

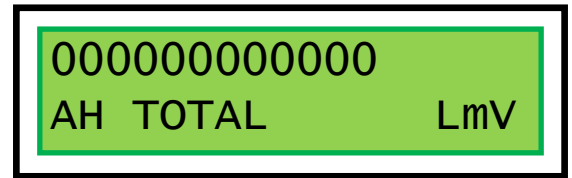
AH-PMP-1DA & AH-1DA Operator's Manual

QUICK START

USING THE METER

Our Amp Hour/Minute meters are designed for measuring accumulated amp-hour, amp-minute, or amp-second totals. AH-PMP-1DA models of Amp-Hour meters can also control two (2) pumps, or one (1) rectifier and one (1) pump.

Our meters incorporate a simple menu design featuring a two (2) button keypad. Pressing the **SELECT** key once cycles through different menu screens. Holding the **SELECT** key for about three (3) seconds will enable changes to be made on the menu screen chosen (not applicable on all screens; see the *Menu Operation* section for information on which values are editable).



The default menu screen, showing the non-resettable amp-hour total

After holding the **SELECT** key for three (3) seconds, a flashing cursor will appear, allowing for changes to be made. In this mode, the **SELECT** key moves your cursor right, and the **CHANGE** key advances the selected value by one. Once you have set the values you want, hold the **SELECT** key to save the setting and return to the menu.

NOTE: The **SELECT key will not change any values by itself! It only provides a way to move through menu screens or move the flashing cursor.**

When the cursor is not flashing, pressing both the **SELECT** and **CHANGE** keys together will take you back to the default 'AH TOTAL' screen (as shown above). However, while editing values (cursor is flashing), pressing both the **SELECT** and **CHANGE** keys together will reset the value to zero or the default factory settings.

SETTING SHUNT SIZE

Our Amp Hour/Minute meters are designed to handle a variety of shunt sizes (in amp-hours, -minutes, or -seconds) and millivolt input signals. To set the shunt size, navigate to the 'SETUP' screen and hold **SELECT** for three (3) seconds to enter setup. The 'SHUNT SIZE' menu appears. Hold **SELECT** for three (3) seconds on this screen to edit the shunt size.

The following settings are available for Amperage:

1A-15A Seconds

1A-500A Minutes

10A-30,000A Hours

The following settings are available for Shunt Size (most rectifiers use a 50mV signal):

25mV-250mV Shunt

Once you have set your desired settings, hold the **SELECT** key for three (3) seconds to return to the menu. Your shunt settings have been saved.

MENU OPERATION

Menu Hierarchy

1. Cumulative Amp-Hour Total (**Default Screen**)
2. Resettable Amp-Hour Total
3. Time Total (Total Runtime)
4. Prime Pump (if either pump is enabled)

IF PUMP 1 IS ENABLED

5. Preset 1
6. Preset 1 Count Left
7. Timer 1
8. Timer 1 Count Left
9. Cycle Count 1

IF PUMP 2 IS ENABLED

10. Preset 2
11. Preset 2 Count Left
12. Timer 2
13. Timer 2 Count Left
14. Cycle Count 2

15. Setup

- 15.1. Shunt Size
- 15.2. Relay 1
- 15.3. Relay 2
- 15.4. Countlink (L Models Only)
- 15.5. Rectifier Power On Reset

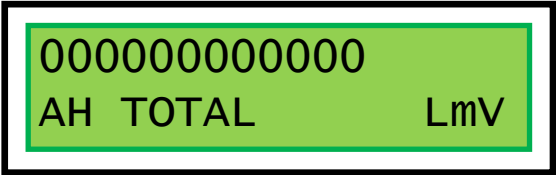
MENU OPERATION

Main Menu Screens

NOTE: The status of the pumps is indicated in the lower right hand corner. **LmV** indicates that no amp hours are accumulating and the pump(s) is off. If pumps are activated, **1** (pump 1), **2** (pump 2), or **12** (pumps 1 and 2) will appear. A **blank** area here indicates you are getting a mV signal but neither pump is enabled.

1. CUMULATIVE AMP HOUR TOTAL

This menu screen shows the accumulated amp hour totals over the life of the meter. This is the default menu screen and will appear when both the **SELECT** and **CHANGE** keys are pressed at the same time.

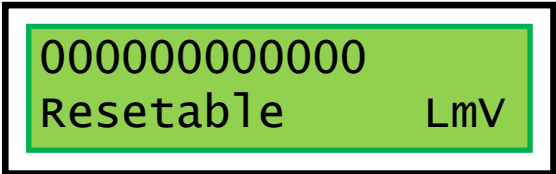


000000000000
AH TOTAL LmV

NOTE: This value cannot be reset and is good to 1 trillion amp hours. This is for EPA compliance and lifetime tracking standards.

2. RESETTABLE AMP HOUR TOTAL

This menu screen totals accumulated amp hours similar to AH TOTAL, but can be reset to zero at any time.

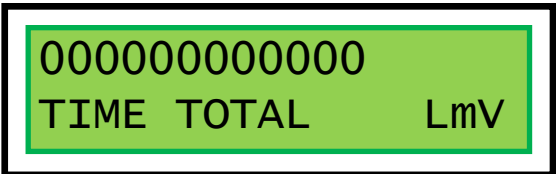


000000000000
Resetable LmV

NOTE: Remember that while editing values, pressing both the **SELECT** and **CHANGE** keys together will reset the value to zero. Outside of editing values, this will navigate back to the AH TOTAL menu screen.

3. TIME TOTAL

This menu screen totals the amount of time the meter has been running.



000000000000
TIME TOTAL LmV

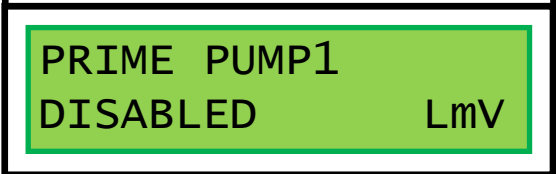
NOTE: This value is for lifetime EPA tracking standards and cannot be reset.

4. PRIME PUMP (if either pump is enabled)

Holding **SELECT** on this screen will allow you to enable/disable both pumps separately. Press **SELECT** to switch between PUMP 1 and PUMP 2. Press **CHANGE** to enable/disable the pump. When a pump is enabled, the "LmV" symbol will disappear.



PRIME PUMP LmV



PRIME PUMP1
DISABLED LmV

NOTE: There is no automatic shutoff once pumps are enabled!

15. SETUP

Holding **SELECT** on this screen will allow you to enter Setup (see page 9; *Setup Options* for more information).

(TOP) The prime pump main menu
(BOTTOM) The prime pump submenu, allowing pumps to be enabled/disabled

MENU OPERATION

Pump Controls (P models only)

5. PRESET 1 / 10. PRESET 2

This screen is used to set the interval of amp hours before the pump is turned on. The pump will activate for the length of time (in seconds) specified in the corresponding TIMER.



PRESET1
000000 LmV

6. PRESET 1 COUNT LEFT / 11. PRESET 2 COUNT LEFT

This screen shows the number of amp hours remaining before the meter activates the corresponding TIMER.




PRESET1 CNT LEFT
000000 LmV

NOTE: This screen is for information purposes only and does not need to be edited.

7. TIMER 1 / 12. TIMER 2

This screen is used to set the amount of time (in seconds) the corresponding pump should run. The amount of amp hours in PRESET COUNT LEFT will count to zero (0), activating the corresponding pump for the amount of time (in seconds) set here.



TIMER1
000000 LmV

8. TIMER 1 COUNT LEFT / 13. TIMER 2 COUNT LEFT

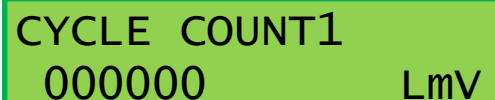
This screen shows the amount of seconds remaining while the corresponding pump is currently “on”. This screen can also be used to add time to the current pump cycle without affecting the TIMER setting.



TIMER1 CNT LEFT
000000 LmV

9. CYCLE COUNT 1 / 14. CYCLE COUNT 2

This screen shows the number of times the corresponding PRESET and TIMER have completed their cycles.



CYCLE COUNT1
000000 LmV

See: “Calculating the Preset and Timer Values Needed” in the appendix to calculate specific values needed for your equipment

MENU OPERATION

Setup Options

15.1 SHUNT SIZE

On this screen, you must select the correct amperage value for your rectifier and the millivolt output of the shunt.

SHUNT SIZE
030000H 0050mV

The following settings are available for Amperage:

1A-15A Seconds

1A-500A Minutes

10A-30,000A Hours

The following settings are available for Shunt Size (most rectifiers use a 50mV signal):

25mV-250mV Shunt

NOTE: Changing the amperage unit to hours, minutes, or seconds will change the units on the entire meter!

15.2 RELAY 1 / 15.3 RELAY 2

This screen is used to select what kind of device you are controlling. You can choose between a PUMP, a RECTIFIER, or to DISABLE one or both of the relays. Enabling either of the relays will allow access to the corresponding PUMP and TIMER menus.

RELAY1
DISABLED

15.4 COUNTLINK (for L models only)

Countlink allows you to keep a cumulative total of multiple meters in a single system.

COUNTLINK
DISABLED

This screen is used to choose between making a meter a Countlink SENDER or RECEIVER. You may also DISABLE Countlink in this menu. Only the last meter in a chain should be a RECEIVER. All preceding meters should be SENDERS. (See page 4; *Countlink Installation* for more information)

15.5 RECTIFIER POWER-ON RESET

If you are controlling a rectifier with your meter, rather than a pump, this screen allows you to send a power restart signal to the rectifier when a cycle is completed.

Rect P-on RESET
DISABLED

See: "Calculating the Preset and Timer Values Needed" in the appendix to calculate specific values needed for your equipment

TROUBLESHOOTING

Amp Hour Problems

PROBLEM	COMMON SOLUTION
No amp hours are recording when rectifier is engaged	The leads of the signal wire may be connected wrong at the shunt or analog ammeter in the remote. Reverse the leads (red = positive, black = negative)
Amp hours are being recorded at a very fast rate	The signal wire may be connected to the volt meter rather than the ammeter. Disconnect and reconnect to the ammeter.
	The signal wire may be laying across the bus bar. Double check that it is not.
Amp hours are coming in faster or slower than normal	The shunt size may be incorrect for your rectifier/meter. Double check you have the correct shunt size (see pg. 6; <i>Setting Shunt Size</i> and the <i>Appendix</i> for more information)

Peristaltic Pump Problems

PROBLEM	COMMON SOLUTION
Pump(s) stay on all the time	The PRESET amp hours may be coming in faster than the TIMER can time out. Double check the calculations to make sure feed rate is correct. If so, you may need a bigger pump or to use two pumps together.
Pump(s) won't engage when PRESET times out or when activated in PRIME PUMP screen	The 5A fuse protecting the relays may be blown. Unplug the meter, open the lid, and check the fuse for continuity. If fuse is OK, engage the relay in PRIME PUMP, check for 120VAC out of the receptacle with a DMM meter. If there is 120VAC, the pump controller is OK, but the pump and/or its connection may have problems.
Pumps don't pump as much as they used to in the same amount of time	The squeeze tubes may have deteriorated to the point that they cannot expand after being collapsed. They need to be replaced. The roller may be worn, and must be replaced if so.
Strokes (AHP2 models only) are not being recorded when the pump is enabled	Determine where the problem is located. Place the controller in the "MANUAL PUMP" mode. Carefully take a jumper and, intermittently, go across terminal #9 & #10 for Stroke 1 and terminals #9 & #11 for Stroke 2. If strokes are recorded in the Manual Pump screen for each stroke pump, the controller is working. The problem may be with the signal coming from the pump to the controller. Please call your source to get suggestions on how to fix this problem. If no strokes are recorded in the Manual Pump screen, then the controller is not recording the signal. Please call your source of this meter for directions for repair.

APPENDIX

Pump Settings Example

The values you may need to run your metering system can vary significantly. Usually, the calculations are very straightforward, requiring only a ratio of chemical additions per amp hour units (typically supplied by your chemical representative).

Below is a **step-by-step example** of how to derive your calculations for an actual situation.

STEP 1. Determine desired feed ratio

Nominal Feed Ratio Desired: 1 gallon per 18,000 amp/hours

Convert to Metric: 3784 ml (1 gallon) per 18,000 amp/hours

STEP 2. Determine the feed rate per amp/hour

ml ÷ amp/hours: 3784 ml ÷ 18,000 amp/hours = 0.21 ml per 1 amp/hour

STEP 3. Determine the hourly maximum desired feed ratio

ml per amp/hour x shunt size: 0.21 ml per 1 amp/hour x 6000 amp shunt = 1260 ml per 6000 amp/hours

STEP 4. Determine actual pump flow rate (*Flow rate should be calculated for one minute.*

Use a measured container to gather this information. If using a pulse type pump, try to remain at 100% stroke and 100% rate for maximum accuracy. Prime the corresponding pump(s) to get your results.)

Pump rate measured: 32 ml per minute

Pump rate x 60 minutes (1 hour): 32 ml x 60 = 1920 ml per hour

STEP 5. Determine feed rate multiplier (*If your multiplier here is greater than one (1), your pump is too small for the desired feed rate*)

Desired feed rate (STEP 3) ÷ Actual feed rate (STEP 4): 1260 ml per 6000 amp/hours ÷ 1920 ml per hour = .66

STEP 6. Determine pump ON time

Feed rate multiplier (STEP 5) x 3600 seconds (1 hour): .66 x 3600 seconds = 2376 seconds

STEP 7. Calculate and select the final settings (**THIS IS YOUR FINAL RATIO**)

Every 6000 amp/hours the pump will turn on for 2376 seconds (STEP 6)

CONTINUED ON NEXT PAGE

APPENDIX

Pump Settings Example

Now, break down the ratio to a usable number

When rounding seconds, always go down to the next lowest whole second (e.g.; 50.9 sec. = 50 sec; 50.1 sec. = 50 sec.) When rounding amp/hours, always round up to the next whole amp/hour (e.g.; 50.9 = 51; 50.1). This practice will ensure that your meter is adding less rather than too much chemical.

Find the smallest seconds setting:

Ratio:	6000 amp/hours	:	2376 Seconds
Round Down:	6000	:	2376
Difference:	0	:	0
% Error:	0%	:	0%

Dividing by 10 =

Ratio:	600.0 amp/hours	:	237.6 Seconds
Round Down:	600.0	:	237
Difference:	0	:	-0.6 Seconds
% Error:	0	:	-0.25%

Dividing by 10 =

Ratio:	60.00 amp/hours	:	23.76 Seconds
Round Down:	60.00	:	23
Difference:	0	:	-0.76
% Error:	0	:	-3.30%

Keep Seconds and Correct for Error =

Ratio:	60.0 amp/hours X [1-0.033(% error)]	:	23 Seconds
New Ratio:	58.02	:	23
Round Up:	59	:	23
Difference	+0.98	:	23
% Error	1.67%	:	0.0

The final setting will be for every 59 amp/hours the pump must run for 23 seconds. Every 18,000 amp/hours (*STEP 1*) you will need to add 63 ml (3784 ml [*STEP 1*] x 0.0167 [% error]) to correct for the 1.67% error.

SEE NEXT PAGE FOR A BLANK WORKSHEET TO CALCULATE YOUR SETTINGS

APPENDIX

Pump Settings Worksheet

You will need the following information to use this worksheet:

Nominal Feed Ratio (as recommended by your chemical representative):

(A)_____ gallons per (B)_____ amp/hours

Shunt Size: (E)_____ Amps

Actual Pump Volume: (G)_____ ml per minute (measured by you)

STEP 1. Determine desired feed ratio

(A)_____ gallons per (B)_____ amp/hours

Convert to metric (3784ml = 1 gallon) (C)_____ ml per (B)_____ amp/hour

STEP 2. Determine the feed rate per amp/hour

(C)_____ ml ÷ (B)_____ amp/hour = (D)_____ ml per amp/hour

STEP 3. Determine the hourly maximum desired feed ratio

(D)_____ ml per amp/hour x (E)_____ amps (shunt size) = (F)_____ ml per hour

STEP 4. Determine actual pump flow rate (*Flow rate should be calculated for one minute.*

Use a measured container to gather this information. If using a pulse type pump, try to remain at 100% stroke and 100% rate for maximum accuracy.)

(G)_____ ml per minute x 60 minutes = (H)_____ ml per hour

STEP 5. Determine feed rate multiplier (*If your multiplier here is greater than one (1), your pump is too small for the desired feed rate*)

(F)_____ ml per maximum amp/hour ÷ (H)_____ ml per hour

STEP 6. Determine pump ON time

(I)_____ x 3600 seconds (1 hour) = (J)_____ seconds

STEP 7. Calculate and select the final settings (*THIS IS YOUR FINAL RATIO*)

Ratio: _____ : _____

Round: _____ : _____

Difference: _____ : _____

% Error: _____ : _____

Every (E)_____ amp/hour, the pump must turn ON for (J)_____ seconds.