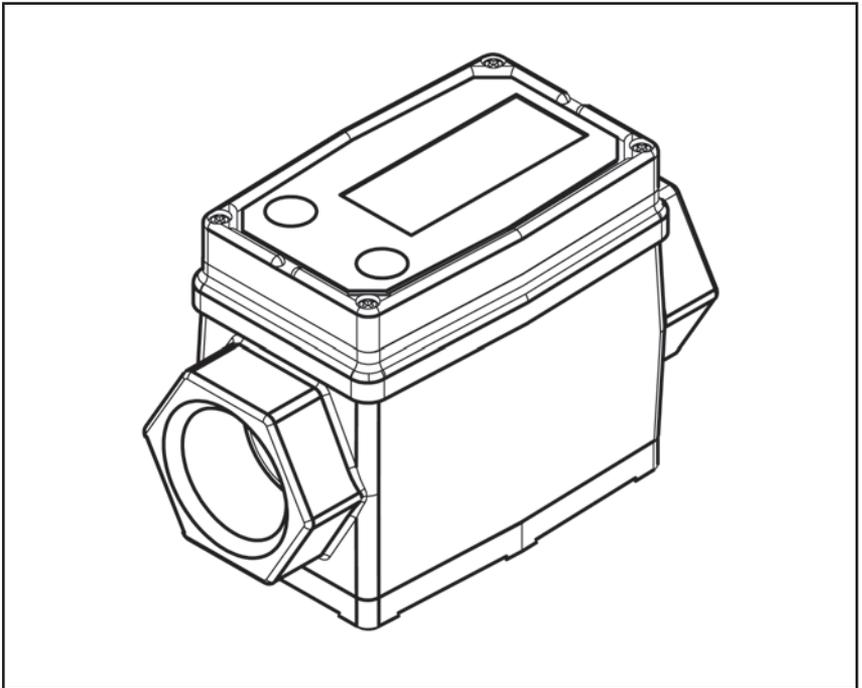


# Industrial Grade **09 COMPUTER ELECTRONICS** Owner's Manual



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***GREAT PLAINS INDUSTRIES, INC.***

*"A Great Plains Ventures Subsidiary"*

[www.gpimeters.net](http://www.gpimeters.net)

**1-888-996-3837**

## 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.

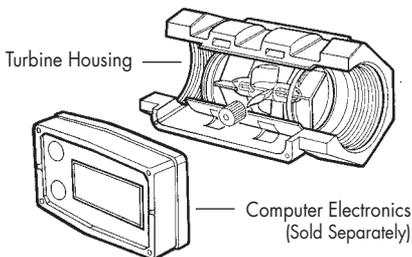


President  
Great Plains Industries, Inc.

## 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**



## 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.

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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 output modules.

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.

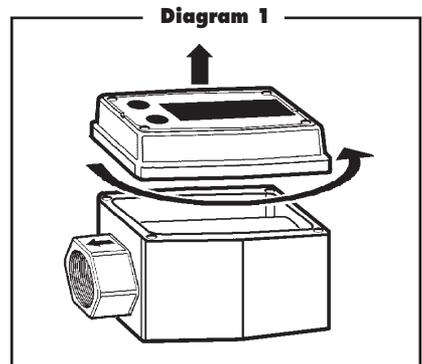
## INSTALLATION

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 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 computer display is upside down, remove the four screws, turn the display 180° and reinstall the screws. See Diagram 1.



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

Our computer electronics are Factory Mutual Approved, C-UL Classified and carry a Class 1, Division 1 Approval for hazardous environments. In addition, GPI meters have NEMA Type 4 enclosures.

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

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.



### 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 with 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 zeroes must be added to the 6 digits shown.

Press the DISPLAY button briefly to switch between the TOTAL 1, TOTAL 2 BATCH and FLOWRATE. 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.

NOTE: Totalization counts total units without differentiating between gallons, litres or field calibrated units.

### Flowrate Feature (some models)

To use this feature, press and release DISPLAY 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 or flowrate 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:

1/2 inch meter	1 GPM (3.8 LPM)
3/4 inch meter	2 GPM (7.6 LPM)
1 inch meter	5 GPM (18.9 LPM)
1-1/2 inch meter	10 GPM (37.9 LPM)
2 inch meter	20 GPM (75.7 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 on the 2 inch meter, it is strongly recommended that Field Calibration be completed with a combination of volume and weight determined with 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 test solvent at 70° F (21° C) for low flow and 1-inch meters and water at 70° F (21° C) for 2-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, 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 FACAL 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 (Units per Minutes, Hours and Days)

- Factory Calibration Curve Units Enabled (Gallons, Imperial Gallons, Litres, 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.

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.

## MAINTENANCE

The computer electronics is powered by lithium batteries. 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 should be replaced. Replacement batteries can be ordered from your distributor or the factory. See details in the Parts Section.

**LobAtt**

## TROUBLESHOOTING

Symptom	Probable Cause	Corrective Action
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>
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>
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>
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>
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

## Computer Electronics Terminal Connections

### 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:

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

### K-Factor:

Minimum:	.01 pulses/unit
Maximum:	> 999,999 pulses/unit

### Field Calibration Correction:

Minimum:	-99.9%
Maximum:	+99.9%

### Readout Totals:

Minimum Display:	0.01
Maximum Display:	999,999 (x100)

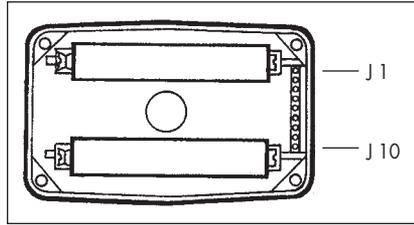
### Temperatures:

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
Optional External Power Module:	7-30 VDC



**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 may be 5 volts to 10 volts DC.

**J-6 Ground**

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

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	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 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.**

## WEEE DIRECTIVE



The Waste Electrical and Electronic Equipment (WEEE) directive (2002/96/EC) was approved by the European Parliament and the Council of the European Union in 2003. This symbol indicates that this product contains electrical and electronic equipment that may

include batteries, printed circuit boards, liquid crystal displays or other components that may be subject to local disposal regulations at your location. Please understand those regulations and dispose of this product in a responsible manner.

**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: \_\_\_\_\_

## Declaration of Conformity

Manufacturer's Name: Great Plains Industries, Inc.  
Manufacturer's Address: 5252 East 36th Street North  
Wichita, KS USA 67220-3205

Declares, that the product:

Product Name: Electronic Digital Meter  
Model Numbers: 03\*\*\*\*\*  
A1\*\*\*\*\*  
A2\*\*\*\*\*  
G2\*\*\*\*\*

*Model numbers include all combinations  
of an alpha-numeric series as illustrated above.*

Conform to the following Standards:

EMC: EN 50081-1 (Reference EN 55022)  
EN 50082-1

Energy - Limited Apparatus: EN 50021  
I.P. Code: BS EN 60529

Supplementary Information:

"The products comply with the requirements of the EMC  
Directive 89/336/EEC and the ATEX Directive 94/9/EC  
(ANNEX VIII)."

I, the undersigned, hereby declare that the equipment specified above conforms  
to the above Directive(s) and Standard(s).

Signature:   
Full Name: Mr. Grant Nutter  
Position: President  
Great Plains Industries, Inc.  
Place: Wichita, KS USA  
May 2003

## Limited Warranty Policy

Great Plains Industries, Inc. 5252 E. 36<sup>th</sup> Street North, Wichita, KS USA 67220-3205, hereby provides a limited warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This product includes a 1 year warranty. Manufacturer's sole obligation under the foregoing warranties will be limited to either, at Manufacturer's option, replacing or repairing defective Goods (subject to limitations hereinafter provided) or refunding the purchase price for such Goods theretofore paid by the Buyer, and Buyer's exclusive remedy for breach of any such warranties will be enforcement of such obligations of Manufacturer. 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 manufacture or on the date of purchase with an original sales receipt. 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, contact the GPI Customer Service Department at 316-686-7361 or 888-996-3837. Or by mail at:

Great Plains Industries, Inc.  
5252 E. 36<sup>th</sup> St. North  
Wichita, KS, USA 67220-3205

The company shall, 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).



Factory Mutual Approved  
Intrinsically Safe for Class I, II, III, Division 1, All Groups.



NEMA  
4



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