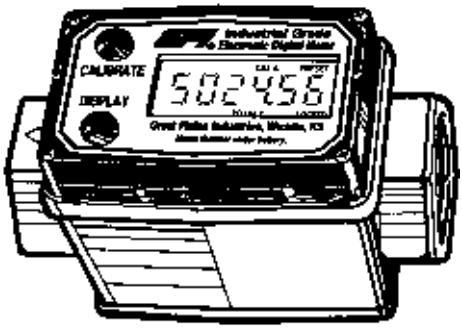
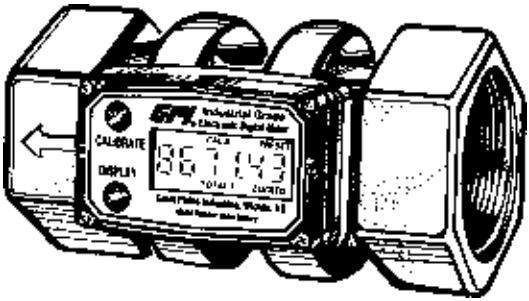
Industrial Grade
COMPUTER ELECTRONICS
Owner's Manual

Computer Electronics shown with Model S100 and S200 Turbine Housings which are sold separately.





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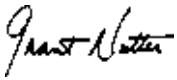
12/98

To the owner . .

Congratulations on receiving your GPI Industrial 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.



President
Great Plains Industries, Inc.

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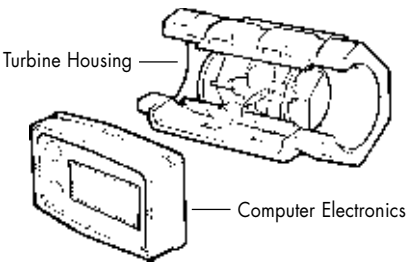
GENERAL INFORMATION

This manual will assist you in operating and maintaining the Computer Electronics of the GPI Industrial 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.

Figure 1



For best results, take the time to fully acquaint yourself with all information about all components of your GPI Electronic Digital Metering System prior to installation and use.

If you need assistance, contact the dealer from whom you purchased your computer.

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

Warnings alert you to the potential for personal injury.

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.

Safety Instructions

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

1. This equipment is approved to handle only fluids which 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 Industrial Grade Turbine Housings. They are also designed to work with several accessory modules which transmit an electronic signal to a wide variety of external equipment.

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 front 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 O-ring 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 (15.2cm) away from motors, relays, or transformers.

All GPI 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.

OPERATIONS

All operations are reflected in the LCD readout. The top line identifies the calibration

curve. The middle line reflects flow information. The bottom line shows information from the totalizer. Words or "flags" display on the top and bottom line to further identify specific information.

The computer is powered by field replaceable batteries. When the readout becomes dim or faded, the batteries need to be replaced. Reference the Maintenance Section for details.

NOTE: Operations can be practiced prior to installation. To simulate flow conditions, blow gently through the turbine.

Turn On

The meter is on when any display is present. It turns on automatically when liquid flows through the meter. It can be turned on manually by pressing and releasing the DISPLAY button.

Turn Off

The meter turns off automatically approximately four minutes after flow stops. When the meter is off, the readout is blank.

Batch and Cumulative Totals

Total flags are displayed on the bottom line. A Batch Total indicates flow during a single use. It is labeled with TOTAL followed by a number. On most models this is TOTAL 2. To zero a batch total, make sure it is displayed and hold down DISPLAY for three seconds until the display changes to zeros.

The Cumulative Total is the total of all liquid measured since the meter's power was connected. At your first use, the Cumulative Total is not zero because of calibration at the factory. The Cumulative Total is labeled as TOTAL LOCKED indicating it cannot be manually zeroed. (See Figure 2) The Cumulative Total is zeroed only when batteries are removed or go dead or when the Cumulative Total reaches the maximum value of 999,999.

Figure 2

To change between totals, press and release DISPLAY.

NOTE: Generally, readout displays change when buttons are released.

Factory and Field Calibration Curves

Calibration Curve information is shown on the top line of the readout. The Field Calibration Curve is set by the user. It can be changed or modified at any time using the Calibration Procedures in the Calibration Section. If a Field Calibration has not been completed, the meter uses the Factory Calibration Curve. Field Calibration is shown as CAL followed by a letter. On most models this is CAL B.

A Factory Calibration Curve is preset by the manufacturer and stored permanently in the meter's computer. The Factory Calibration Curve is always flagged with PRESET on the top line. In most models, Factory Calibration appears as CAL A PRESET. (See Figure 3)

Figure 3

To change between a Field Calibration Curve and a Factory Calibration Curve, hold CALIBRATE down while pressing and releasing DISPLAY. When the desired curve appears, release both buttons.

Flow Rate

Some models include a Rate of Flow feature. When this feature is activated, the word FLOWRATE displays to the left on the bottom line. (See Figure 4) When this flag is displayed, the numbers on the middle line reflect the rate of flow. To activate this feature, press and release DISPLAY until FLOWRATE appears to the left on the bottom line.

Figure 4

Bypass

Some models contain a Bypass feature for those instances when the meter has continuous flow and power conservation is important. When Bypass is activated the flow is not monitored or totaled by the computer. When activated, BYPASS displays on the middle line. (See Figure 5) In Bypass Mode, the meter no longer senses the flow and the readout goes off after a few minutes. Push the DISPLAY button to activate the readout again.

Figure 5

Propeller

A small propeller displays to indicate liquid is flowing through the meter.

"NO" Flag

The NO flag displays on the left of the top line when particular conditions have not been met during calibration procedures. While NO displays, normal flow does not register on the meter. To resume normal flow counting, return to CAL A Preset and back to CAL B before continuing field calibration. This information is detailed fully in the Calibration Section.

CALIBRATION

Field Calibration and Factory calibration are defined in the section above. Field Calibration is necessary when Factory Calibration accuracy is not acceptable. Factory Calibration is completed with either stoddard test solvent (on Mid-Flow turbine sizes) or water (on High-Flow turbine sizes) at 70°F (21°C).

If you are dispensing a comparable liquid which has a different uniform viscosity, a Field Calibration can improve meter accuracy.

NOTE: A Field Calibration below the 10:1 flow range can adversely effect accuracy.

The use of a uniformly dependable, accurate calibration container is highly recommended for the most accurate results.

Due to high flow rate, it is strongly recommended that Field Calibration of High Flow (1-1/2 and 2 inch) meters be completed with a combination of volume and weight using fine resolution scales.

For most accurate results during Field Calibration, dispense at a flow rate which best simulates your actual operating conditions. During Field Calibration, avoid repeated stopping or "trickling" of the flow.

Make sure you meet the meter's minimum flow rate requirements.

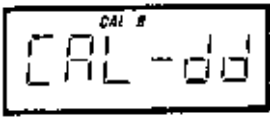
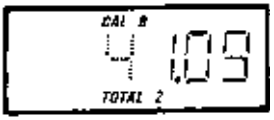
1/2 inch meters -	0.5 GPM (1.9 LPM)
3/4 inch meters -	1 GPM (3.8 LPM)
1 inch meters -	2.5 GPM (9.5 LPM)
1-1/2 inch meters -	5 GPM (19 LPM)
2 inch meters -	10 GPM (38 LPM)

If the minimum flow rate requirements are not met during the Field Calibration procedures, the readout blinks "NO" when you try to exit Calibration Mode and you must calibrate again.

The maximum volume dispensed and adjusted during the Calibration Procedure below should not exceed 99.99 units in most models. On models with 1-1/2 or 2-inch fittings and some special order models, the maximum volume should not exceed 999.9 units. During calibration, the two left-hand digits on the readout are ignored.

For best results, the meter should be installed and purged of air prior to Field Calibration.

Dispense/Display Calibration Procedures

YOUR ACTION	NOTES
1. Hold down CALIBRATE while pressing and releasing DISPLAY until the Field Calibration Curve appears. Release both buttons.	Remember, Field Calibration curves are *not* preset.
2. Press and release DISPLAY until the Batch Total appears.	Remember, a Batch Total is *not* locked.
3. Hold down DISPLAY for three seconds to zero the total. 	
4. Dispense the desired volume and stop. 	For the most accurate results, dispense at a flow rate which best simulates your actual operating conditions. Avoid stopping or "trickling" the flow.
5. Press CALIBRATE then hold down DISPLAY (both) for approximately three seconds until CAL-dd flashes. Release both buttons. 	
6. When the buttons are released, the volume dispensed returns with one digit flashing. Set this readout to the amount you want. DISPLAY moves from left to right. CALIBRATE changes the value from 0-9. 	Remember, the two left-hand digits are ignored during calibration.
7. With the readout set to the desired amount, hold down CALIBRATE as you briefly press DISPLAY. CAL End flashes and the original amount appears without any flashing digits. 	Calibration is complete and you can resume normal operations. If NO displays, see Troubleshooting.

MAINTENANCE

The computer electronics are powered by lithium batteries which provide at least 4,000 hours of actual use. If the meter's readout should become dim or blank, the batteries should be replaced. Replacement batteries can be ordered from the factory. See details in the Parts Section or your distributor.

When batteries are disconnected or fail, the Batch and Cumulative Totals return to zero. 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 replace 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 O-ring 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
Meter is not accurate	1. Field Calibration not performed properly	Field calibrate again or select Factory Calibration.
	2. Factory Calibration not suitable for liquid being measured	Perform a Field Calibration according to Calibration Section.
	3. Meter operated below minimum flow rate	Increase flow rate.
	4. Meter partially clogged with dried liquid	Remove meter. Clean carefully. Make sure rotor spins freely.
	5. Turbine bearings partially clogged with dried liquid	Remove meter. Clean carefully. Make sure rotor spins freely.
	6. Sealant material wrapped around rotor	Remove meter. Make sure rotor spins freely.
	7. Installed too close to fittings	Install correctly.
	8. Installed too close to motors or electrically "noisy" environment	Install correctly.

TROUBLESHOOTING

Symptom	Probable Cause	Corrective Action
Readout faded or blank	1. Batteries weak, dead, or not connected	Remove computer, check and replace batteries if necessary.
	2. Computer defective	Contact the factory.
Normal flow rate but meter does not count (Meter comes on when DISPLAY button pushed)	1. Field Calibration not performed correctly	Field Calibrate again or select Factory Calibration.
	2. Rotor stuck or damaged	Remove meter. Make sure rotor spins freely.
	3. Sealant material wrapped around rotor	Remove meter. Make sure rotor spins freely.
	4. Computer defective	Contact the factory.
Reduced flow rate and meter does not count (Meter comes on when DISPLAY button pushed)	1. Meter clogged with dried liquids	Remove meter. Clean carefully. Make sure rotor spins freely.
	2. Below minimum flowrate	Increase flow.
Cannot get meter into field calibration	1. Factory Calibration (PRESET) curve active	Hold down CALIBRATE and push and release DISPLAY until PRESET flag goes off. Proceed with calibration according to the Calibration Section.
	2. Computer circuit board defective	Replace computer. Contact the factory.
	3. Button defective	Replace computer. Contact the factory.
Computer blinks "NO" after field calibration	1. Flow rate too low	Try again and increase flow rate to minimum calibration rate. See Calibration Section.
	2. Rotor not spinning freely	Remove meter. Clean carefully. Make sure rotor spins freely.

SPECIFICATIONS

Features available include:

- 0 to 3 Totalizing Registers
- 1 to 3 Calibration Curves
- 1 Point Field Calibration Curve
- Rate of Flow Feature – Yes or No
- Bypass Feature – Yes or No
- Flow Rate Time Base in Minutes, Seconds, Hours, or Days

Input Pulse Rate:

Minimum Pulse In:	DC
Minimum Coil Input:	10 Hz
Maximum Raw:	750 Hz

K-Factor:

Minimum:	16 pulses/unit
Maximum:	10,000 pulses/ unit*

Field Calibration:

Maximum Pulse Count:	65,535 pulses
Minimum Time:	6 seconds

Readout Totals:

Minimum Display:	0.01
Maximum Display:	999,999

Temperatures:

Operational:	+14° to +140°F (-10° to +60°C)
Storage:	-40° to +158°F (-40° to +70°C)

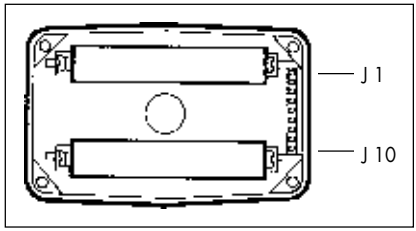
If wider operating temperature ranges are desired, reference information on GPI Remote Kits.

Power:

Internal Power Supply:	2 Lithium Batteries at 3 volts each
Minimum Battery Life:	4,000 operational hours
Optional External Power:	5.75 volts DC ±5%

* Consult factory for higher K-Factor prescaled values.

Computer Electronics Terminal Connections



J-1 **Reset**
When connected by a jumper wire to Ground (J1-6), this has the same effect as initial power up and zeroes out all totalizers.

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-3 **Calibration Preset Override**
When connected by a jumper wire to Ground J1-6, this has the same effect as pressing the CALIBRATE button but allows modification of Preset Calibration Curves.

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/µ 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 ±5%.

J-6 **Ground**

J-7, 8, 9, 10 Programming interfaces. Not accessable to user.

Model Number System for Computer Electronics

Product Identifier

Computer Electronics Assembly

01 = Special, 1 Button
02 = Special, 2 Button
03 = 2 Totals, 2 Cals
04 = 2 Totals, 2 Cals, Rate
05 = 3 Totals, Bypass, 3 Cals
06 = 2 Totals, 1 Cal
07 = 3 Totals, Bypass, Rate, 3 Cals
08 = Rate, 2 Cals

Factory Calibrated Units

GM = Gallons per Minute
LM = Liters per Minute
OO = Special

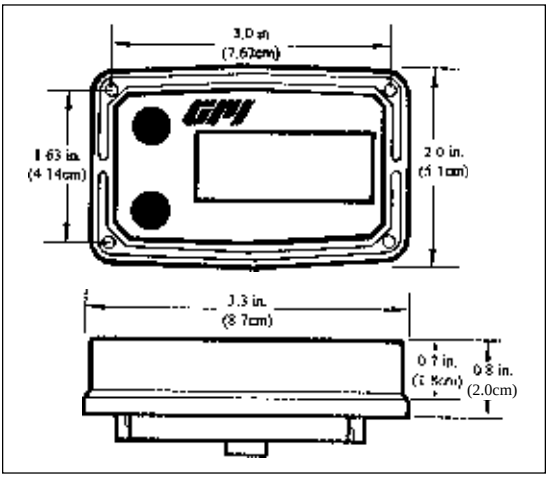
Turbine Housing

Fitting

Packaging

A2+ 03+GM +S075+N+A1 (sample)

Computer Electronic Codes



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	O-Ring
116000-1	Large (5 gal.) Calib. Container
116004-6	Small (5 liter) Calib. Container
116004-5	Small (5 qt.) Calib. Container

SERVICE

For warranty consideration, parts, or other service information, please contact your local distributor. If you need further assistance, call the GPI Customer Service Department in Wichita, Kansas, during normal business hours.

1-888-996-3837

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.

Copy the information located on the Turbine housing. This information will be required by Customer Service.

Model No: _____

Serial No: _____

MFD: _____

Distributor Name: _____

Distributor Phone Number: _____

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3205, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

a.) the product has been altered or modified outside the warrantor's duly appointed representative;

b.) the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its above address no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE OF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).

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Patent Numbers
U.S. Patents 4,856,348; 4,700,579; and 5,046,370. Australian Patent 572,494. Canadian Patent 1,223,464. European Patent 0147004. German Patent P347894.2-08. Italian Patent 68074-BE/89.

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