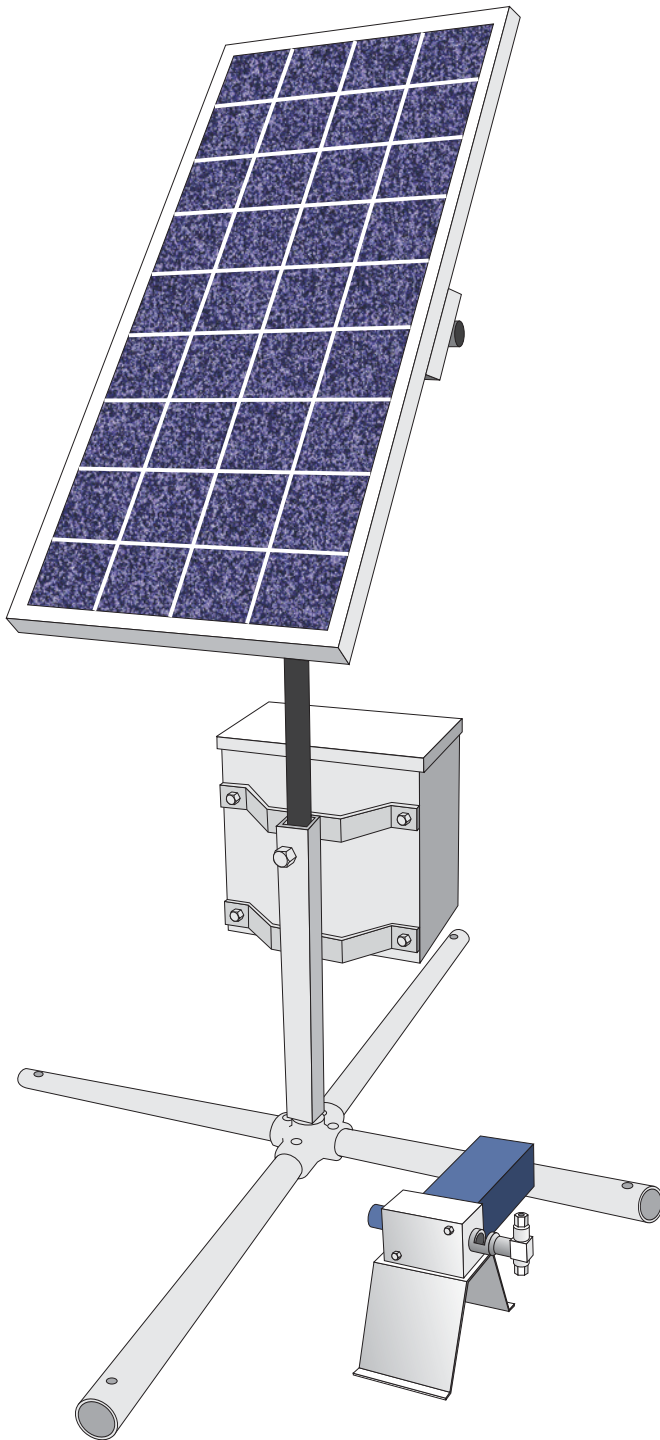


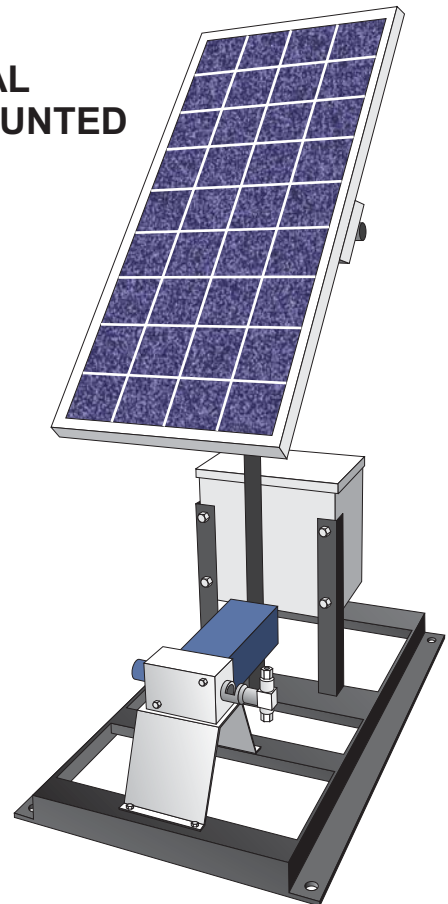
**STANDARD  
MAST with QUAD LEGS**  
Shown with 80 watt Panel



**Features**

- ◆ Environmentally Friendly
- ◆ 12 VDC Gearmotor-Driven  
Non-Solar 120 VAC version available
- ◆ Adjustable Displacement
- ◆ All-Stainless Pump Head
- ◆ Plunger Sizes Available: 1/4", 3/8" and 1/2"
- ◆ Industry-Standard Adjustable V-Ring Packing
- ◆ Dual-head Pump Option
- ◆ 50 watt, 80 watt or 110 watt Panels Available
- ◆ 12 VDC Deep-cycle Battery
- ◆ Advanced **DigiMax ADC** Timer including:
  - AUTO Mode**
    - No need to set RUN and OFF times*
    - Simply enter desired quarts per day*
  - Cycle counter
  - Battery Voltage Monitor
  - Exclusive Temperature Monitor Feature**
- ◆ Standard Mast with quad-legs, Skid-Mount available

**OPTIONAL  
SKID-MOUNTED**



## AUTO MODE • QUICK START

1. Switch the main Power Switch to ON
2. Press **YES+** and **EX** to enter Program Mode (verify by presence of black blocks to left of characters)
3. Press **YES+** or **NO-** to toggle OP MODE to Auto
4. Press **SCROLL MENU** to Motor Sz and use **YES+** or **NO-** to choose your motor size (RPM's) (See NOTE below)
5. Press **SCROLL MENU** to Plg Size (Plunger Size) and use **YES+** or **NO-** to choose your plunger size (See NOTE below)
6. Press **SCROLL MENU** to Pin Pos (Pin Position) and use **YES+** or **NO-** to choose your pin position (factory setting is 3)
7. Press **SCROLL MENU** to Qts/Day (Quarts per Day) and use **YES+** or **NO-** to choose desired quarts per day
8. Press **SCROLL MENU** to TEMP MODE and use **YES+** or **NO-** to toggle ON or OFF
9. Press **SCROLL MENU** to Temp SP (Set Point °F) and use **YES+** or **NO-** to adjust up or down to desired temp (if active)
10. Press **YES+** and **EX** again to exit Program Mode

**NOTE:** *Newer controls (with software date code showing 02Aug10 or later) skip Steps 4 and 5. On older controls, once the Motor Size and Plunger Size have been set they should not have to be changed again. Only the Quarts per Day (and occasionally Pin Position) will likely be adjusted from time to time. If pump is configured with dual heads, utilize settings based upon ½ of the desired volume. For instance, if you desire 20 quarts of output, use settings for 10 quarts. Also, once settings are made, they remain intact in the control's memory. Shutting the Main Power Switch OFF will not affect the settings.*

## MANUAL MODE • QUICK START

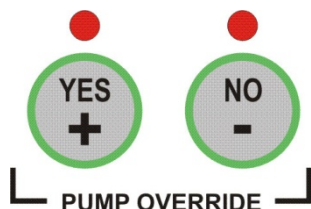
Consult the included charts to determine the appropriate **ON TIME** and **OFF TIME** based on your desired quarts per day. It is VERY IMPORTANT that you make sure you are using the appropriate chart data based upon Motor Size, Plunger Size and Pin Position. Failure to do so will result in erroneous volumes pumped.

1. Switch the main Power Switch to ON
2. Press **YES+** and **EX** to enter Program Mode (verify by presence of black blocks to left of characters)
3. Press **YES+** or **NO-** to toggle OP MODE to Manual
4. Press **SCROLL MENU** to ON TIME and use **YES+** or **NO-** to choose your desired ON TIME (running time).
5. Press **SCROLL MENU** to OFF TIME and use **YES+** or **NO-** to choose your desired OFF TIME (idle time between cycles)
6. Press **SCROLL MENU** to TEMP MODE and use **YES+** or **NO-** to toggle ON or OFF
7. Press **SCROLL MENU** to Temp SP (Set Point in °F) and use **YES+** or **NO-** to adjust up or down to desired temperature (CT indicates Current Temperature)
8. Press **YES+** and **EX** again to exit Program Mode

**NOTE:** *If pump is configured with dual heads, utilize settings based upon ½ of the desired volume. For instance, if you desire 20 quarts of output, use settings for 10 quarts. Once settings are made they remain intact in the control's memory. Shutting the Main Power Switch OFF will not affect the settings.*

### FOR CONTINUOUS PUMP OVERRIDE

Pressing the **YES+** and **NO-** buttons simultaneously will cause the pump to immediately begin to run and will continue running until both buttons are again pressed simultaneously.



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## Introduction

The WellMark **DigiMax ADC** Timer/Controller provides a multitude of control features. This allows the user to fine-tune pump output for a broad range of operating conditions.

The pump head(s) can be adjusted to one of three different displacement settings. Control of fluid volume can be achieved easily utilizing the **DigiMax ADC** Control's **AUTO** mode. In **AUTO** mode the user need only set the Pin Position (also Motor Size, Plunger Size on controls with software date code prior to 02Aug10) and then input the desired number of Quarts Per Day. Once this data is entered the controller's internal processor will run the pump as necessary to achieve the desired output. Alternatively, the user may use the **Manual** mode, controlling the volume by setting the **ON** time and **OFF** time (idle time between run cycles) manually.

### Temperature Sensor

The WellMark EIP Chemical Injection Pump includes a unique **Temperature Sensor** feature which allows a pre-set temperature threshold (**Set Point**) to be established. Once this feature is activated, the pump will not run until the temperature drops to or below the **Set Point**. This is a money-saving feature as there is no need to pump anti-freezing agents such as methanol if freezing conditions are not present.

***NOTE:** The pump is pre-set at the factory with the Displacement set at its maximum (Pin Position 3). The control will be factory set in **AUTO** mode with the Motor Size, Plunger Size and Pin Position set for the pump configuration delivered.*

## Setup of Pump Unit

The WellMark EIP Solar-electric Chemical Injection Pump provides an environmentally-clean method for injection of chemical into a line under pressure. It is a positive-displacement design, powered by an electric motor, thereby eliminating the gas emissions inherent with pneumatic-style pumps. Applications include injection of methanol corrosion inhibitors, friction reducers or scale inhibitors into wellheads or pipelines. Any chemical injection pump utilizing a photovoltaic power system must manage numerous variables in an attempt to maintain adequate power for the task at hand. Among those variables are:

- Available sunlight
- Size and capability of the solar panel
- Size of the battery or batteries
- Power draw of the motor
- Size/displacement of the plunger
- Required discharge pressure of the pump
- All of these variables must be considered when sizing a photovoltaic pump system.

### Unit Positioning and Panel Tilt Adjustment

Regional information about available sunlight can be found at <http://www.nrel.gov/gis/solar.html>. Further evaluation of the specific site may be necessary to maximize clear presentation of the solar panel to the sun. Any adjacent items that may cast shadows on the panel **throughout the day** will negatively affect the overall performance of the package. Maximum exposure will help to assure that the battery maintains enough power to drive the pump throughout the night.

To get the most from position-fixed (or seasonally adjusted) photovoltaic solar panels, you should point them in the direction that captures the most sun. Solar panels should always face true south in the Northern Hemisphere, North in the Southern Hemisphere, tilted from the horizontal at a degree equal to your latitude plus 15 degrees in winter, or minus 15 degrees in summer. An additional 3 - 5% can be gained by evaluating this more carefully and making adjustments accordingly.

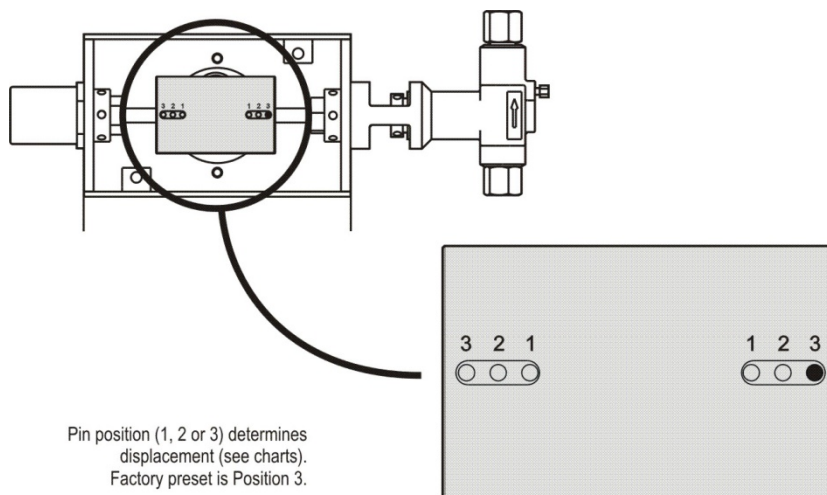
**IMPORTANT:** Unit **MUST** be staked down to avert toppling in high wind conditions.

## Pump Selection

A wide ratio between **OFF** time and **ON** time (OFF:ON) will usually result in maximized efficiency of the battery/solar charging system. For example: 30 seconds **OFF** time versus 5 seconds **ON** time would result in a ratio of 6:1. Ratios lower than 2:1 may result in progressive loss of battery charge, depending upon available sunlight and differential pumping pressure.

As reviewed against the following "Pump Displacement & Timer Settings" charts, the pump's required rate should optimally fall within the middle of the pumps capacity range. This gives room for adjustment if the service criteria changes.

Make sure the Pin Position is set in the appropriate position for the pump volumes desired. Factory preset position is for the highest displacement - Position 3.



### **NOTE:**

*The included charts are intended solely as a starting point, indicating the pump's ability to perform under ideal conditions – i.e. fully charged 12 volt battery, discharge pressures of 1000 psi or less. Voltage above or below 12 volts will affect the RPMs of the motor and thereby the rate of discharge. Discharge pressures above 1000 psi and viscosity of the injected liquid may also affect rate. It is highly recommended that the user verify the actual injection rate utilizing a graduated sight glass. Re-checking the rate over several days should allow the user to determine the most optimal settings for a particular application. Also, if pump is configured with dual heads, utilize settings based upon ½ of the preferred volume. For instance, if you desire 20 quarts of output, use settings for 10 quarts.*

## **Operation of Control**

**NOTE:** "Quick Start" Instructions are on Page 1.

Your pump unit control panel includes a Main Power Switch (On/Off), an automotive-type fuse holder (protects the pump motor and circuitry from overload conditions) and the **DigiMax ADC** timer control, which uses capacitive-sensing buttons. Like many touch-screen devices, there is no actual contact with the button, which only requires a light touch. When a button is pressed the **LED** above it will illuminate. The **back-lit digital display** indicates several pertinent pieces of information. In normal running mode it will cycle through the current pump settings as follows:

### **MANUAL**

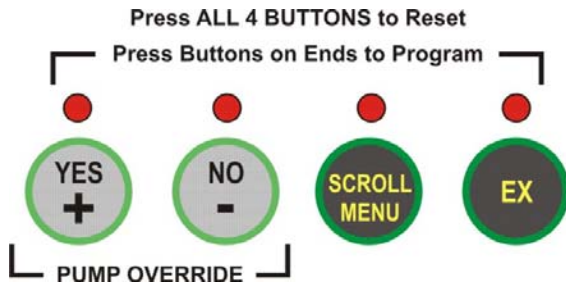
- OP MODE (Manual)
- ON TIME (in seconds)
- OFF TIME (in seconds)
- Temp Mode (ON or OFF)
- Temp SP (Set Point in °F)

### **AUTO**

- Motor Size (30RPM or 64RPM)
- Plunger Size (1/4", 3/8" or 1/2")
- Pin Position (1, 2 or 3)
- Qts. per Day
- Temp Mode (ON or OFF)
- Temp SP (Set Point in °F)

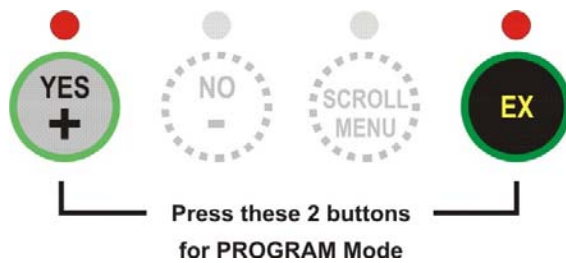
In **Program Mode** the display will show whichever of the above settings are currently being addressed/adjusted.

Buttons are labeled as shown below:



### Button Functions

To enter Program Mode, press the two outside buttons (YES + and EX) simultaneously



Control enters the **Program Mode**, indicated by the black blocks to the left of the characters as shown below.



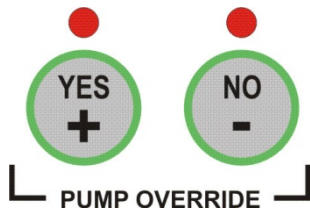
*NOTE: If no more buttons are pushed, control will remain in Program Mode for thirty seconds and then revert back to Run Mode.*

### SCROLL MENU Button



Once in **Program Mode**, pressing this button increments through the menu options. Once a menu option is indicated, it will stay there until another key is pressed or a thirty-second time out occurs.

## YES + and NO - Buttons



These buttons are dual function. Primarily they are used to either scroll through the options or to increase/decrease an entered value. Secondly, when pressed simultaneously they can be used to activate a **PUMP OVERRIDE**, allowing the user to run the pump continuously. This can be handy for priming or purging duties.

***NOTE:** All changes to settings are made in Program Mode. To enter Program Mode, press YES and EX buttons simultaneously. Verify Program Mode by noting solid black block to the left of the characters in the display as shown below.*

## Troubleshooting

### **Pump will not run**

1. Check that Main Power Switch is in the ON position.
2. Check fuse. If burned replace with new one.
3. Check cables and battery connections to assure they are clean and tight.
4. Check battery voltage and perform a load-test, replacing if necessary.
5. Check Temperature Sensor Feature. Is the Temp Mode ON? If so, is the ambient temperature higher than the Temp SP setting? With the Temp Mode ON, the pump will not run until the temperature drops to or below the **Temp SP** (Set Point). Either disengage the Temp Mode (set it to OFF) or re-adjust the **Temp SP** to an appropriate operating temperature for the application at hand.

### **Pump does not deliver proper quarts per day**

1. AUTO Mode - Check to assure that the settings accurately reflect the pump configuration (i.e. Motor Size, Plunger Size, Pin Position)
2. MANUAL Mode - Check that the ON and OFF times are set according to the proper chart data.
3. Check battery voltage. High voltage will cause the pump RPM's to increase. Conversely, low voltage will cause the pump RPM's to drop. Both conditions will affect the volume pumped accordingly. This is inherent with all DC/battery-powered systems. The charts are intended solely as a starting point. The user should monitor the pumps condition and volume performance, making adjustments as necessary to achieve the desired rate. Unless conditions are unduly severe (lengthy overcast days, extremely low temperatures, and/or extremely high differential pressures) performance of the pump should be within 10-15% of the charts. A battery that continuously discharges, even under ideal conditions should be load-tested and replaced if necessary.

### **Battery will not maintain adequate voltage (below 12 volts)**

1. Check to see that the solar panel(s) are oriented in the proper direction and at the proper angle. Solar panels should always face true south in the Northern Hemisphere, North in the Southern Hemisphere, tilted from the horizontal at a degree equal to your latitude plus 15 degrees in winter, or minus 15 degrees in summer. An additional 3 - 5% can be gained by evaluating this more carefully and making adjustments accordingly. Also, check to assure that the panels are clean. Accumulating dirt can have a detrimental effect on electrical output efficiency of solar panels.
2. Check surrounding facility to assure that trees, poles, equipment do not cast shadows across the solar panel(s) at anytime during the day. Be sure to consider that shadows track differently as the sun's apparent attitude changes throughout the seasons.
3. Check cables and battery connections to assure they are clean and tight.
4. Perform a load-test on the battery and replace if necessary.
5. Consider upgrading system (higher wattage panel(s), multiple batteries) if conditions are such that current panel/battery cannot maintain adequate charge.

### **Pump repeatedly stalls and burns fuse**

1. Check that there are no obstructions downstream that would result in the pump trying to pump against an impassable blockage. Temporarily removing the pump from downstream pressure so that it can run pressure-free will help diagnose whether the pump is

pumping reliably. Clear the blockage if necessary. Be particularly careful when using downstream atomizers, that the orifice is not damaged or plugged.

2. Check the pump head and discharge check on the pump, disassembling if necessary to check for foreign material that might have found its way into the pump head, impeding flow. If so, clear the debris and take necessary steps to assure that pumped liquid remains free of such debris.

#### **Pump motor runs, but there is no liquid being pumped from the discharge check valve**

1. Visually observe whether the plunger is moving back and forth in the pump head. If it is not, remove the housing cover and assure that, 1) the pin is still installed in its proper position, and 2) all cam parts are still in place and working properly. If everything appears to be in place, the problem is likely within the gear head on the motor. Consult factory for replacement.
2. **If plunger IS moving back and forth in the pump head**, check all fittings to make sure that none of them are leaking. Next, check to assure that the Gland Nut is tight. A loose Gland Nut can result in insufficient Packing load, resulting in the pump being unable to pump liquid against differential pressure – even though there may be no visible liquid leaking from the Packing. With the pump running, loosen the Bleed Screw and assure that liquid does flow from it. Re-tighten the Bleed Screw. Tighten the Gland Nut until the pump begins to push liquid appropriately. Tighten ONLY enough to achieve proper movement of liquid. DO NOT OVERTIGHTEN beyond what is necessary, as doing so may inhibit the Plunger's movement.

#### **Chemical leaks from the packing area in the fluid head**

1. Pull clear cover back toward the pump head to gain access to the Gland Nut. Using a screw driver or punch, engage holes in the Gland Nut and tighten it down on the Packing until the leak stops, also enough to assure that liquid does pump properly. A loose Gland Nut can result in insufficient Packing load, resulting in the pump being unable to pump liquid against differential pressure – even though there may be no visible liquid leaking from the Packing. DO NOT OVERTIGHTEN Packing, as doing so may inhibit the Plunger's movement.

Pump Specifications

Pin Position	1/4" Plunger			3/8" Plunger			1/2" Plunger		
	1	2	3	1	2	3	1	2.000	3
Area (sq.in.)	0.0491			0.1104			0.1963		
Stroke (in.)	0.624	0.874	1.124	0.624	0.874	1.124	0.624	0.874	1.124
Displacement per Stroke (cu.in.)	0.0306	0.0429	0.0552	0.0689	0.0965	0.1241	0.1225	0.1716	0.2206
Displacement per Stroke (oz.)	0.0170	0.0238	0.0306	0.0382	0.0535	0.0688	0.0679	0.0951	0.1223
Ounces per Second of Operation *	0.0085	0.0119	0.0153	0.0191	0.0267	0.0344	0.0339	0.0475	0.0611
Gallons/day running constant	5.73	8.03	10.32	12.88	18.04	23.21	22.91	32.09	41.26
Max. Discharge Pressure	<b>3000 psi</b>			<b>1500 psi</b>			<b>800 psi</b>		

\* Based upon **30 rpm** motor speed

Required Run Time

		Total Seconds of RUN-TIME per Day								
		1/4" Plunger			3/8" Plunger			1/2" Plunger		
		Pos 1	Pos 2	Pos 3	Pos 1	Pos 2	Pos 3	Pos 1	Pos 2	Pos 3
Quarts per Day	1.00	3770	2691	2093	1677	1197	931	943	673	523
	1.25	4712	3364	2616	2096	1496	1163	1179	842	654
	1.50	5655	4037	3139	2515	1796	1396	1414	1010	785
	1.75	6597	4710	3662	2934	2095	1629	1650	1178	916
	2.00	7540	5383	4186	3353	2394	1862	1886	1346	1047
	2.25	8482	6056	4709	3772	2693	2094	2122	1515	1178
	2.50	9424	6729	5232	4191	2993	2327	2357	1683	1309
	2.75	10367	7402	5755	4611	3292	2560	2593	1851	1440
	3.00	11309	8074	6278	5030	3591	2792	2829	2020	1570
	3.25	12252	8747	6802	5449	3890	3025	3065	2188	1701
	3.50	13194	9420	7325	5868	4190	3258	3300	2356	1832
	3.75	14137	10093	7848	6287	4489	3490	3536	2525	1963
	4.00	15079	10766	8371	6706	4788	3723	3772	2693	2094
	4.50	16964	12112	9418	7545	5387	4189	4243	3029	2356
	5.00	18849	13457	10464	8383	5985	4654	4715	3366	2617
	5.50	20734	14803	11511	9221	6584	5119	5186	3703	2879
	6.00	22619	16149	12557	10060	7182	5585	5658	4039	3141
	6.50	24504	17495	13603	10898	7781	6050	6129	4376	3403
	7.00	26388	18840	14650	11736	8379	6515	6600	4712	3664
	7.50	28273	20186	15696	12574	8978	6981	7072	5049	3926
8.00	30158	21532	16743	13413	9576	7446	7543	5386	4188	
8.50	32043	22877	17789	14251	10175	7912	8015	5722	4450	
9.00	33928	24223	18835	15089	10773	8377	8486	6059	4711	
9.50	35813	25569	19882	15928	11372	8842	8958	6395	4973	
10.00	37698	26915	20928	16766	11970	9308	9429	6732	5235	
11.00	41468	29606	23021	18443	13167	10239	10372	7405	5758	
12.00	45237	32298	25114	20119	14364	11169	11315	8079	6282	
13.00	49007	34989	27207	21796	15561	12100	12258	8752	6805	
14.00	52777	37681	29300	23472	16758	13031	13201	9425	7329	
15.00	56547	40372	31392	25149	17955	13962	14144	10098	7852	
16.00	60316	43063	33485	26826	19152	14892	15087	10771	8376	
17.00	64086	45755	35578	28502	20349	15823	16030	11445	8899	
18.00	67856	48446	37671	30179	21546	16754	16973	12118	9423	
19.00	71626	51138	39764	31855	22743	17685	17916	12791	9946	
20.00	75396	53829	41857	33532	23940	18616	18858	13464	10469	
22.00	82935	59212	46042	36885	26334	20477	20744	14811	11516	
24.00	90475	64595	50228	40238	28728	22339	22630	16157	12563	
26.00	98014	69978	54414	43591	31123	24200	24516	17503	13610	
28.00	105554	75361	58599	46945	33517	26062	26402	18850	14657	
30.00	113093	80744	62785	50298	35911	27923	28288	20196	15704	
32.00	120633	86127	66971	53651	38305	29785	30174	21543	16751	
34.00	128172	91510	71156	57004	40699	31646	32059	22889	17798	
36.00	135712	96893	75342	60357	43093	33508	33945	24236	18845	
38.00	143252	102276	79528	63711	45487	35370	35831	25582	19892	
40.00	150791	107659	83713	67064	47881	37231	37717	26928	20939	



1/4" PLUNGER (SMALL Motor)

RUN and OFF TIME SETTINGS

		1/4" Plunger					
		Pin Position 1		Pin Position 2		Pin Position 3	
		Displ/stroke (oz.) = 0.0170		Displ/stroke (oz.) = 0.0238		Displ/Stroke (oz.) = 0.0306	
		RUN	OFF	RUN	OFF	RUN	OFF
Quarts per Day	1.00	2	44	2	62	2	81
	1.25	2	35	2	49	2	64
	1.50	2	29	2	41	2	53
	1.75	2	24	2	35	2	45
	2.00	2	21	2	30	2	39
	2.25	2	18	2	27	2	35
	2.50	2	16	2	24	2	31
	2.75	2	15	2	21	2	28
	3.00	2	13	2	19	2	26
	3.25	2	12	2	18	2	23
	3.50	2	11	2	16	2	22
	3.75	2	10	2	15	2	20
	4.00	2	9	2	14	2	19
	4.50	2	8	2	12	2	16
	5.00	2	7	2	11	2	15
	5.50	2	6	2	10	2	13
	6.00	2	6	2	9	2	12
	6.50	2	5	2	8	2	11
	7.00	2	5	2	7	2	10
	7.50	2	4	2	7	2	9
	8.00	3	6	2	6	2	8
	8.50	3	5	2	6	2	8
	9.00	3	5	2	5	2	7
	9.50	4	6	2	5	2	7
	10.00	4	5	3	7	2	6
	11.00	4	4	3	6	2	6
	12.00	4	4	3	5	2	5
	13.00	4	3	3	4	3	7
	14.00	4	3	3	4	3	6
	15.00	4	2	3	3	3	5
	16.00	5	2	3	3	4	6
	17.00	6	2	4	4	4	6
	18.00	6	2	4	3	4	5
	19.00	6	1	5	3	4	5
	20.00	6	1	5	3	4	4
	22.00	Not Available		5	2	4	4
	24.00			5	2	4	3
	26.00			5	1	4	2
	28.00			5	1	4	2
	30.00	Not Available		5	0	4	2
32.00	6			0	5	1	
34.00	7			0	5	1	
36.00	Not Available					6	1
38.00					6	1	
40.00							7

Indicates setting that may over-burden the battery's ability to maintain full charge. You may consider moving up one plunger size.

**3/8" PLUNGER (SMALL Motor)**

RUN and OFF TIME SETTINGS

		3/8" Plunger					
		Pin Position 1		Pin Position 2		Pin Position 3	
		Displ/stroke (oz.) = 0.0382		Displ/stroke (oz.) = 0.0535		Displ/Stroke (oz.) = 0.0688	
		RUN	OFF	RUN	OFF	RUN	OFF
<b>Quarts per Day</b>	1.00	1	51	1	71	1	92
	1.25	1	40	1	57	1	73
	1.50	1	33	1	47	1	61
	1.75	1	28	1	40	1	52
	2.00	1	25	1	35	1	45
	2.25	1	22	1	31	1	40
	2.50	1	20	1	28	1	36
	2.75	1	18	1	25	1	33
	3.00	1	16	1	23	1	30
	3.25	1	15	1	21	1	28
	3.50	1	14	1	20	1	26
	3.75	1	13	1	18	1	24
	4.00	1	12	1	17	1	22
	4.50	1	10	1	15	1	20
	5.00	1	9	1	13	1	18
	5.50	1	8	1	12	1	16
	6.00	1	8	1	11	1	14
	6.50	1	7	1	10	1	13
	7.00	2	13	1	9	1	12
	7.50	2	12	1	9	1	11
	8.00	2	11	1	8	1	11
	8.50	2	10	1	7	1	10
	9.00	2	9	1	7	1	9
	9.50	2	9	1	7	1	9
	10.00	2	8	2	12	2	17
	11.00	4	15	3	17	2	15
	12.00	4	13	3	15	2	13
	13.00	4	12	3	14	2	12
	14.00	4	11	3	12	2	11
	15.00	4	10	3	11	3	16
	16.00	4	9	4	14	3	14
	17.00	4	8	4	13	4	18
	18.00	4	7	4	12	5	21
	19.00	5	9	6	17	5	19
	20.00	5	8	4	10	6	22
	22.00	5	7	4	9	6	19
	24.00	5	6	4	8	6	17
	26.00	5	5	4	7	6	15
	28.00	5	4	4	6	6	14
	30.00	5	4	4	6	6	13
32.00	5	3	4	5	6	11	
34.00	5	3	4	4	6	10	
36.00	5	2	4	4	6	9	
38.00	6	2	4	4	6	9	
40.00	6	2	5	4	6	8	

Indicates setting that may over-burden the battery's ability to maintain full charge. You may consider moving up one plunger size.



1/2" PLUNGER (SMALL Motor)

RUN and OFF TIME SETTINGS

		1/2" Plunger					
		Pin Position 1		Pin Position 2		Pin Position 3	
		Displ/stroke (oz.) = 0.0679		Displ/stroke (oz.) = 0.0951		Displ/Stroke (oz.) = 0.1223	
		RUN	OFF	RUN	OFF	RUN	OFF
<b>Quarts per Day</b>	1.00	1	91	1	127	1	164
	1.25	1	72	1	102	1	131
	1.50	1	60	1	85	1	109
	1.75	1	51	1	72	1	93
	2.00	1	45	1	63	1	82
	2.25	1	40	1	56	1	72
	2.50	1	36	1	50	1	65
	2.75	1	32	1	46	1	59
	3.00	1	30	1	42	1	54
	3.25	1	27	1	38	1	50
	3.50	1	25	1	36	1	46
	3.75	1	23	1	33	1	43
	4.00	1	22	1	31	1	40
	4.50	1	19	1	28	1	36
	5.00	2	35	1	25	1	32
	5.50	2	31	1	22	1	29
	6.00	2	29	1	20	1	27
	6.50	2	26	1	19	1	24
	7.00	2	24	1	17	1	23
	7.50	2	22	1	16	1	21
	8.00	2	21	2	30	1	20
	8.50	2	20	2	28	1	18
	9.00	2	18	2	27	1	17
	9.50	2	17	2	25	1	16
	10.00	3	24	2	24	2	31
	11.00	3	22	2	21	2	28
	12.00	3	20	2	19	2	26
	13.00	3	18	2	18	2	23
	14.00	3	17	2	16	2	22
	15.00	3	15	3	23	2	20
	16.00	3	14	3	21	3	28
	17.00	3	13	3	20	3	26
	18.00	3	12	3	18	3	25
	19.00	3	11	3	17	3	23
	20.00	3	11	3	16	3	22
	22.00	5	16	4	19	6	39
	24.00	5	14	4	17	6	35
	26.00	5	13	4	16	6	32
	28.00	5	11	4	14	6	29
	30.00	5	10	4	13	6	27
32.00	5	9	4	12	6	25	
34.00	5	8	4	11	6	23	
36.00	5	8	4	10	6	22	
38.00	6	8	4	10	6	20	
40.00	6	8	5	11	6	19	

Indicates setting that may over-burden the battery's ability to maintain full charge. You may consider moving up one plunger size.

Pump Specifications

Pin Position	1/4" Plunger			3/8" Plunger			1/2" Plunger		
	1	2	3	1	2	3	1	2.000	3
Area (sq.in.)	0.0491			0.1104			0.1963		
Stroke (in.)	0.624	0.874	1.124	0.624	0.874	1.124	0.624	0.874	1.124
Displacement per Stroke (cu.in.)	0.0306	0.0429	0.0552	0.0689	0.0965	0.1241	0.1225	0.1716	0.2206
Displacement per Stroke (oz.)	0.0170	0.0238	0.0306	0.0382	0.0535	0.0688	0.0679	0.0951	0.1223
Ounces per Second of Operation *	0.0181	0.0254	0.0326	0.0407	0.0570	0.0733	0.0724	0.1014	0.1304
Gallons/day running constant	12.22	17.12	22.02	27.49	38.50	49.51	48.87	68.45	88.03
Max. Discharge Pressure	<b>5000 psi</b>			<b>2500 psi</b>			<b>1200 psi</b>		

\* Based upon [64 rpm](#) motor speed

Required Run Time

		Total Seconds of RUN-TIME per Day								
		1/4" Plunger			3/8" Plunger			1/2" Plunger		
		Pos 1	Pos 2	Pos 3	Pos 1	Pos 2	Pos 3	Pos 1	Pos 2	Pos 3
Quarts per Day	1.00	1767	1262	981	786	561	436	442	316	245
	1.25	2209	1577	1226	982	701	545	552	394	307
	1.50	2651	1892	1471	1179	842	654	663	473	368
	1.75	3092	2208	1717	1375	982	764	773	552	429
	2.00	3534	2523	1962	1572	1122	873	884	631	491
	2.25	3976	2839	2207	1768	1262	982	994	710	552
	2.50	4418	3154	2452	1965	1403	1091	1105	789	613
	2.75	4859	3469	2698	2161	1543	1200	1215	868	675
	3.00	5301	3785	2943	2358	1683	1309	1326	947	736
	3.25	5743	4100	3188	2554	1824	1418	1436	1026	797
	3.50	6185	4416	3433	2751	1964	1527	1547	1104	859
	3.75	6626	4731	3679	2947	2104	1636	1657	1183	920
	4.00	7068	5046	3924	3144	2244	1745	1768	1262	981
	4.50	7952	5677	4414	3536	2525	1963	1989	1420	1104
	5.00	8835	6308	4905	3929	2805	2181	2210	1578	1227
	5.50	9719	6939	5395	4322	3086	2400	2431	1736	1350
	6.00	10602	7570	5886	4715	3367	2618	2652	1893	1472
	6.50	11486	8200	6376	5108	3647	2836	2873	2051	1595
	7.00	12369	8831	6867	5501	3928	3054	3094	2209	1718
	7.50	13253	9462	7357	5894	4208	3272	3315	2367	1840
8.00	14136	10093	7848	6287	4489	3490	3536	2524	1963	
8.50	15020	10723	8338	6680	4769	3708	3757	2682	2086	
9.00	15903	11354	8829	7073	5050	3927	3978	2840	2208	
9.50	16787	11985	9319	7466	5330	4145	4199	2998	2331	
10.00	17670	12616	9810	7859	5611	4363	4420	3156	2454	
11.00	19437	13877	10791	8645	6172	4799	4862	3471	2699	
12.00	21204	15139	11772	9431	6733	5235	5304	3787	2944	
13.00	22971	16401	12753	10216	7294	5672	5746	4102	3190	
14.00	24738	17662	13734	11002	7855	6108	6188	4418	3435	
15.00	26505	18924	14715	11788	8416	6544	6630	4733	3681	
16.00	28272	20185	15696	12574	8977	6981	7072	5049	3926	
17.00	30039	21447	16677	13360	9538	7417	7514	5364	4171	
18.00	31807	22709	17658	14146	10100	7853	7956	5680	4417	
19.00	33574	23970	18639	14932	10661	8289	8398	5996	4662	
20.00	35341	25232	19620	15718	11222	8726	8840	6311	4907	
22.00	38875	27755	21582	17289	12344	9598	9724	6942	5398	
24.00	42409	30278	23544	18861	13466	10471	10608	7573	5889	
26.00	45943	32801	25506	20433	14588	11344	11492	8204	6380	
28.00	49477	35324	27468	22005	15710	12216	12376	8836	6870	
30.00	53011	37848	29430	23576	16833	13089	13259	9467	7361	
32.00	56545	40371	31391	25148	17955	13961	14143	10098	7852	
34.00	60079	42894	33353	26720	19077	14834	15027	10729	8343	
36.00	63613	45417	35315	28292	20199	15706	15911	11360	8833	
38.00	67147	47940	37277	29863	21321	16579	16795	11991	9324	
40.00	70681	50463	39239	31435	22443	17452	17679	12622	9815	



1/4" PLUNGER (LARGE Motor)

RUN and OFF TIME SETTINGS

		1/4" Plunger					
		Pin Position 1		Pin Position 2		Pin Position 3	
		Displ/stroke (oz.) = 0.0170		Displ/stroke (oz.) = 0.0238		Displ/Stroke (oz.) = 0.0306	
		RUN	OFF	RUN	OFF	RUN	OFF
<b>Quarts per Day</b>	1.00	2	96	2	135	2	174
	1.25	2	76	2	108	2	139
	1.50	2	63	2	89	2	115
	1.75	2	54	2	76	2	99
	2.00	2	47	2	66	2	86
	2.25	2	41	2	59	2	76
	2.50	2	37	2	53	2	68
	2.75	2	34	2	48	2	62
	3.00	2	31	2	44	2	57
	3.25	2	28	2	40	2	52
	3.50	2	26	2	37	2	48
	3.75	2	24	2	35	2	45
	4.00	2	22	2	32	2	42
	4.50	2	20	2	28	2	37
	5.00	2	18	2	25	2	33
	5.50	2	16	2	23	2	30
	6.00	2	14	2	21	2	27
	6.50	2	13	2	19	2	25
	7.00	2	12	2	18	2	23
	7.50	2	11	2	16	2	21
	8.00	3	15	2	15	2	20
	8.50	3	14	2	14	2	19
	9.00	3	13	2	13	2	18
	9.50	4	17	2	12	2	17
	10.00	4	16	3	18	2	16
	11.00	4	14	3	16	2	14
	12.00	4	12	3	14	2	13
	13.00	4	11	3	13	3	17
	14.00	4	10	3	12	3	16
	15.00	4	9	3	11	3	15
	16.00	5	10	3	10	4	18
	17.00	6	11	4	12	4	17
	18.00	6	10	4	11	4	16
	19.00	6	9	5	13	4	15
	20.00	6	9	5	12	4	14
	22.00	6	7	5	11	4	12
	24.00	7	7	5	9	4	11
	26.00	7	6	5	8	4	10
	28.00	7	5	5	7	4	9
	30.00	7	4	5	6	4	8
32.00	7	4	6	7	5	9	
34.00	8	4	7	7	5	8	
36.00	9	3	8	7	6	9	
38.00	9	3	9	7	6	8	
40.00	10	2	10	7	7	8	

Indicates setting that may over-burden the battery's ability to maintain full charge. You may consider moving up one plunger size.



3/8" PLUNGER (LARGE Motor)

RUN and OFF TIME SETTINGS

		3/8" Plunger					
		Pin Position 1		Pin Position 2		Pin Position 3	
		Displ/stroke (oz.) = 0.0382		Displ/stroke (oz.) = 0.0535		Displ/Stroke (oz.) = 0.0688	
		RUN	OFF	RUN	OFF	RUN	OFF
<b>Quarts per Day</b>	1.00	1	109	1	153	1	197
	1.25	1	87	1	122	1	157
	1.50	1	72	1	102	1	131
	1.75	1	62	1	87	1	112
	2.00	1	54	1	76	1	98
	2.25	1	48	1	67	1	87
	2.50	1	43	1	61	1	78
	2.75	1	39	1	55	1	71
	3.00	1	36	1	50	1	65
	3.25	1	33	1	46	1	60
	3.50	1	30	1	43	1	56
	3.75	1	28	1	40	1	52
	4.00	1	26	1	37	1	49
	4.50	1	23	1	33	1	43
	5.00	1	21	1	30	1	39
	5.50	1	19	1	27	1	35
	6.00	1	17	1	25	1	32
	6.50	1	16	1	23	1	29
	7.00	2	29	1	21	1	27
	7.50	2	27	1	20	1	25
	8.00	2	25	1	18	1	24
	8.50	2	24	1	17	1	22
	9.00	2	22	1	16	1	21
	9.50	2	21	1	15	1	20
	10.00	2	20	2	29	2	38
	11.00	4	36	3	39	2	34
	12.00	4	33	3	35	2	31
	13.00	4	30	3	33	2	28
	14.00	4	27	3	30	2	26
	15.00	4	25	3	28	3	37
	16.00	4	23	4	34	3	34
	17.00	4	22	4	32	4	43
	18.00	4	20	4	30	5	50
	19.00	5	24	6	43	5	47
	20.00	5	22	4	27	6	53
	22.00	5	20	4	24	6	48
	24.00	5	18	4	22	6	44
	26.00	5	16	4	20	6	40
	28.00	5	15	4	18	6	36
	30.00	5	13	4	17	6	34
32.00	5	12	4	15	6	31	
34.00	5	11	4	14	6	29	
36.00	5	10	4	13	6	27	
38.00	6	11	4	12	6	25	
40.00	6	10	5	14	6	24	

Indicates setting that may over-burden the battery's ability to maintain full charge. You may consider moving up one plunger size.



1/2" PLUNGER (LARGE Motor)

RUN and OFF TIME SETTINGS

		1/2" Plunger					
		Pin Position 1		Pin Position 2		Pin Position 3	
		Displ/stroke (oz.) = 0.0679		Displ/stroke (oz.) = 0.0951		Displ/Stroke (oz.) = 0.1223	
		RUN	OFF	RUN	OFF	RUN	OFF
<b>Quarts per Day</b>	1.00	1	194	1	273	1	351
	1.25	1	155	1	218	1	281
	1.50	1	129	1	182	1	234
	1.75	1	111	1	155	1	200
	2.00	1	97	1	136	1	175
	2.25	1	86	1	121	1	155
	2.50	1	77	1	109	1	140
	2.75	1	70	1	99	1	127
	3.00	1	64	1	90	1	116
	3.25	1	59	1	83	1	107
	3.50	1	55	1	77	1	100
	3.75	1	51	1	72	1	93
	4.00	1	48	1	67	1	87
	4.50	1	42	1	60	1	77
	5.00	2	76	1	54	1	69
	5.50	2	69	1	49	1	63
	6.00	2	63	1	45	1	58
	6.50	2	58	1	41	1	53
	7.00	2	54	1	38	1	49
	7.50	2	50	1	36	1	46
	8.00	2	47	2	66	1	43
	8.50	2	44	2	62	1	40
	9.00	2	41	2	59	1	38
	9.50	2	39	2	56	1	36
	10.00	3	56	2	53	2	68
	11.00	3	50	2	48	2	62
	12.00	3	46	2	44	2	57
	13.00	3	42	2	40	2	52
	14.00	3	39	2	37	2	48
	15.00	3	36	3	52	2	45
	16.00	3	34	3	48	3	63
	17.00	3	31	3	45	3	59
	18.00	3	30	3	43	3	56
	19.00	3	28	3	40	3	53
	20.00	3	26	3	38	3	50
	22.00	5	39	4	46	6	90
	24.00	5	36	4	42	6	82
	26.00	5	33	4	38	6	75
	28.00	5	30	4	35	6	69
	30.00	5	28	4	33	6	64
32.00	5	26	4	30	6	60	
34.00	5	24	4	28	6	56	
36.00	5	22	4	26	6	53	
38.00	6	25	4	25	6	50	
40.00	6	23	5	29	6	47	

Indicates setting that may over-burden the battery's ability to maintain full charge. You may consider moving up one plunger size.