

ASSURED AUTOMATION

G2 Series **Industrial Digital Flow Meters** (Stainless Steel Housings)



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assuredautomation.com
1-800-899-0553

General Information

This manual will assist you in installing and maintaining your Assured Automation G2 Series Industrial Grade Flow Meter. Information on computer electronics and accessory modules are contained in other manuals. Please reference those as necessary.

For best results, take the time to fully acquaint yourself with all information about all components of your G2 Series Flow Meter prior to installation and use. If you need further assistance, contact the Assured Automation at 1-800-899-0553 from whom you purchased your turbine.



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.

Read Me!

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 the housing material. Use only fluids that are compatible with the housing material and the wetted components of your turbine.
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. Always dispose of used cleaning solvents in a safe manner according to the solvent manufacturer's instructions.
6. During turbine removal, liquid may spill. Follow the liquid manufacturer's safety precautions for clean up of minor spills.
7. Do not blow compressed air through the turbine.
8. Do not allow liquids to dry inside the turbine.
9. Handle the rotor carefully. Even small scratches or nicks can affect accuracy.
10. When tightening the turbine, use a wrench only on the wrench flats.
11. For best results, always verify accuracy before use.

Product Description

G2 Series Flow Meters are identified by the internal diameter and the inlet and outlet.

Model 05 – 1/2 inch (Mid Flow)

Model 07 – 3/4 inch (Mid Flow)

Model 10 – 1 inch (Mid Flow)

Model 15 – 1 1/2 inch (High Flow)

Model 20 – 2 inch (High Flow)

Each of these turbines is designed to work with on-board computer electronics and/or with one of several accessory modules that can interface to a wide variety of reporting and collecting devices. Liquids flow through the turbine housing causing an internal rotor to spin. As the rotor spins, an electrical signal is generated in the pickup coil. The electrical signal provides the output necessary to operate the on-board computer electronics for local indication directly on the turbine or one of several accessory modules that transmit the signal to external equipment.

Upon receipt, examine your meter for visible damage. The turbine is a precision measuring instrument and should be handled as such. Remove the protective plugs and caps for a thorough inspection. If any items are damaged or missing, contact your distributor. Make sure the turbine model meets your specific needs.

Refer to the Specifications Section and confirm the following:

1. The flow rate is within the limits of your model.
2. The liquid is compatible with the turbine's wetted components.
3. The system's pressure does not exceed the turbine's maximum pressure rating.

Information specific to your particular turbine, including serial number, model number, manufacturing date, and K-factor is etched on the meter.

For your future reference, it is recommended that you record this information in the manual in case it becomes unreadable on the turbine.

Serial Number (SN): _____

Model Number (MODEL): _____

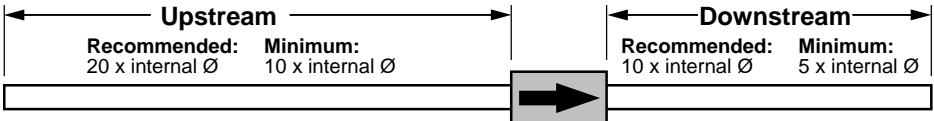
Date of Manufacture (MFG DATE): _____

K-factor (KF): _____

Installation

All G2 Series Flow Meters are designed to measure flow in only one direction. The direction is indicated by the arrow cast-molded on the outlet of the turbine housing. If the opposite direction is desired, and you are using on-board computer electronics, rotate the computer electronics 180 degrees prior to installation.

Flow altering devices such as elbows, valves, and reducers can affect accuracy. The following recommended guidelines are given to enhance accuracy and maximize performance. Distances given here are minimum requirements; double them for desired straight pipe lengths. Upstream from the turbine, allow a minimum straight pipe length at least 10 times the internal diameter of the turbine. Downstream from the turbine, allow a minimum straight pipe length at least 5 times the internal diameter of your turbine.



Upstream Requirements

Model 05 – (0.5" Int. Ø) = 10" (5" min.)
Model 07 – (0.75" Int. Ø) = 15" (7.5" min.)
Model 10 – (1.00" Int. Ø) = 20" (10" min.)
Model 15 – (1.50" Int. Ø) = 30" (15" min.)
Model 20 – (2.00" Int. Ø) = 40" (20" min.)

Downstream Requirements

Model 05 – (0.5" Int. Ø) = 5" (2.5" min.)
Model 07 – (0.75" Int. Ø) = 7.5" (3.75" min.)
Model 10 – (1.00" Int. Ø) = 10" (5" min.)
Model 15 – (1.50" Int. Ø) = 15" (7.5" min.)
Model 20 – (2.00" Int. Ø) = 20" (10" min.)

A typical back pressure of 5 to 50 PSI (0.34 to 3.4 bar) will prevent cavitation. Create back pressure by installing a control valve on the downstream side of the meter at the proper distance detailed above.

Foreign material in the liquid being measured can clog the turbine's rotor and adversely affect accuracy. If this problem is anticipated or experienced, install screens to filter impurities from incoming liquids.

Maximum Particulate Size & Required Screen Mesh

Models 05, 07, & 10:

Particle Size: 0.005" (125 micron)
Screen Mesh: 55

Models 15 and 20:

Particle Size: 0.018" (500 micron)
Screen Mesh: 28

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

To purge the system of air:

1. Ensure some back pressure exists on the turbine in the line.
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. Each turbine contains a removable back coverplate. Leave the coverplate installed unless accessory modules specify removal.

Connections

1. To protect against leakage, seal all threads with an appropriate sealing compound. Make sure the sealing compound does not intrude into the flow path.
2. Make sure the arrow on the outlet is pointed in the direction of the flow.
3. Tighten the turbine onto the fittings. **ONLY use a wrench on wrench flats.**

NOTE: If connecting to new male threads, burrs and curls can adversely effect accuracy. Correct the problem prior to turbine installation.

Maintenance

Verify Accuracy

Before use, check the turbine's accuracy and verify calibration.

1. Make sure there is no air in the system.
2. Measure an exact known volume into an accurate container.
3. Verify the volume against the readout or recording equipment.

NOTE: 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.

Removing the Turbine

1. Drain all liquid from the turbine. Wear protective clothing as necessary.
2. Loosen both ends of the turbine. Use a wrench only on the turbine's wrench flats.
3. If the turbine is not immediately installed again, cap lines as necessary.

Replace Internal Parts (see diagram below)

1. Remove the turbine from the system as detailed above.

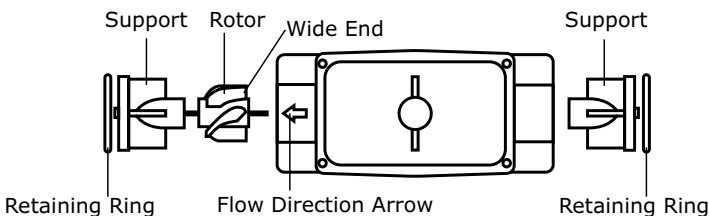
NOTE: Carefully notice the orientation of all internal parts as they are removed, especially the orientation of the rotor to the flow direction arrow.

2. Using a small tool such as a screwdriver or awl, gently pry one retaining ring from its groove. Remove the support. If necessary, use needle nose pliers. Little or no force should be required.
3. Carefully remove the rotor.

CAUTION:

Handle the rotor carefully. Even small scratches or nicks can affect accuracy.

4. Turn the turbine over and remove the other retaining ring. Remove the other support.
5. Clean, as detailed below, or discard as necessary.
6. Replace one support and retaining ring. Parts should drop easily into place with little or no force.
7. Install the rotor. Make sure the wide end of the rotor's blades faces the flow direction.
8. Turn the turbine over and drop the second support into place. Put the final retaining ring into position.
9. Reinstall the turbine, purge the system of air, and verify accuracy before use.



Cleaning the Turbine

During use, the turbine should be kept full of liquid to ensure that drying does not occur inside the turbine. If drying or caking should occur, the rotor will stick or drag, affecting accuracy. To determine if the rotor is stuck or dragging, gently blow air through the meter and listen for the quiet whir of the rotor.

CAUTION:

Never blow compressed air through the meter. It could damage the rotor.

1. Remove the turbine from the system following the directions above.

!!! WARNING !!!

During turbine removal, liquid may spill. Follow the liquid manufacturer's safety precautions for clean up of minor spills.

2. Apply a penetrating lubricant such as WD-40 or a recommended cleaning solvent on the turbine's rotor, shaft, and bearings. Allow it to soak for 10 to 15 minutes.

CAUTION:

Do not submerge the meter.

3. Carefully remove residue from the rotor using a soft brush or small probe such as a screwdriver. Be careful not to damage the rotor and support.

!!! WARNING !!!

Follow the liquid manufacturer's instructions for the disposal of contaminated cleaning solvents.

4. When the rotor turns freely, install the meter again, following the Installation instructions.

Troubleshooting

If measurement is found to be inaccurate during the verification procedure, review this list of possible causes, and follow the instructions in the solution.

Possible causes of inaccurate measurement:

Cause: Turbine operated below minimum rate.

Solution: Increase flow rate. See Specifications for flow ranges.

Cause: Turbine is partially clogged with dried liquid.

Solution: Remove turbine. Clean carefully. Make sure rotor spins freely.

Cause: Turbine bearings partially clogged with dried liquid.

Solution: Remove turbine. Clean carefully. Make sure rotor spins freely.

Cause: Sealant wrapped around rotor.

Solution: Remove turbine. Clear material from rotor.
Make sure rotor spins freely.

Cause: Installed too close to fittings.

Solution: Install correctly. See Installation Section.

Cause: Improper connections to recording device.

Solution: Check all electrical connections.
Reference appropriate installation instructions.

Service

For warranty consideration, parts, or other service information, please contact Assured Automation Customer Service Department in Clark, New Jersey, during normal business hours. **1-800-899-0553**

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

1. The model number of your turbine.
2. The serial number or manufacturing date code of your turbine.
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. ASSURED AUTOMATION 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 turbines without specific authority from Assured Automation. Due to strict regulations governing transportation, handling, and disposal of hazardous or flammable liquids, Assured Automation will not accept turbines for rework unless they are completely free of liquid residue.

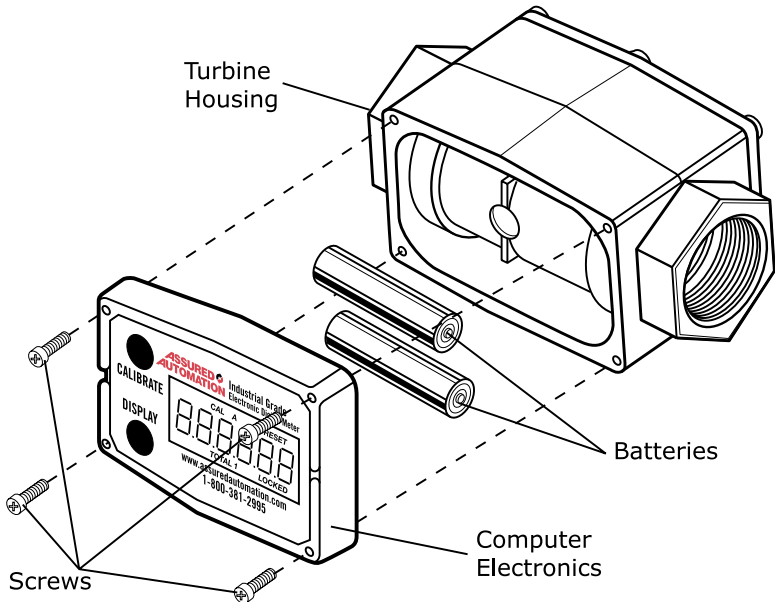
CAUTION: Turbines not flushed before shipment can be refused and returned to the sender.

Replacement Parts

Replacement Kits are available for turbine assemblies and computer assemblies. Individual components within these assemblies, such as rotors, signal generators, and buttons are not available. The factory will determine the exact Turbine Assembly or Computer Assembly you need when given the model number and serial number of the flow meter.

Order Replacement Parts with the part numbers given here.

Part Number	Description
901002-52	09 Series Computer O-Ring
125500-1	05 (1/2 inch) Rotor/Support Replacement Kit
125500-2	07 (3/4 inch) Rotor/Support Replacement Kit
125500-3	10 (1 inch) Rotor/Support Replacement Kit
125500-4	15 (1-1/2) inch Rotor/Support Replacement Kit
125500-5	20 (2 inch) Rotor/Support Replacement Kit
904005-20	One 05 (1/2 inch) Retaining Ring
904005-21	One 07 (3/4 inch) Retaining Ring
904005-22	One 10 (1 inch) Retaining Ring
904005-23	One 15 (1-1/2 inch) Retaining Ring
904005-24	One 20 (2 inch) Retaining Ring
113520-1	Battery Kit (2 batteries included)



Specifications - Stainless Steel Models

All data on Models S05, S07, and S10 determined with 1 centipoise Kermac solvent test fluid at 70°F (21°C). Data on Models S15 and S20 is determined with water at 70°F (21°C).

All Assured Automation Stainless Steel turbines are available with Factory Mutual approval with a Class 1, Division 1 Approval for hazardous environments when equipped with on-board computer display.

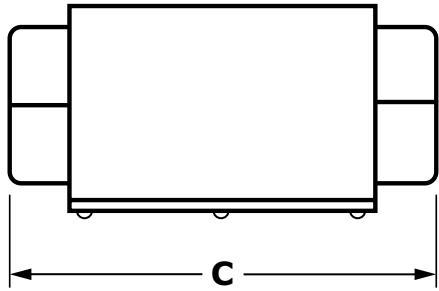
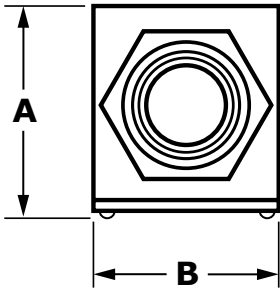
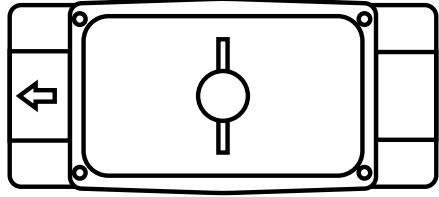
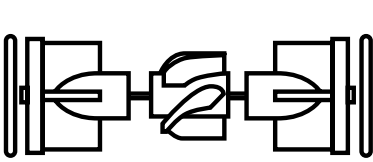
Models Size	S05 1"	S07 3/4"	S10 1"	S15 1 1/2"	S20 2"
Linear Flow Range in GPM (LPM)	1 - 10 (3.8 - 38)	2 - 20 (7.6 - 76)	5 - 50 (19 - 190)	10 - 100 (38 - 380)	20 - 200 (76 - 760)
Maximum Flow ¹ in GPM (LPM)	15 56.8	30 113.6	75 284	150 568	300 1,136
Fluid Velocity in Extended Range in ft./sec (m/sec)	0.5 - 10.6 0.2 - 3.2	0.6 - 12.1 0.2 - 3.7	0.93 - 18.6 0.28 - 5.7	0.8 - 15.9 0.24 - 4.8	0.96 - 19.1 0.29 - 5.8
Max. Pressure Drop in 10:1 Range	8 PSIG 0.55 bar	7.5 0.5 bar	5 PSIG 0.34 bar	4 PSIG 0.28 bar	4 PSIG 0.28 bar
Frequency Range in Linear Flow Range	45 - 450 Hz 0.3 - 3 GPM	37 - 370 Hz 3 - 50 GPM	45 - 475 Hz 30 - 300 GPM	35 - 350 Hz	33 - 330 Hz
Connections NPT or ISO Female Threads	1/2 inch	3/4 inch	1 inch	1 1/2 inch	2 inch
Weight without Computer Electronics*	1.8 lbs. 0.8 kg	2.0 lbs. 1.0 kg	2.4 lbs. 1.1 kg	4.0 lbs. 1.8 kg	6.3 lbs. 2.9 kg
Performance Linear Range (in 10:1) Repeatability	± 2.0% ± 0.1%	± 2.0% ± 0.1%	± 1.5% ± 0.1%	± 1.0% ± 0.1%	± 1.0% ± 0.1%
Pressure Rating	1500 PSIG (contact factory to 3000 PSIG) 21 bar (contact factory to 207 bar)				
Temperature Range	-40°F to 250°F These temperatures apply to operations and storage. They are only for the turbine without computer electronics. Final operational temperature range is determined by computer electronics or accessory modules.				
Materials of Wetted Components					
<p style="text-align: center;">Housing: 316 Stainless Steel Journal Bearings: Ceramic (96% Alumina) Shaft: Tungsten Carbide Rotor and Supports: PVDF Retaining Rings: 316 Stainless Steel</p>					

* Computer electronics add 0.2 lbs. (0.1kg) to total weight.

1) The meter can operate up to this flowrate without damage. Continuous operation will severely degrade meter life and performance.

Dimensions - Stainless Steel Models

Models Size	S05 1"	S07 3/4"	S10 1"	S15 1 1/2"	S20 2"
A (Height) in Inches (mm)	1.8" (46 mm)	2.0" (51 mm)	2.2" (51 mm)	2.8" (69 mm)	3.2" (84 mm)
B (Width) in Inches (mm)	2.0" (51 mm)	2.0" (51 mm)	2.0" (51 mm)	2.7" (69 mm)	3.3" (84 mm)
C (Length) in Inches (mm)	4.2" (1107 mm)	4.3" (109 mm)	4.5" (114 mm)	5.3" (135 mm)	6.3" (160 mm)



Limited Warranty Policy

Assured Automation, 19 Walnut Avenue, Clark, NJ 07066-1605 hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Assured Automation except models BP-10, BP-12, CP-5, D-12, D-24, D-115, D-230, LP-50 and RP-5. These models carry a 90-day warranty. The 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 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.

ASSURED AUTOMATION 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.

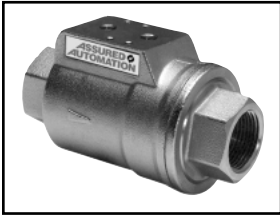
The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed. This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

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



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Automated & Manual Valves



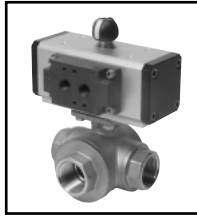
VA Series

Compact, pneumatically actuated On/Off valve



Ares & Zeus

Angle seat valves.
Steam service



33D Series

3-way ball valve.
Stainless steel



36 Series

full port ball valve.
Stainless steel

Special Valve Assemblies



Manual valves with limit switches for remote indication of valve position



Special Tee assembly with one electric actuator



Electrically operated control valves with positioning control panels

Digital Flow Meters



Water Series

Water flow meter



TM Series

PVC light duty flow meter



Fuel Series

Fuel flow meter

See our complete line of automated and manual valves, electric and pneumatic actuators, and valve accessories at: assuredautomation.com

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09 Computer Electronics Owner's Manual

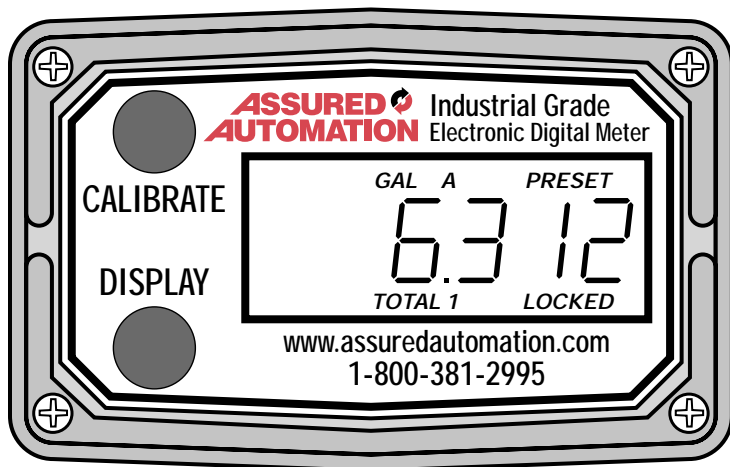


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1-800-899-0553

General Information

This manual will assist you in operating and maintaining the Computer Electronics of the Assured Automation Flow Meters. Calibration details are given in this manual. Information on turbine housings and accessory modules are contained in other manuals. Please reference those as necessary.

For best results, take the time to fully acquaint yourself with all information about all components of your Assured Automation 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.

Information specific to your particular turbine, including serial number and manufacturing date is printed on the bottom of the turbine housing.

For your future reference, it is recommended that you record this information in the manual in case it becomes unreadable on the turbine.

Serial Number: _____

Date of Manufacture: _____

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 Assured Automation Flow Meter 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 by using 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 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 Assured Automation 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.

NOTES:

- Avoid electronically "noisy" environments. Install at least 6 inches (15.2cm) away from motors, relays, or transformers.
- All Assured Automation A1 Series meters are tested and calibrated at the factory using state-of-the-art calibration procedures and testing equipment.
- 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.

!!! WARNING !!!

Never blow compressed air through the meter. It could damage the rotor.

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

Whenever no flow has been sensed for one minute, the unit automatically switches to a power-saving “sleep” mode with a blank display. The unit will automatically “wake up” the moment any flow is sensed and will remain awake as long as fluid is flowing. Totals are never lost during sleep periods.

Batch and Cumulative Totals

Total flags are displayed on the bottom line. The **Cumulative Total** (labeled TOTAL 1 LOCKED) is the total of all fluid measured since the meter’s power was connected. (At your first use, the Cumulative Total may not read zero because of calibration at the factory.) The **Batch Total** (labeled TOTAL 2) indicates flow during a single use.

Clearing a Totalizer

The Batch totalizer register (TOTAL 2) may be independently cleared to 0.00 at any time. To clear a batch totalizer, with the desired totalizer displayed, press and hold the **DISPLAY** button. At about three seconds, the displayed total will be cleared to “0.00.” You can do this even while fluid is flowing, in which case counting will resume after you release the **DISPLAY** button.

The Cumulative totalizer register is labeled as TOTAL 1 LOCKED indicating that it cannot be manually zeroed (See Figure 1). The Cumulative totalizer can be cleared only when the batteries are removed or go dead or when the Cumulative Total reaches the maximum value of 999,999.

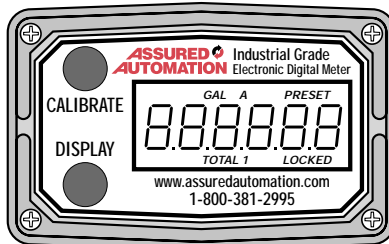


Figure 1

Operations (continued)

Changing Display Registers

To change to another totalizer register or to FLOWRATE mode during normal operation, briefly press and release the DISPLAY button.

The mode is displayed on the bottom line of the display, underneath the numeric digits. Each time you press and release the DISPLAY button, the mode will advance as follows:

- TOTAL 1 LOCKED (Cumulative Total)
- TOTAL 2 (Batch Total)
- FLOWRATE
- TOTAL 1 LOCKED (etc.)

You can change registers at any time, even during flow. Non-visible totalizer registers will continue to accumulate.

NOTE: Generally, display registers change when the buttons are **released**.

Factory and Field Calibration Curves

Assured Automation “09” series flow computers have enhanced calibration features. All calibration information is visible to the user as words in the upper part of the display, above the numeric digits.

All units will be configured with a “factory” calibration curve, for which units of gallons or liters may be selected by the user (“GAL” or “LTR” will be visible). This curve is NOT user adjustable: the word “PRESET” is displayed to show this. (See Figure 2) The factory calibration is stored permanently in the computer’s memory.

The “field” calibration curve(s) may be set by the user, and can be changed or modified at any time using the calibration procedure described below in the CALIBRATION section. Totals or flowrate derived from the field calibration are visible when the field calibration setting is selected (“CAL B” or “CAL C” will be visible).

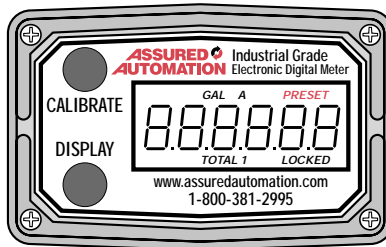


Figure 2

Operations (continued)

Selecting a Different Calibration Setting

You can switch between GAL and LTR modes at will without “corrupting” totalizer contents. For example, the computer can totalize 10.00 gallons. If the user switches to LTR mode, the display will immediately change to “37.50” (the same amount in units of liters). GAL / LTR switching also works in FLOWRATE mode.

To select a different calibration setting, first press and hold the CALIBRATE button. Continue to hold it while also briefly pressing and releasing the DISPLAY button (you may then also release the CALIBRATE button).

The flag indicators in the upper area of the display will change to show the newly selected calibration setting. Calibration settings change in this order: GAL, LTR, CAL B, CAL C, GAL (etc.). While fluid is flowing only the GAL and LTR selections may be made, however, when NO fluid flow is occurring, any setting may be selected.

Flowrate Mode

The Rate of Flow feature is accessed by briefly pressing and releasing the DISPLAY button as described above. When this feature is activated, the word “FLOWRATE” displays to the left on the bottom line (See Figure 3) and the numbers in the middle of the display reflect the rate of flow (instead of total). Units are set to update the display every five seconds, so the first reading after flow starts or changes and the last reading after flow stops or changes will not be correct. This is normal.

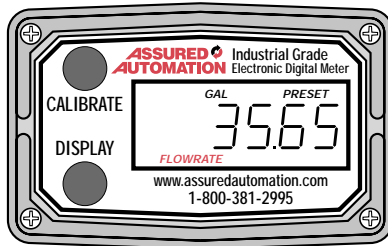


Figure 3

Propeller

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

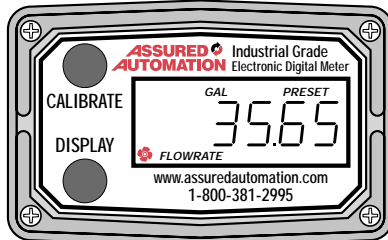


Figure 4

Calibration

Factory Calibration settings are programmed into each flowmeter during production, and are correct for light fluids such as water, gasoline, or diesel fuel. Factory Calibration is completed with either stoddard test solvent (on 1" turbine sizes) or water (on 2" turbine sizes) at 70°F (21°C). Readings using the standard factory calibration curves may not be accurate in some situations – for example, if the unit measures a “heavy” fluid such as motor oil, especially under extreme temperature conditions.

For improved accuracy under such conditions, the Assured Automation flow computer allows for “field” calibration, that is, user entry of custom calibration parameters. A “single point” calibration may yield acceptable accuracy with light liquids, however, heavy liquids may require five or more calibration points to achieve a high level of accuracy. Up to 15 custom calibration points can be entered.

NOTE: A Field Calibration below the minimum flow rate 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 rates, it is strongly recommended that Field Calibration of 2" meters be completed with a combination of volume and weight using fine resolution scales. 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 – these actions will result in less accurate calibrations.

Make sure you meet the meter’s minimum flow rate requirements!

1 in. low flow meters: 0.3 GPM (1.5 LPM)

1 in. meters: 3 GPM (18.8 LPM)

2 in. meters: 30 GPM (114 LPM)

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

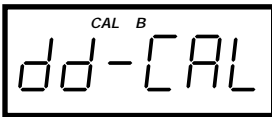
Calibration (continued)

1. Hold down CALIBRATE while pressing and releasing DISPLAY until the Field Calibration curve appears (“CAL B” or “CAL C” message will be displayed in the top row above the numeric digits.) Release both buttons.

Note: Remember that Field Calibration curves are not preset.

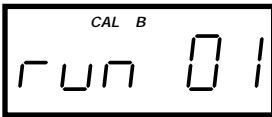


2. To calibrate, press and hold the CALIBRATE button. While holding the CALIBRATE button, also press and hold the DISPLAY button. Hold both buttons for about 3 seconds until you see a blinking “dd-CAL” message. Once the “dd-CAL” message appears, release both buttons. You are now in field calibration mode.



3. Once the buttons have been released from Step 2, the display will show the blinking message “run 01.”

Note: The computer is waiting for you to make a decision to either exit from field calibration mode or to begin a dispense run. If you want to exit the calibration now, go to Step 11.



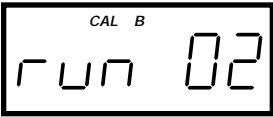
4. If you want to continue with the calibration, but have not dispensed any fluid yet, make any final preparations to your pumping system, but don't start pumping yet.
5. Start your pumping system so that fluid flows through the meter. The display will stop blinking and show the “run 01” message. Dispense into a container that allows you to judge the amount of fluid pumped. When you have pumped the desired amount (for example, 10 gallons), stop the fluid flow quickly.
Note: When the computer displays a non-blinking “run 01” message, it is sensing fluid flow. For the most accurate results, dispense at a flow rate which best simulates your actual operating conditions. Avoid “dribbling” more fluid or repeatedly starting and stopping the flow - these actions will result in less accurate calibrations.

Calibration (continued)

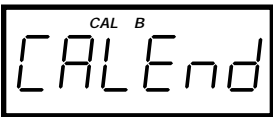
6. Once the flow has stopped, briefly press and release both buttons. At this point the computer display will change to “0000.0” with the left-hand digit blinking. **Note:** When the display shows “0000.0” the computer has stopped “watching” for fluid flow and is now waiting for you to enter some numbers.



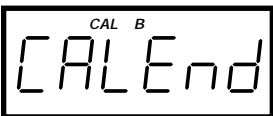
7. Enter the volume (amount) of fluid that you dispensed (for example, if your 10-gallon container is full, enter “10.0” for gallons or “37.5” for liters). To enter numbers use the CALIBRATE button to change the value of the digit that is blinking and use the DISPLAY button to advance the “blink” to the next digit.



8. Once the correct number has been entered, briefly press and release both buttons. The display will now change to a blinking “run 02” message.
9. To enter another calibration point, go back and repeat Steps 3 through 8. **Notes:** It is possible to set up to 15 cal-curve points, and the “run ##” message will increment each time you repeat the calibration process (run 01, run 02, run 03, etc., up to run 15).
10. To end calibration, press and hold both buttons for about 3 seconds until you see the “CAL End” message. **Notes:** After you release the buttons, the computer will resume normal operations with the new cal point(s) active.



11. If you HAVE NOT dispensed any fluid, you can exit calibration without changing the cal curve. If the message “run 01” is showing and you have not dispensed any fluid, hold both buttons for about 3 seconds until you see a “CAL End” message. **Notes:** After you release the buttons, the computer will resume normal operation and the old curve (if you have entered one in the past) is still intact.



User Configuration

The new “09” series Assured Automation flow computer 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 Assured Automation 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 1 Total, Batch 2 Total, Flowrate Mode)
- Flowrate Update Interval (Units per Minute, Hour, or Day)
- Flowrate Timebase (Minute, Hour, Day)
- Factory Calibration Curve A Units Enabled (Gallons, Liters)
- Field Calibration Curve B and/or C Enabled
- Dispense/Display or K-Factor Entry Calibration
- Maximum Resolution for Field Calibration (0, 1 or 2 Decimals)

Changing Configuration Settings

Access to the configuration process is restricted for security until a “password” is entered. Contact your distributor or Assured Automation to get the password and instructions to unlock and reset configuration settings. 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 Assured Automation computers are programmed with two different field calibration methods, only one of which is active, the “dispense-display” calibration procedure described above. It is possible to activate “K-Factor entry” field calibration by changing configuration settings. Contact your distributor or Assured Automation to get the correct password, configuration code, and instructions for this calibration method. K-Factor Entry Calibration is similar to the dispense-display calibration procedure described above, and allows up to 15 calibration points to be entered using meter K-Factor inputs.

Maintenance

The computer electronics are powered by lithium batteries which provide at least 9,000 hours (1 year). Under most conditions, the batteries need to be replaced about once a year. Removing the batteries before storing the meter will extend battery life. If the meter's readout should become dim or blank, the batteries should 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 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 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 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.
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 flowrate 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 flowrate 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 or button is defective	Replace computer. Contact the factory.

Specifications

Standard Features Include:

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

Input Pulse Rate:

Minimum Pulse In: DC 0Hz
Minimum Coil Input: 10 Hz
Maximum Raw: 1,000 Hz

K-Factor:

Minimum: 0.1 pulses/unit
Maximum: > 10,000 pulses/unit

Field Calibration:

Minimum Time: 10 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, a remote kit can be used, where the electronics are not mounted to the turbine.

Power:

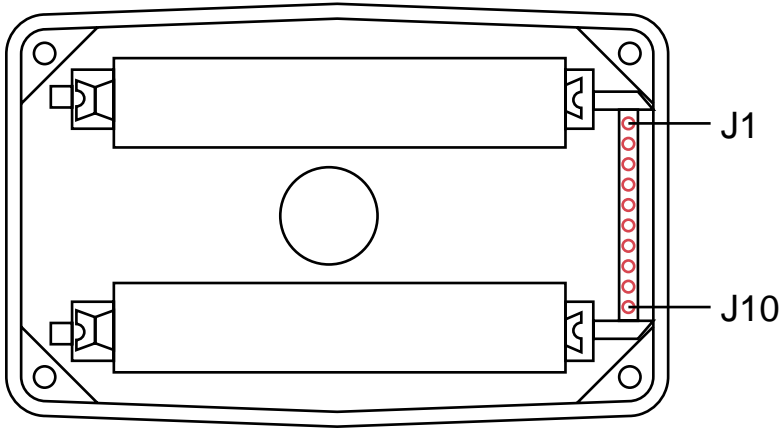
Internal Power Supply: 2 Lithium Batteries at 3 volts each
Minimum Battery Life: 9,000 hours of use (1 year)

Approvals:



Specifications (continued)

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-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 \pm 5%.

J-6 Ground

J-7, 8, 9, 10

Programming interfaces. Not accessible to user.

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.) Calibration Container

Service

For warranty consideration, parts, or other service information, please contact your local distributor. If you need further assistance, call the Assured Automation Customer Service Department in Clark, New Jersey, during normal business hours.

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. Assured Automation 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 Assured Automation Customer Service Department. Due to strict regulations governing transportation, handling, and disposal of hazardous or flammable liquids, Assured Automation will not accept computer electronics or meters for rework unless they are completely free of liquid residue.

Limited Warranty Policy

Assured Automation, 19 Walnut Avenue, Clark, NJ 07066-1605 hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Assured Automation. The 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 Clark, New Jersey, or to 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.

ASSURED AUTOMATION 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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