Model RF-OMS	Radio Frequency Oil Management System	Installation & Operation Manual

IMPORTANT !!!! This manual contains important warnings and information. READ AND KEEP FOR REFERENCE.

Specific keypad/software set-up instructions are contained in the keypad packaging.

BadgerMeter,Inc.

IOM-085-01
Part No. 53400-085
11-02

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Factory Settings
Each meter is preprogrammed and calibrated at the factory. Unless otherwise specified at the time of the order, each meter is programmed in quarts for use with motor oil. The meter is shipped in the Manual Mode. If you need to change the factory settings, see page 6.

1000 psi (67 bar) Maximum Working Pressure
8 gpm (30 Lpm) Maximum Flow Rate

This Meter is designed specifically to dispense motor oils (S.A.E. 5-50), gear oils (S.A.E. 80-240), automatic transmission fluid, antifreeze (Ethylene Glycol) solution, and hydraulic fluid. Other models of the EPM are designed to dispense brake fluid or windshield wiper fluid.

SYMBOLS

⚠WARNING

This symbol is an alert to the possibility of serious injury or death if the instructions are not followed.

⚠CAUTION

This symbol is an alert to the possibility of damage to or destruction of equipment if the instructions are not followed.

⚠WARNING

Equipment Misuse Hazard

1. This equipment is for professional use only.
2. Read all instructions, tags, and labels before operating the equipment.
3. Use the equipment only for its intended purpose.
4. Do **NOT** modify or alter the equipment.
5. Do **NOT** leave equipment unattended while dispensing.
6. Check equipment daily. Repair or replace worn or damaged parts immediately.
7. Do **NOT** exceed the maximum working pressure level of the lowest rated system component.
8. Use only extensions and nozzles that are designed for use with this equipment.
9. Use only fluids and solvents that are compatible with the equipment. Read all fluid and solvent manufacturer's warnings.
10. Tighten all fluid connections before operating this equipment.
11. Do **NOT** stop or deflect leaks with hands, body, gloves, or rags.
12. Do **NOT** dispense valves towards any person or any part of the body.
13. Do **NOT** place hands or fingers over the end of or into the dispense valve.
14. Comply with all local, state, and federal fire, electrical, and safety regulations
15. Use of this product in a manner other than specified in this manual may result in impaired operation or damage to equipment.

Radio Frequency Oil Management System Overview

Badger Meter's Radio Frequency Oil Management System (RF-OMS) consists of an A/C powered keypad with an integrated ticket printer and up to 48 RF equipped meters. The product has been designed to offer greater control over the dispensing of AFP with significant reductions in installation costs and the associated hardware common to most hard-wired systems today. Dispensing information and authority is communicated from the keypad to the meter with actual dispensing information being communicated back to the keypad utilizing 902-928 Mhz frequency hopping spread spectrum radio communications. Tracking of all dispenses, by PIN#, Work Order #, fluid type, Meter/Hose # allows the software to compute the remaining balances of up to 8 different tanks/fluids.

Keypad Overview

FCC ID: GIF-RFKEYPAD
FCC CERTIFIED, PART 15, SUBPART C

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The keypad consists of an integrated 40-column ticket printer, antennae for RF communications and a 16-button keypad to enter and authorize dispensing transactions. The Keypad also houses the electronics that maintain the computed inventory levels via deliveries, dispenses and other manual transactions.

The Keypad is A/C powered and should be installed indoors as close to the meters it will communicate with as possible (Max 300 feet) but yet secured from abuse and environment issues. Reference the keypad installation instructions for a list of materials that may significantly impact RF range. Software in the keypad recognizes two levels of authority: Supervisor and Operator. The Supervisors Personal Identification Number (PIN) allows for system initialization, configuration, communication diagnostics and report generation. The operator pin authorizes and records all dispenses.

If RF Communications from the keypad to the meter are unavailable (temporary obstruction, damage to the keypad, power outage, etc) the meter may be programmed to dispense in the manual mode by entering a code via the buttons on the meter. In this mode, the meter will only dispense after verifying that it

is unable to communicate with the keypad. All dispenses in this mode are recorded to memory and, in total, are communicated to the keypad once communications are reestablished. Inventory levels and consumption data are updated when communications are restored.

Meter Overview

FCC ID: GIF-RFEPM
FCC CERTIFIED, PART 15, SUBPART C

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The meter is Badger's Electronic Preset meter (EPM) equipped with RF communications allowing authorization and dispense information. Once a work order has been set up, the operator simply pulls the trigger and the authorized amount of fluid for that meter will dispense. The valve will automatically shut off when the full amount has been dispensed. A "Top Off" feature allows additional amounts to be dispensed and tracked after the valve closes. Upon completion of the dispense effort, the valve locks prohibiting any unauthorized dispense to occur.

Overhead view of Keypad

Keypad Installation.

The keypad should be mounted, near a 110 volt electrical outlet, to a structurally sound wall through the two holes on the side of the keypads casing. Height on the wall should be 5 to 6'. Care should be taken to avoid mounting behind any steel objects (tool storage cabinets and metal chain linked fences) that may block the RF communication signal. Care should also be taken to avoid direct, significant heat sources.

Meter/Keypad Programming.

The keypad has been wall mounted, paper installed in the printer, and power supply activated, the unit will go through certain self-diagnosis. The unit is then ready to be programmed to the meters that you want it to communicate with. To begin the programming, reference the detailed Instruction Manual on Page 5.

Menu Configuration.

Software included in the RF-OMS allows for tracking of all fluids under its control. However all tanks need to be defined and entered into the keypad detailing the size, type of fluid, beginning balance, and any deliveries made by the oil company supplier. Once established, the software automatically tracks all dispenses and calculates the balances. The system recognizes two levels of authority: Supervisor initilizes, configures, communicates and report generation and Operator dispenses fluids to work-orders.
The procedure for supervisor operations is located in the Instruction Manual on Page 5.

Testing the system.

You are now ready to test the system communications. The procedure for testing the system is located in the detailed Instruction Manual on Page 23.

Meter Installation

Pre-Installation Procedure

1. Relieve the system pressure:

a. Turn off the power supply to the pump or close the shutoff valve.
b. Dispense any fluid in the system into a waste container by opening the dispense valve.
c. Open all bleed-type master air valves and fluid drain valves in the system.
d. Leave the drain valve open until ready to pressurize the system.

2. Close the shutoff valve.

3. Ground hoses and reels:
Grounding reduces the risk of static sparking; ground all system components according to local, state, and federal code. Consult the user's manual of the pump and other system components to ground the following:

i. Pump: follow manufacturer's recommendations
ii. Air and Fluid Hoses: use only grounded hoses
iii. Air Compressor: follow manufacturers recommendations
iv. Fluid Supply Container: Follow the local code

⚠WARNING

Do not use Teflon® tape on pipe joints; it may cause a loss of grounding across the joint.

Installation Procedure

1. If this is an existing installation, go directly to step 6. *Steps 2 through 5 are for flushing the system prior to installing the meter.*
2. Close fluid dispense valves at every dispense position.
3. Once the main fluid outlet valve at the pump is closed, the air pressure to the pump motor is properly adjusted, and the air valve is open, slowly open the main fluid valve.
4. Place the hose end in a waste container. Make sure hose is secure so no fluid will leak during flushing.

5. Slowly open the dispense valve and allow enough oil to pass through to ensure that the system is clean. Close the valve and repeat for all dispense positions.

Note: If the system has multiple dispense positions, begin at the position farthest from the pump, and move towards the pump.

6. Relieve the Pressure (see Relieve the System Pressure, above).
7. Insert the metal end of the hose into the swivel located at the end of the handle, and tighten completely with an open ended, adj able wrench.

Attaching the hose

Note: The threaded end of the meter will always have female threads, so the metal end of the hose must have male threads. Apply thread sealant to the male end. The inlet and outlet connections are both 1/2" NPT or 1/2" BSPP depending on meter model.

8. Thread the new nozzle onto the opposite end of the meter and screw in tightly with an open ended, adjustable wrench.

Installing the nozzle

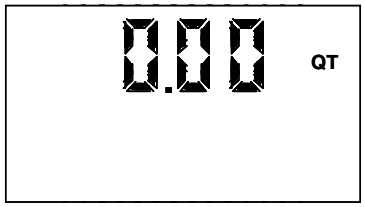
9. Open all dispense position shut-off valves, and start the pump to pressurize the system.
10. To ensure accuracy, purge all air from the fluid lines and dispense valve before use.

Operating the Meter - Manual Mode - When RF Communications are Unavailable

Operating the Meter

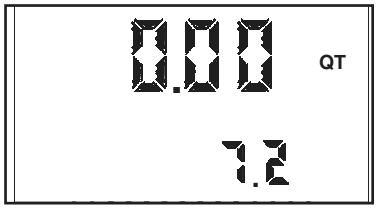
RF Mode:

When the battery pack is attached to the meter, the meter will automatically enter the RF Mode. The trigger is in a lock-out position and no oil can be dispensed until a dispense order is received by the meter.



RF Mode

1. Press (RESET) on meter to receive dispense order from keypad: Trigger unlocks.



RF Mode Batch

2. Pull the trigger to begin the flow. The valve will automatically lock in place, even though the trigger will fall back to the closed position. The flow will automatically shut off when the programmed dispense order size has been dispensed.

⚠CAUTION

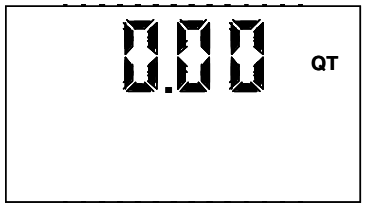
Do **NOT** press (RESET) before topping off. The meter will return to a lock-out position and not allow additional fluid to be dispensed until receipt of a valid dispense order from this keypad.

3. The user has the option to top off at the end of the dispense order. To top off the tank, simply pull the trigger to begin the flow and release when the desired amount has been pumped.

4. Press the (RESET) button when finished to reset the meter. This total quantity dispensed will be transmitted to the keypad and the meter will return to a lock-out position. The meter is now ready to receive the next dispense order from the keypad.

Manual Mode - No RF Communications

1. Program the meter to manual mode by holding down TOTAL key and pressing (0.1), (10), (RESET), (1) and AUTO. The solenoid will now unlock and the meter may be used as a standard Auto Series EPM.



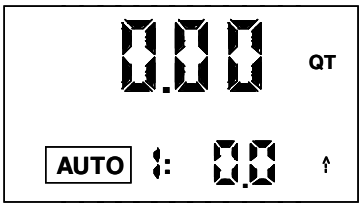
Manual Mode

2. Pull the trigger to begin the flow.

3. When the desired amount has been pumped, release the trigger to stop the flow. Press RESET to reset counter display to zero.

Programming the Preset Batch Function when RF Communications are Unavailable

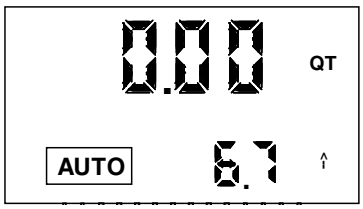
1. To enter the batch-programming mode, press the AUTO button. The following screen will appear:



Auto Mode

2. The meter is now ready to be programmed. Change the batch size by pressing the 10, 1 and 0.1 buttons.

   a. Pressing the 10 button will increase the batching amount in increments of 10 units.
   b. Pressing the 1 button will increase the batching amount in increments of 1 unit.
   c. Pressing the 0.1 button will increase the batching amount in increments of 0.1 units.



3. Pull the trigger to begin the flow. The valve will automatically lock in place, even though the trigger will fall back to the closed position. The flow will automatically shut off when the desired batch size has been dispensed.

⚠CAUTION

The valve will always lock in the maximum open position.
Note: At any time during the operation of the meter, the flow may be stopped by pressing the red button. This will electronically close the valve, stopping the flow. Batching may be resumed by pulling the trigger.

4. The user has the option to top off at the end of the batch. To top off the tank, simply pull the trigger to begin the flow and release when the desired amount has been pumped.

5. Press the RESET button when finished to reset the meter. It is now ready for the next batch.

⚠CAUTION

Do **NOT** press RESET before topping off. The meter will begin a new batch.

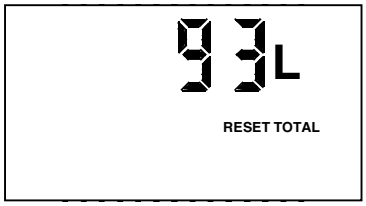
Normal Operating Mode Functions

Total
This option allows users to see the accumulated total as well as the resettable total.

Press and hold the TOTAL button while in normal operating mode to see the accumulated total. Continue holding and after three seconds the screen will change to the resettable total, which displays the total fluid dispensed since the resettable total was last set back to zero.

Press the RESET button while viewing the resettable total to set the resettable total back to zero. Release the TOTAL button to return to the normal operating screen.

Note: The accumulated total cannot be reset, unless the user changes from English units to metric units or from metric to English units. (See Changing Factory Settings.)



Total Function

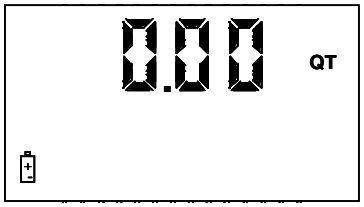
Electrical Override
In case of an emergency or to interrupt a batch, the meter is equipped with an **electrical override**. This option automatically closes the valve in the meter, stopping the flow immediately. Batching can be continued after an override, even if the meter is in the middle of a programmed batch.

Press the red button to activate the electrical override. This can only be used when the valve is open.

Service

Changing the Battery
When the batteries need to be changed, a progression of warnings will appear on the screen.

1. First warning: the **Low Battery Icon** will appear in the lower left corner of the display. This means that the batteries are low and need to be changed within one week after the icon first appeared.



2. Second warning: The **AUTO** function will shut off and the auto icon will disappear. This means the battery power is too low to run the auto function. The meter can still run in manual mode.

3. Third Warning: The screen goes blank. This means there is no power left. The display cannot be run. However the meter will still allow fluid to pass through when the valve is opened, but it will not measure flow.

• The battery compartment is located on the underside of the trigger guard. Unscrew the two screws located under the guard and remove the battery cover to expose the batteries.

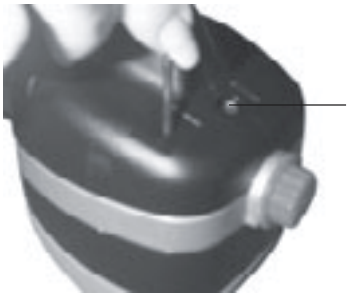
• Replace the old batteries. This meter takes 4 AA alkaline batteries. Replace the cover and the screws when finished. Note battery polarity markings inside battery compartment cover.

• Dispose of used batteries properly according to local regulations.

Changing Factory Settings

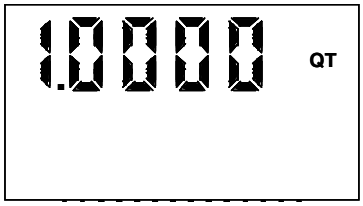
Factory Settings
Each meter is preprogrammed and calibrated at the factory. Unless otherwise specified at the time of the order, each meter is programmed in liters for use with motor oil.

1. Press RESET to wake up the meter if screen is blank.
   To enter the programming mode, press and hold the **<PROGRAMMING>** key located in the access hole under the meter for 2 seconds. (See picture below)



Location of access hole for PROGRAMMING Key.

After the screen flashes, it will display the scale factor and units of measurement.



Initial Programming Screen

Programming the Units
This meter comes with the option to choose 4 different units of measure. Unless otherwise specified at the time of the order, each meter is programmed in liters for use with motor oil. The 'L' will be flashing on initial start-up.

1. Toggle the four options ('L', 'QT', 'GAL', 'PT') by pressing the TOTAL button.
2. When the desired option is on the screen, press the RESET button to advance. The units of measurement icon will stop flashing and the first digit of the scale factor will begin flashing.

Note: If the 'L' units have been selected, the decimal point will begin to flash. The user now has the option to change the decimal point to either a period or a comma. To do this, press the TOTAL button. Press the RESET button to advance to the scale factor screen.

⚠CAUTION

Changing the units of measurement from metric to English, or from English to metric will clear the accumulated total, and resettable total.

Recalibrating the Meter
The Scale factor is used to adjust the accuracy of the meter. The scale factor will be set at the factory for oil. The primary use for the recalibration function is if the user wants to batch fluids with a viscosity other than 10W oil. If the fluid has a lower viscosity, more fluid can slip past the gears without being detected. Changing the scale factor can adjust the meter to compensate for that loss The meter multiplies each pulse by this number to correct the accuracy when it converts to the specified units, so the reading on the dial is always correct.

For an approximate scale factor for fluids of different viscosities, consult the following chart:

Type of Fluid	Viscosity (cSt)	Scale Factor
Water/Anti-Freeze	5	1.044
Anti-Freeze	18	1.007
Automatic Transmission Fluid	80	1.002
Motor Oil	140	1.000
Mobil 80W-90	450	0.999
50W	900	0.996
140W	1800	0.993

(Unless otherwise specified at the time of the order, each meter is programmed in quarts for use with motor oil.)

Note: The original meter scale factor is written inside of the meter when calibrated at the factory. It may have been revised after field installation. Use scale factor shown on display, not the trigger.

To view the current program scale factor, do the following:

1. Press and hold the TOTAL button.
2. Then, press and hold the AUTO button.

For an absolute scale factor, perform the following test:

Run a pre-measured batch of fluid through the meter. If the meter is programmed to batch 4.200 quarts, and it batches the entire amount but only reads 4.000 quarts, then the scale factor needs to be adjusted. Divide the quantity delivers (4.2) by the quantity dispensed (4.0) to get the error factor (1.05)

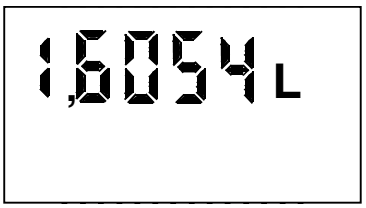
To calculate the new scale factor:

If existing scale factor is 1.0123, the calculation would be: 1.0123 (existing scale factor) x 1.05 (error factor) = 1.0629 (new scale factor)

Change the scale factor:

Press **<PROGRAMMING>** key to enter the programming mode, and the RESET button to advance through the units mode.

1. The first digit of the scale factor will be flashing.
2. Press the TOTAL button to scale through the numbers.



Scale Factor Screen

3. Press RESET to advance to the next number in the scale factor.
4. Repeat steps 2 and 3 for all five digits in the scale factor.

Note: All digits can be scrolled between 0 and 9 except the first, which can only be scrolled from 0 to 1.

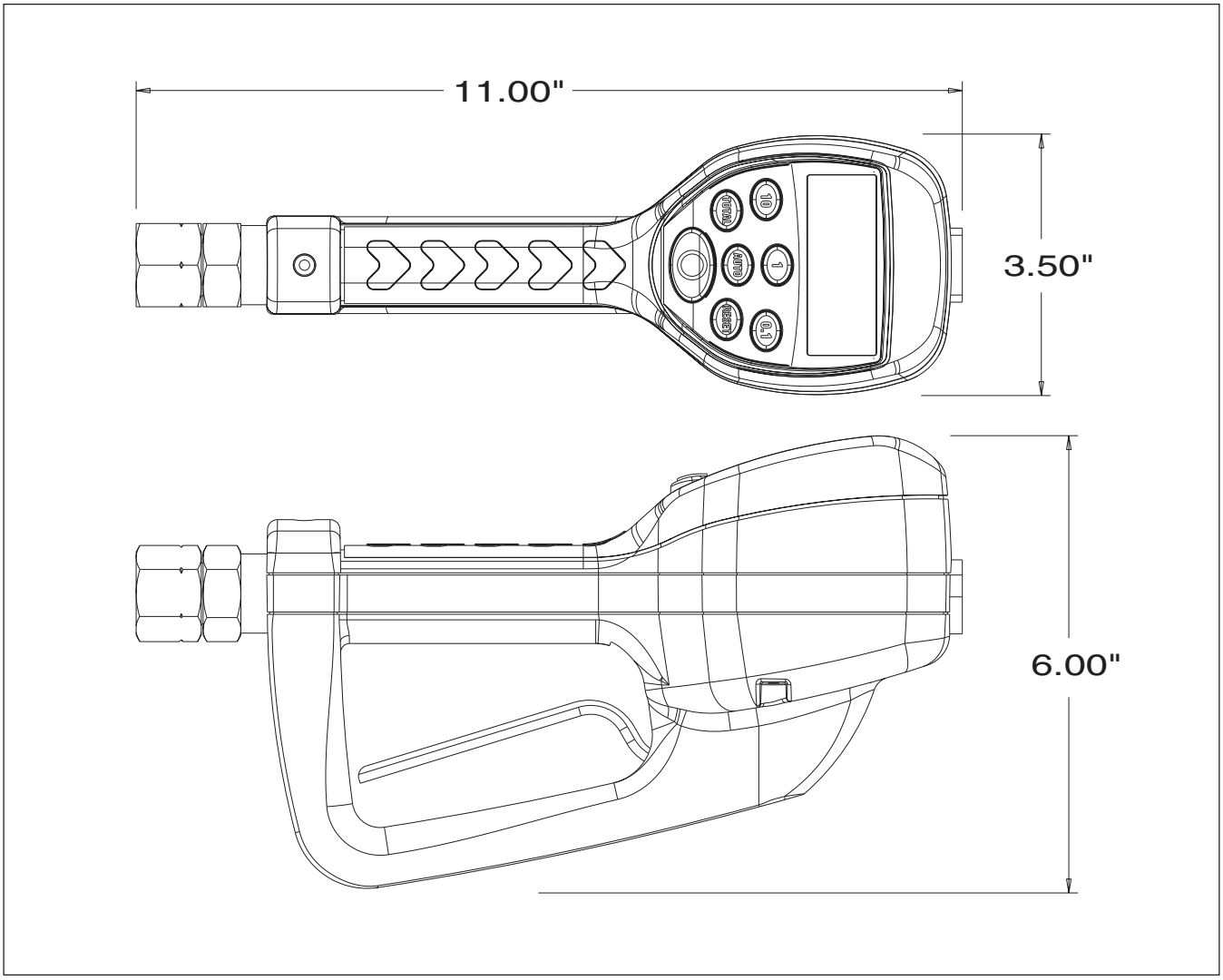
5. When finished setting the scale factor, press the RESET button and the scale factor and units measurement screen will be replaced with the pulse delay screen:

Setting the Pulse Delay Factor
The **Pulse Delay Factor** is used to correct for fast flow rates by closing the valve in the meter between one and five pulses sooner than the selected value. The meter is factory programmed with a pulse delay factor of 0.

Pulse Delay Screen

Advance through all five scale factor digits by pressing the RESET button. The above screen will now be displayed.

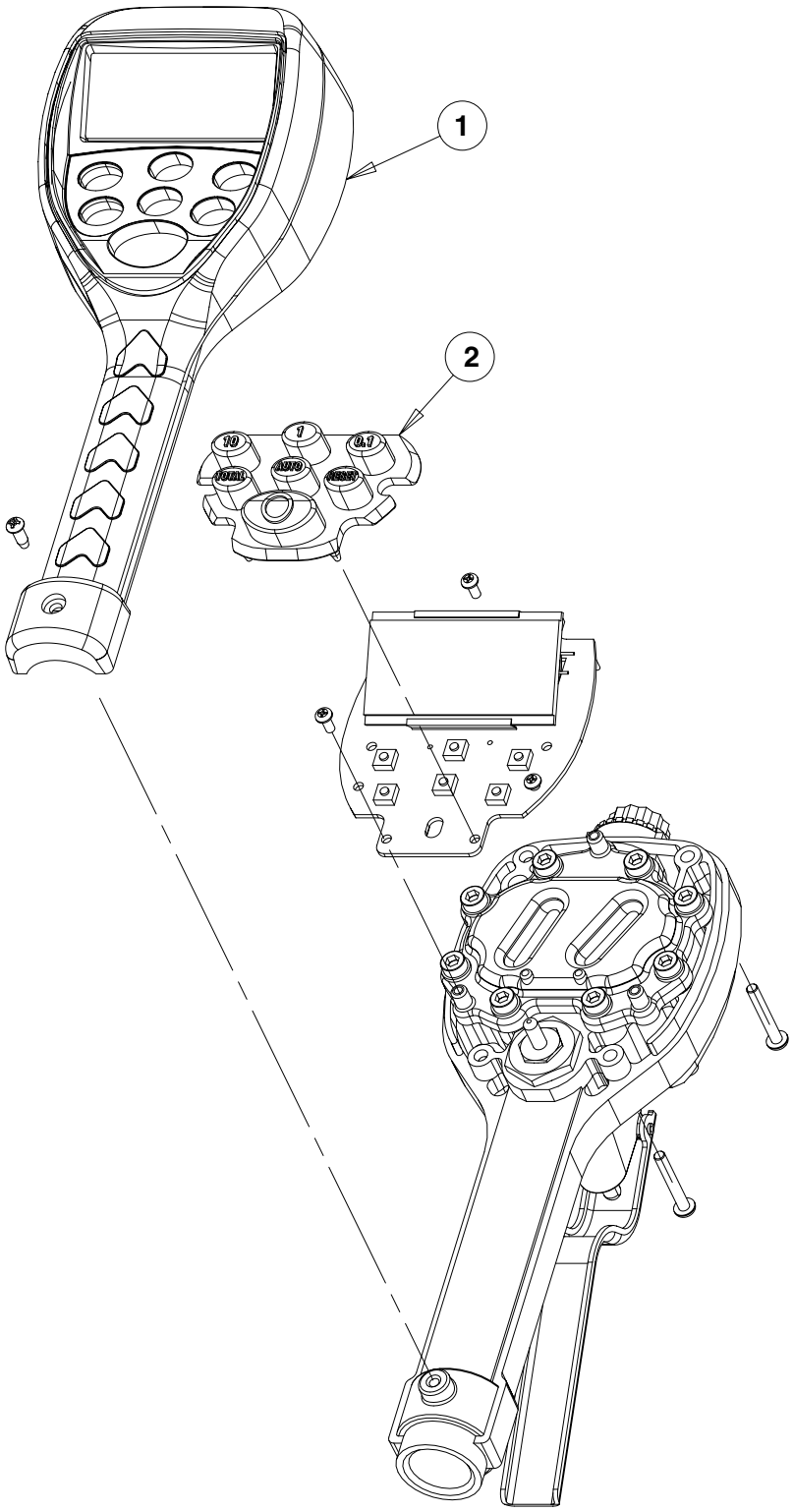
1. The 'PS-' will be followed by a flashing zero. The zero is the initial setting of the pulse delay factor
2. Scroll between settings (0 to 5) by pressing the TOTAL button.
3. When finished selecting the pulse delay factor, press RESET and the display will return to the scale factor screen.
4. When finished programming these options, press the **<PROGRAMMING>** key and hold it until the screen flashes three times then goes blank. Press the RESET button to return to the normal operating screen.



SPECIFICATIONS

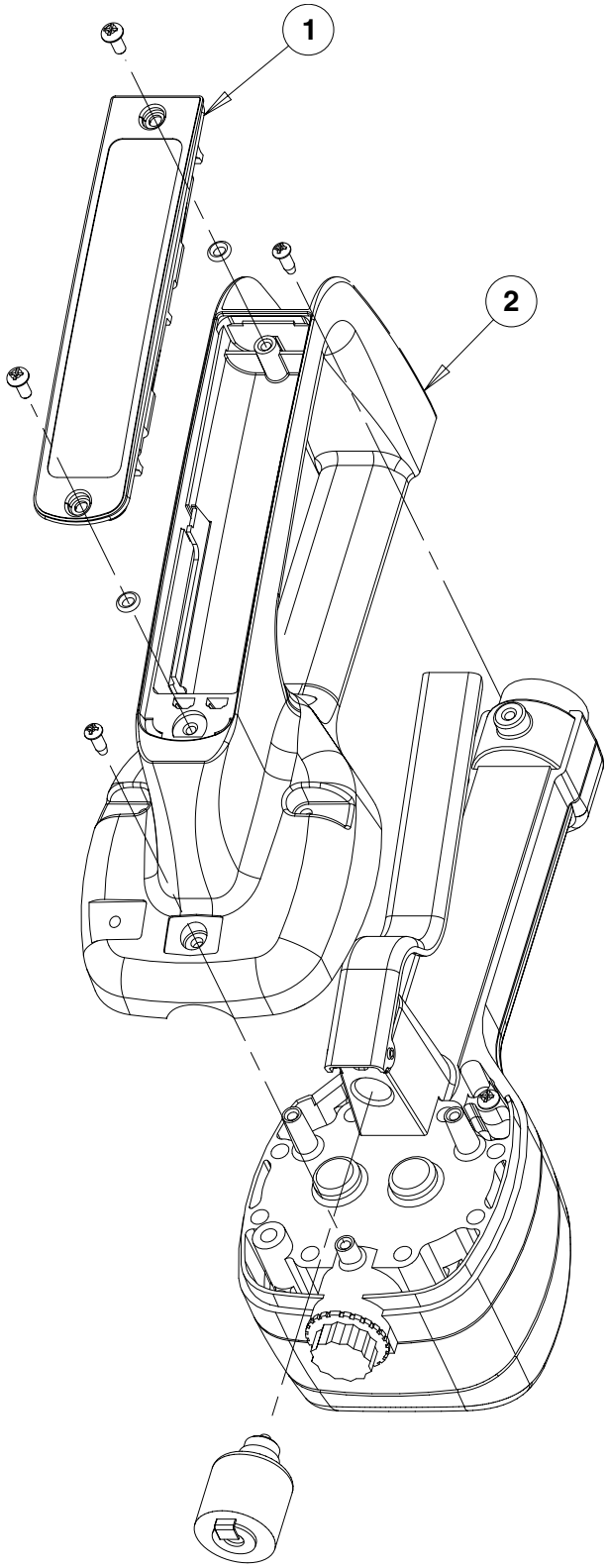
	English	Metric
Maximum Flow *	8 gpm	30 lpm
Minimum Flow *	0.25 gpm	1 lpm
Operating Pressure (Maximum)	1000 psi	67 bar
Operating Pressure (Minimum)	5 psi	.35 bar
Operating Temperature (Maximum)	120° F	50° C
Operating Temperature (Minimum)	20° F	- 5° C
Accuracy	+/- 0.5%	+/- 0.5%
5-Digit LCD Display, 10 mm High x 5 mm Wide	Quarts, Pints, Gallons	Liters
Inlet and Outlet Connections	½" NPT	½" BSPP

* Tested with DTE-25 motor oil at ambient temperature. Min.-Max. flow range will vary with fluid viscosity.



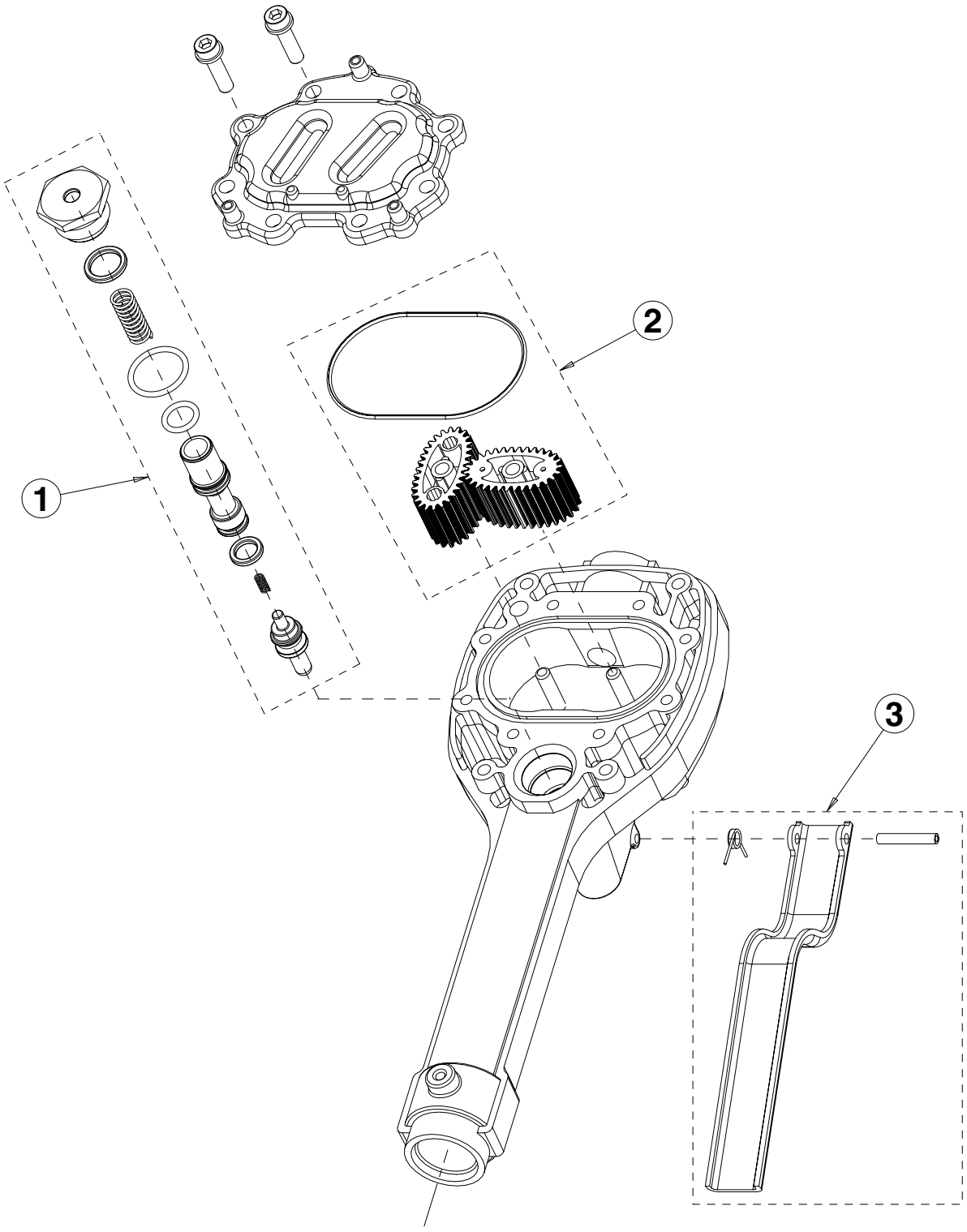
ITEM #	PART DESCRIPTION	PART NUMBER
1	Top Case with Screws	64103-006
2	Keypad	63802-002

NOTE: For service required on parts not listed above, please contact Badger Meter's authorized service center in Milwaukee.



ITEM #	PART DESCRIPTION	PART NUMBER
1	Battery Door with Screws	64103-004
2	Bottom Case with Screws	64103-003

NOTE: For service required on parts not listed above, please contact Badger Meter's authorized service center in Milwaukee.



ITEM #	PART DESCRIPTION	PART NUMBER
1	Valve Assembly	64103-001
2	Gear Service Kit with O-Ring	62896-001
3	Trigger Assembly	64103-005

NOTE: For service required on parts not listed above, please contact Badger Meter's authorized service center in Milwaukee.

Please see our website at
www.badgermeter.com
for specific contacts.

Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding bid obligation exists.

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