J-7, 8, Programming interfaces. Not accessible to user.

J-9, 10

NOTE: Safety approvals are void if any external connections are made to computer electronics.

## PARTS

The factory, when provided with model number and serial number, can replace your entire Computer Electronics Assembly.

Order replacement kits, parts, and accessories with the part numbers given here.

Part No.	Description
113520-1	Battery Replacement Kit
901002-52	Seal
116000-1	Large (5 gal.) Calibration Container. Use for water based fluids. Do not use with fuel products.

## SERVICE

To obtain prompt, efficient service, always be prepared with the following information:

1. The model number of your computer electronics.
2. The serial number or manufacturing date code of your computer electronics.
3. Specific information about part numbers and descriptions.

For warranty work always be prepared with your original sales slip or other evidence of purchase date.

## Returning Parts

Please contact the factory before returning any parts. It may be possible to diagnose the trouble and identify needed parts in a telephone call. GPI can also inform you of any special handling requirements you will need to follow covering the transportation and handling of equipment which has been used to transfer hazardous or flammable liquids.

### ⚠ CAUTION

**Do not return computer electronics or meters without specific authority from the GPI Customer Service Department. Due to strict regulations governing transportation, handling, and disposal of hazardous or flammable liquids, GPI will not accept computer electronics or meters for rework unless they are completely free of liquid residue.**

### ⚠ CAUTION

**Meters not flushed before shipment can be refused and returned to the sender.**