

# Sidewinder Pumps Inc. AC C1D2 Timer/Controller



There ain't no better pump



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## 1. Warnings

### 1.1. 120 VAC operation in a C1D2 area

1.1.1. Your Sidewinder Timer/Controller is designed to be hardwired into a 120 VAC circuit that is approved for use in a Class 1 Division 2 environment. All conduit and fittings must meet C1D2 standards and be installed by an electrician certified to work / do installs in a C1D2 area. The timer will not run on alternate voltages, and must only be connected to a grounded source. **(120VAC, 5.0 AMPS, 60HZ, CLASS 1 DIVISION 2 GROUPS A, B, C, D, T3C)**

### 1.2. Shock Hazard

1.2.1. **There are no user serviceable parts in the Timer/Controller. As in any 120 VAC device, serious injury or death can occur with improper service/contact to internal parts.** Hazardous voltage is present in the non-accessible, inside part of the timer/controller box, and the motor is powered by 120 VAC. Always disconnect the timer/controller before connecting or disconnecting any devices/loads. The timer/controller should ONLY be serviced by trained Sidewinder personnel.

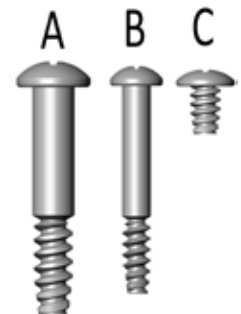


## 2. Unpacking, Installation, and Connection of the Timer/Controller

### 2.1. What's in the box?

2.1.1. Your Sidewinder AC C1D2 Timer/Controller comes with DIN rail mount molded bosses, and with four holes for mounting to either an available mount bracket (Part Number AC-MBHD-1-A) from Sidewinder or your own mount bracket. The box contains the following items:

- (1) Timer (AC timer approved for C1D2 use)
- (1) Screw kit – (4) Screw "A" for main enclosure cover, (2) Screw "B" for enclosure wiring cover, and (4) Screw "C" for mounting the timer/controller to Sidewinder's Pump Mount Bracket, if applicable.



**(Covers must be securely in place to achieve C1D2 safety status)**

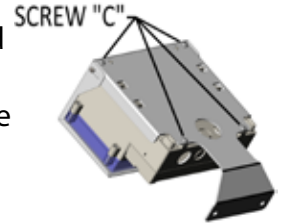
- (1) AC C1D2 Timer Manual (this document)

### 2.2. SCADA

2.2.1. If you desire to utilize the SCADA capability of your Sidewinder C1D2 Timer and not route the data wire in the same conduit as power wiring, you must add an additional hole to the enclosure. The hole located in the center on the rear side of the enclosure is the **ONLY HOLE** that may be added for routing I/O cables to the timer. A **¼" trade size fitting is the maximum size fitting** that will work with the assembly. Conduit and fittings must be approved for use in a C1D2 area, and must be installed to code for the C1D2 area by a qualified electrician/installer. The I/O is via 3 wires. Positive, negative, and ground wires are connected to the left end of the terminal strip at the bottom of the enclosure.



**2.3. Mount The Timer/Controller:** While the Sidewinder C1D2 Timer can be used to control most any AC load (5 amps or less), it was primarily designed to control the Sidewinder AC pump with its corresponding C1D2 rated motor. The timer must be mounted securely prior to operation. If you choose to utilize Sidewinder’s mounting bracket made for Sidewinder’s pump, see steps 2.3.1 thru 2.3.3. If you use an alternate mount, skip to step 2.3.3 below.



2.3.1. Fasten the timer/controller to the mount bracket using Screw “C” from 2.1.1.

2.3.2. Fasten the timer/controller bracket to the top of the AC Pump using the (2) Hex Head ¼-20 Stainless Steel Screws shipped installed on the pump head. (“\*” in picture to the right.)

2.3.3. Connect the Pump to the Timer/Controller. Utilize a licensed electrician to insure C1D2 code compliance to go from the Timer to the terminal box on the AC Motor. The timer and pump are designed to use ½” trade size fittings. Use 14 to 18 gauge wire to go from the terminal strip in the bottom of the timer enclosure to the motor.



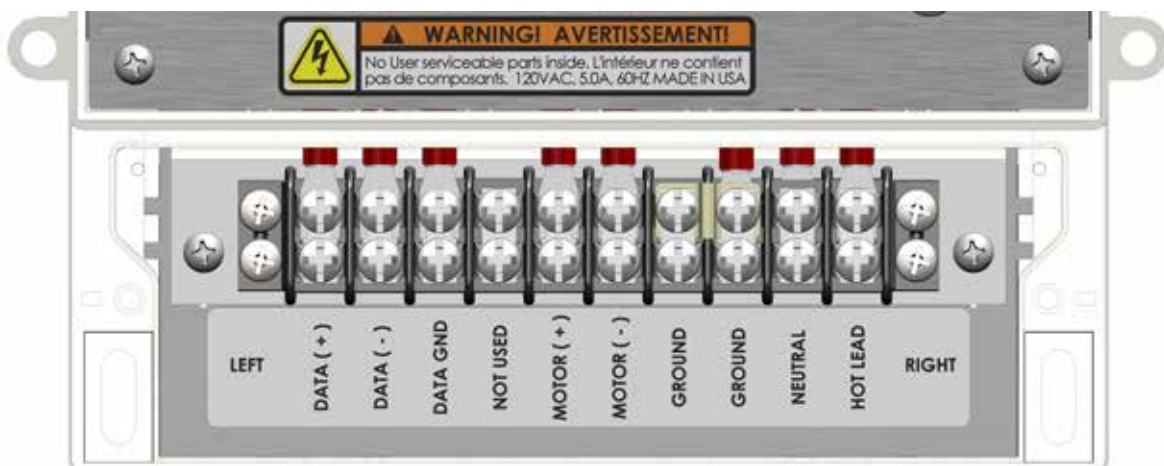
**2.4. Power connection.** Power must be connected to the timer using a method approved for Class 1 Division 2 wiring. The timer has a breaker switch that limits maximum current the timer will provide to a connected device. However, Sidewinder suggests using between 18 and 14 gauge wire for connections.

2.4.1. **NOTE: ALL WIRING MUST BE DONE BY A CERTIFIED ELECTRICIAN. THERE ARE NO USER SERVICEABLE PARTS.**

2.4.2. **SIDEWINDER STRONGLY SUGGESTS THE ADDITION OF A C1D2 OR C1D1 IN-LINE KILL SWITCH WITHIN VIEW OF THE TIMER, AND BETWEEN THE POWER SOURCE AND THE TIMER SHOULD A MALFUNCTION OCCUR, AS THE TIMER IS SEALED AND REQUIRES A TOOL (PHILLIPS SCREWDRIVER) TO ACCESS THE BREAKER/SWITCH AND CONTROL SURFACE!**



2.4.3. **EACH SIDE OF THE WIRE ACCESS COVER HAS SLOTS FOR LOCKOUT TAGS.**



**3. Understanding the control panel: The Sidewinder C1D2 timer was designed primarily as a controller for the Sidewinder AC pump equipped with a C1D2 rated motor. The remaining portion of this document deals with using the timer to control the Sidewinder pump.**



**3.1. On-Off Switch and circuit protection** - This switch functions as both an on-off switch and also provides a resettable circuit breaker function.

**3.2. MENU button** – stops pump function immediately, and enables programming and setting access. *(NOTE: if no button is pressed, the pump will resume operation after 1 minute.)*

**3.3. SCROLL button** – used to toggle between various setting areas.

**3.4. Left & Right Arrows** – used to change settings.



**3.5. 3-Digit LED Display** - This display shows setting values, and during operation counts down as the pump cycles on and off.



**3.6. Individual LEDs.**

3.6.1. There are (7) individual LEDs.



3.6.1.1. PUMP ON – Lights any time the pump is running. Flashes when the controller is in “SECONDS ON” or “MINUTES ON” setting mode.

3.6.1.2. PUMP OFF – Lights when the pump is in a non-running portion of the cycle. Flashes when the controller is in “SECONDS OFF” or “MINUTES OFF” setting mode.

3.6.1.3. PRIME – Lights when the prime function is being used. (Described in section 4 below.)

3.6.1.4. SET SECONDS - Flashes when the controller is in the “SET SECONDS” mode. Lights when in run mode and seconds are counting down.

3.6.1.5. SET MINUTES – Flashes when the controller is in the “SET MINUTES” mode. Lights when in run mode and minutes are counting down.

3.6.1.6. TEMPERATURE – Lights when the temperature mode is “ON” and temperatures are at or below the set point. Flashes when the temperature mode is “ON” but temperatures are above the set point.

3.6.1.7. MODBUS – Lights when accessing MODBUS address function.

#### 4. Timer/Controller Self-Test

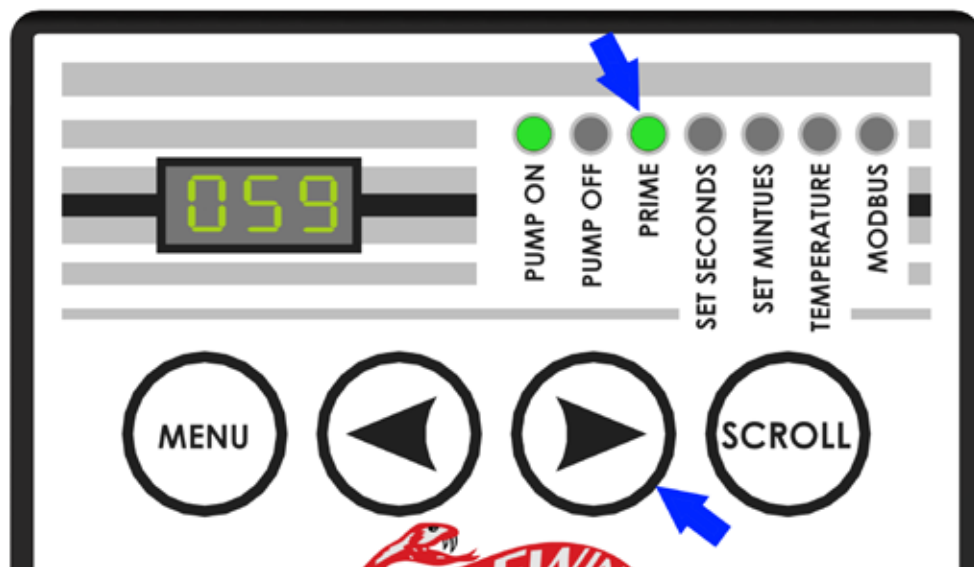
When the timer/controller is first turned on, a small “self-test” is performed. Each digit on the three digit LED display will countdown to 0. During this countdown, the “PUMP OFF” LED will be illuminated. After the self-test is complete, the “POWER ON” LED will illuminate and the pump will run at the last pump cycle settings. Pressing “MENU” at any time will stop pump operation for 1 minute.

#### 5. Priming the pump

After your AC Pump is plumbed and ready to run, use the prime function to provide a continuous run of the pump motor for priming. PRIME can be accessed only while the controller is in the run mode.

5.1. Press the right arrow button, and the pump will ignore the cycle settings and run continuously for one minute. (The PRIME LED will turn on.) Note: The prime function will not cause the pump to run if the temp mode is “ON”, and the actual temperature is not low enough to turn the pump on. Turn temp mode off to prime.

5.2 .Press the right arrow again to stop the prime function at any time while the pump is running in the Prime mode. The pump reverts to a normal run mode.



**5.3. AFTER PRIMING THE PUMP, GO TO “6. PROGRAMMING FOR DESIRED OUTPUT” LATER IN MANUAL FOR INSTRUCTIONS ON PROGRAMMING.**

**PRIOR TO USING THE PUMP FOR NORMAL OPERATION, INSTALL THE COVER OVER THE FRONT PANEL. THIS PUMP IS ONLY APPROVED FOR USE IN A C1D2 LOCATION AFTER THE COVER IS CORRECTLY INSTALLED. (NOTE: THE COVER OVER THE WIRING BAY AT THE LOWER SIDE OF THE PUMP SHOULD ALREADY BE PROPERLY INSTALLED AT THIS POINT!)**

**OPENING THE TIMER TO PERFORM CHANGES IN SETTINGS AFTER PUMP HAS BEEN PUT IN OPERATION MUST BE PRECEDED BY CAREFULLY ASCERTAINING THAT THE AREA IS FREE OF POTENTIALLY EXPLOSIVE GASES OR DUST, AND THE AREA IS APPROVED FOR TEMPORATY OPENING OF THE TIMER. THE TIMER MUST BE PROPERLY SEALED AGAIN AFTER CHANGES ARE MADE, BEFORE NORMAL OPERATION IS RESUMED!**

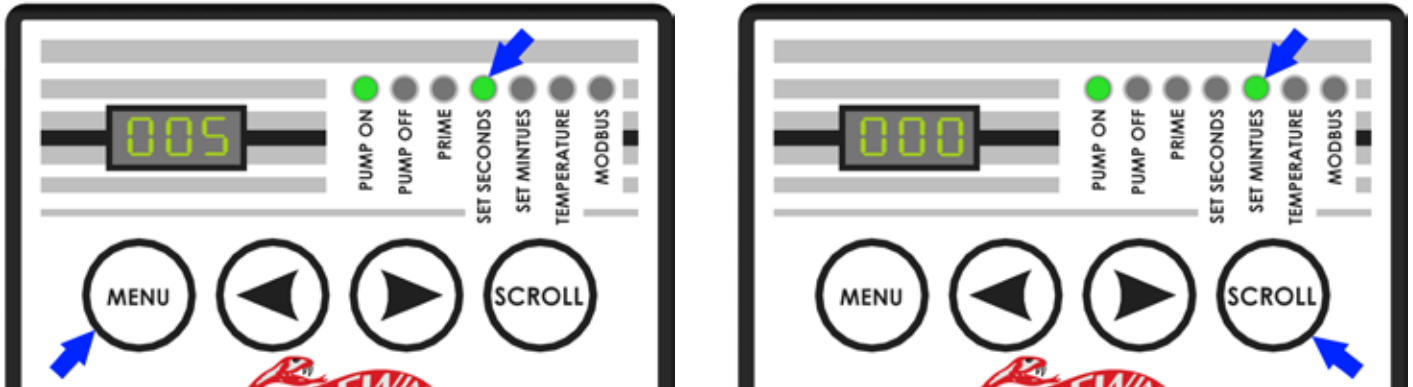
## 6. Programming for desired pump output

### 6.1. How it works

6.1.1. Your Sidewinder AC Timer/Controller controls the AC Pump by setting two variables, Cycle "ON" time, and Cycle "OFF" time. Charts are provided that provide estimated outputs based on your setting selections. Output can be set up for intermittent dosing, or for batch type dosing. The chart on page 11 of this document provides an estimated setting, but Sidewinder strongly recommends that output be verified using a pump calibration gauge. NOTE: Flow rates less than 1.2 Qts/Day may be achieved by setting "ON TIME" to seconds, and "OFF TIME" to minutes. Contact the factory for more information.

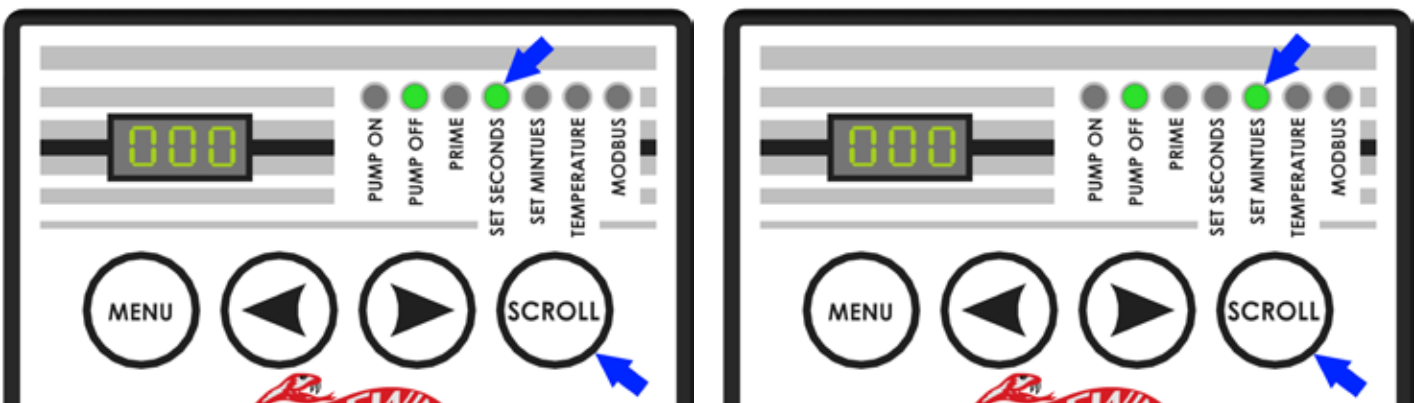
### 6.2. Set the "ON" time

6.2.1. To set the "ON" time, press "MENU". The "PUMP ON" LED will flash, and the "SET SECONDS" LED will flash. The 3-digit LED will display the current setting. Use the left or right arrows to change the setting for number of seconds "ON". This setting is adjustable from 0 – 59 seconds. Press the "SCROLL" button and the "SET SECONDS" LED quits flashing and the "SET MINUTES" LED will flash. This setting is adjustable from 0 to 60 minutes of on-time.



### 6.3. Set the "OFF" time

6.3.1. To set the "OFF" time, press "SCROLL" again. The "PUMP OFF" LED will flash, and the "SET SECONDS" LED will flash. The 3-digit LED will display the current setting. Use the left or right arrows to change the setting for number of seconds "OFF". This setting is adjustable from 0 – 59 seconds. Press the "SCROLL" button and the "SET SECONDS" LED quits flashing and the "SET MINUTES" LED will flash. This setting is adjustable from 0 to 60 minutes of off-time. NOTE: Press "SCROLL" once more to lock the settings in, then press "MENU" to begin pump operation.

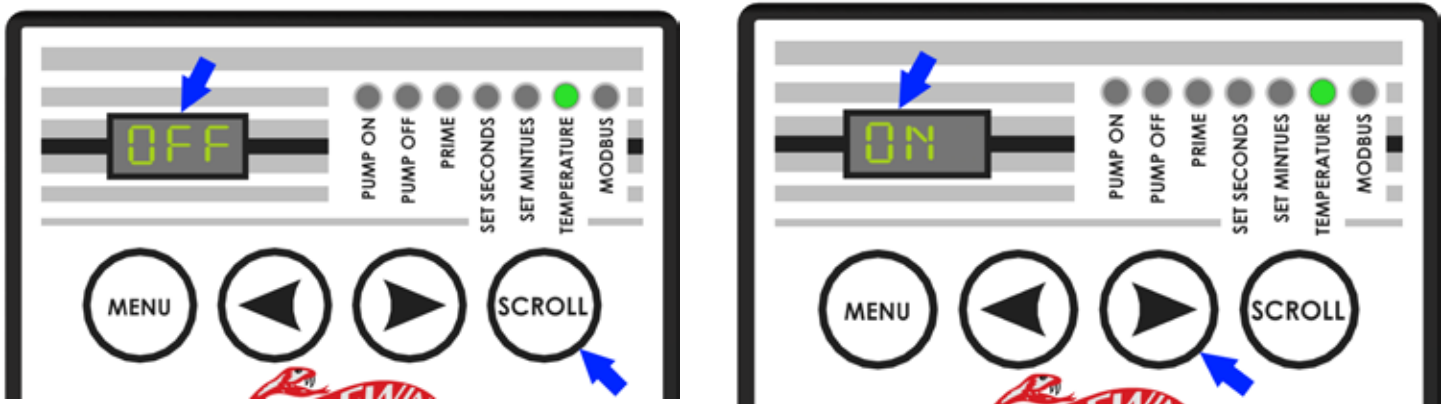


## 7. Accessing Temperature Controlled Operation

Your Sidewinder AC Pump Timer/Controller can also be set to run only after the ambient temperature near your pump has reached a temperature selected by you. After ambient temperature rises past the set point, the pump will shut off and remain off until the temperature is again, at or below the set point. The "TEMPERATURE" led will flash anytime the temperature mode is "ON" and ambient temperatures are not at or below the set point. It will be on, but stop flashing, when the ambient temperature is at or below your set point. The pump will run per your on-time, off-time settings.

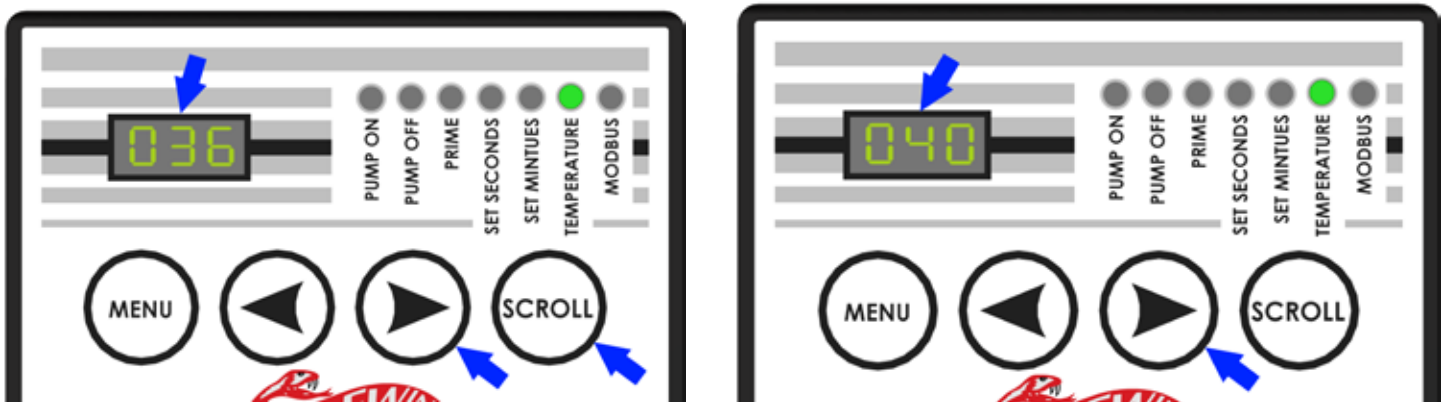
### 7.1. Turn the Temperature Mode on/off

7.1.1. Press "SCROLL" until the "TEMPERATURE" LED flashes. The three digit LED display will say "ON" or "OFF" depending on the status of the temperature mode. If it is "OFF", pressing either of the arrow button changes the setting to "ON".



### 7.2. Set the desired temperature

7.2.1. When "ON" is displayed, pressing the "SCROLL" button enables setting of the temperature that you want the pump to start running. Press the arrow keys to change the temperature setting. Pressing "SCROLL" again exits the temperature setting mode. Press "MENU" to return to a run mode. Now, the pump will not run until the temperature drops to the set point. At that point, the pump will run, and will continue to run until the temperature rises above the set point, and the pump returns to a non-running mode.





### 7.3. Temperature sensor calibration

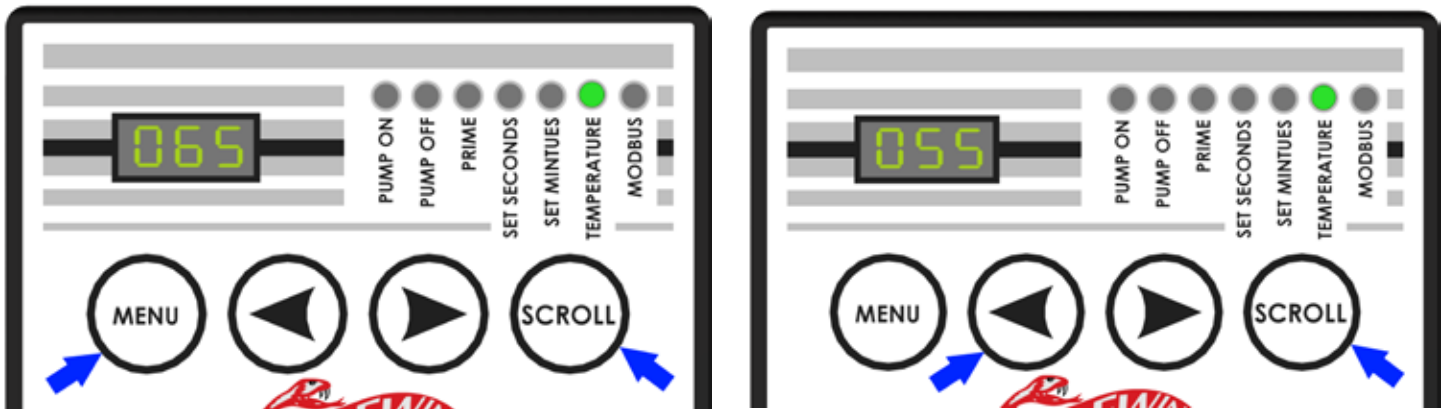
(NOTE: Temperature mode should be in the "ON" setting prior to 7.3.1)

7.3.1. Turn the timer/controller off.

7.3.2. Hold both the "SCROLL" and "MENU" buttons down, and turn the unit ON.

7.3.3. All LEDs and display segments will flash.

7.3.4. Release "SCROLL" and "MENU".



7.3.5. The unit will perform a self-test, and when complete, it will be in temperature calibration mode. The 3-digit LED display will show its measured temperature. If "OFF" is displayed, the unit was not in temp mode. Press either arrow key to enter temp mode. The temperature should now be displayed. Go to step 7.3.6.

7.3.6 Use the left and right arrows to decrease or increase the calibration by +/- 50 degrees Fahrenheit until the display shows the actual ambient temperature at that time. The display will show the internal temperature of the controller which can be impacted by the electronics, but should stabilize after the unit runs a while. For example, if the actual temperature at the site is 50 degrees, but your unit reads 65 degrees, press the left arrow until the display shows 55. Press "SCROLL" to lock in the calibrated setting. The pump will enter a normal run mode. If you do not press "SCROLL", your changes will not be saved.

**NOTE: It is important to turn the timer on and allow its internal temperatures to stabilize before using this calibration mode. Wait at least 10 minutes of run time before calibrating the temperature shown on the display.**

## 8. MODBUS Information

### 8.1. Channel Selection

- 8.1.1. Press “SCROLL” until the “MODBUS” LED flashes. The 3-digit LED display shows the current MODBUS channel selected. Use the arrows to change the setting. The default value is “16”.

The other MODBUS settings are:

Baud Rate = 9600  
Data Bits = 8  
Stop Bits = 1  
Parity = none

### 8.2. Communication Details (MODBUS):

- 8.2.1. Discrete Input Contacts {Read Function 0x02}  
Register 1: Low Battery Flag... 1=Voltage is less than 11.0V  
Register 2: Battery Blink Flag... 1=Voltage is less than 10.0V  
Register 3: High Temp Flag... 1=Temperature is greater than set point  
Register 4: Update Flag... 1=Controller is updating the display

- 8.2.2. Analog Input Registers {Read Function 0x04}  
Register 1: Current Temperature Reading  
Register 2: Current Voltage Reading (decimal is assumed)  
i.e. 121 = 12.1V  
Register 3: Current Run Timer – in seconds  
Register 4: Current Off Time – in seconds  
Register 5: Timeout – amount of time that the controller may be left in “MENU” mode.

- 8.2.3. Discrete Output Coils {Read Function 0x01}  
Register 1: Output (pump) 1=on  
Register 2: Temperature Mode 1=on  
Register 3: Prime Mode 1=on  
Write Single Coil: 0x05  
Write Multiple Coils: 0x15

- 8.2.4. Analog Output Holding Registers {Read Function 0x03}  
Register 1: On Timer: Seconds (0 to 59)  
Register 2: On Timer: Minutes (0 to 15)  
Register 3: Off Timer: Seconds (0 to 59)  
Register 4: Off Timer: Minutes (0 to 15)  
Temperature Set Point (-40 to 100) Degrees F  
Modbus Address (1 to 127)  
Elapsed Timer (not saved – starts at 0 on power up)

Write Single Holding Register: 0x06  
Write Multiple Holding Registers: 0x16

## APPROXIMATE QUARTS PER DAY AT VARIOUS ON-TIME / OFF-TIME SETTINGS

(ALWAYS VERIFY ACTUAL OUTPUT WITH A PUMP CALIBRATION GAUGE)

BATCH DOSING SETTINGS														
PLUNGER DIAMETER	ON MIN	OFF MIN	SIMPLEX QTS / DAY	DUPLEX QTS / DAY	PLUNGER DIAMETER	ON MIN	OFF MIN	SIMPLEX QTS / DAY	DUPLEX QTS / DAY	PLUNGER DIAMETER	ON MIN	OFF MIN	SIMPLEX QTS / DAY	DUPLEX QTS / DAY
1/4"	60	0	73.5	146.9	3/8"	60	0	165.3	330.6	1/2"	60	0	293.9	587.8
1/4"	55	5	67.3	134.7	3/8"	55	5	151.5	303.1	1/2"	55	5	269.4	538.8
1/4"	50	10	61.2	122.4	3/8"	50	10	137.8	275.5	1/2"	50	10	244.9	489.8
1/4"	45	15	55.1	110.2	3/8"	45	15	124.0	248.0	1/2"	45	15	220.4	440.8
1/4"	40	20	49.0	98.0	3/8"	40	20	110.2	220.4	1/2"	40	20	195.9	391.8
1/4"	35	25	42.9	85.7	3/8"	35	25	96.4	192.9	1/2"	35	25	171.4	342.9
1/4"	30	30	36.7	73.5	3/8"	30	30	82.7	165.3	1/2"	30	30	146.9	293.9
1/4"	25	35	30.6	61.2	3/8"	25	35	68.9	137.8	1/2"	25	35	122.4	244.9
1/4"	20	40	24.5	49.0	3/8"	20	40	55.1	110.2	1/2"	20	40	98.0	195.9
1/4"	15	45	18.4	36.7	3/8"	15	45	41.3	82.7	1/2"	15	45	73.5	146.9
1/4"	10	50	12.2	24.5	3/8"	10	50	27.6	55.1	1/2"	10	50	49.0	98.0
1/4"	5	55	6.1	12.2	3/8"	5	55	13.8	27.6	1/2"	5	55	24.5	49.0
1/4"	1	59	1.2	2.4	3/8"	1	59	2.8	5.5	1/2"	1	59	4.9	9.8
INTERMITTENT FLOW SETTINGS														
PLUNGER DIAMETER	ON SEC	OFF SEC	SIMPLEX QTS / DAY	DUPLEX QTS / DAY	PLUNGER DIAMETER	ON SEC	OFF SEC	SIMPLEX QTS / DAY	DUPLEX QTS / DAY	PLUNGER DIAMETER	ON SEC	OFF SEC	SIMPLEX QTS / DAY	DUPLEX QTS / DAY
1/4"	60	0	73.5	146.9	1/2"	60	0	293.9	587.8	1/2"	60	0	293.9	587.8
1/4"	55	5	67.3	134.7	1/2"	55	5	269.4	538.8	1/2"	55	5	269.4	538.8
1/4"	15	3	61.2	122.4	1/2"	15	3	244.9	489.8	1/2"	15	3	244.9	489.8
1/4"	12	4	55.1	110.2	1/2"	12	4	220.4	440.8	1/2"	12	4	220.4	440.8
1/4"	6	3	49.0	98.0	1/2"	6	3	195.9	391.8	1/2"	6	3	195.9	391.8
1/4"	7	5	42.9	85.7	1/2"	7	5	171.4	342.9	1/2"	7	5	171.4	342.9
1/4"	8	8	36.7	73.5	1/2"	8	8	146.9	293.9	1/2"	8	8	146.9	293.9
1/4"	7	10	30.3	60.5	1/2"	7	10	121.0	242.0	1/2"	7	10	121.0	242.0
1/4"	6	12	24.5	49.0	1/2"	6	12	98.0	195.9	1/2"	6	12	98.0	195.9
1/4"	4	12	18.4	36.7	1/2"	4	12	73.5	146.9	1/2"	4	12	73.5	146.9
1/4"	2	10	12.2	24.5	1/2"	2	10	49.0	98.0	1/2"	2	10	49.0	98.0
1/4"	2	22	6.1	12.2	1/2"	2	22	24.5	49.0	1/2"	2	22	24.5	49.0
1/4"	1	59	1.2	2.4	1/2"	1	59	4.9	9.8	1/2"	1	59	4.9	9.8

**MAXIMUM PRESSURES: 1/4" - 5000 PSI, 3/8" - 2500 PSI, 1/2" 1500 PSI**

### 9. Pump Output Table

**Note: Output rates less than 1.2 Quarts / Day can be achieved by setting "ON TIME" to seconds, and "OFF TIME" to minutes. Contact the factory for more information.**

## 10. Calculating Approximate Outputs

V1 = Quarts per stroke

1/4" plungers ... V1 = 0.000850339

3/8" plungers ... V1 = 0.001913263

1/2" plungers ... V1 = 0.003401357

T1 = On time

T2 = Off time

C1 = Cycles /Day (if seconds)

$$C1 = 86,400 / (T1 + T2)$$

i.e. If T1 = 5 sec and T2 = 5 sec

$$C1 = 86,400 / (5 + 5) = 8,640 \text{ Cycles/Day}$$

C1 = Cycles /Day (if minutes)

$$C1 = 1440 / (T1 + T2)$$

i.e. If T1 = 10 min and T2 = 10 min

$$C1 = 1440 / (10 + 10) = 72 \text{ Cycles/Day}$$

(Note: These calculations assume 1 full stroke per second of motor run. At lower pressures more than one stroke per second may be achieved.)

Q1 = QUARTS PER DAY = V1 x C1 x T1

For Example:

For a Simplex Pump with a 1/4" plunger, T1 = 10 sec, T2 = 5 sec

$$C1 = 86,400 / (10 + 5) = 5760 \text{ cycles/day}$$

$$Q1 = 0.000850339 \text{ quarts/stroke} \times 5760 \times 10 = 48.98 \text{ Quarts/Day}$$

For a Simplex Pump with a 1/2" plunger, T1 = 10 min, T2 = 20 min

$$C1 = 1440 / (10 + 20) = 48 \text{ cycles/day}$$

$$Q1 = 0.003401357 \times 48 \times 10 = 1.63 \text{ Quarts/Day}$$

For Duplex Pumps pumping to the same location, add the two pumps totals, or multiply by (2) if both sides of the pump have the same size plunger.

**Please NOTE: These calculations provide an estimated output. Sidewinder strongly recommends that you use a pump setting gauge to insure accurate daily output.**

**THIS PAGE PROVIDED FOR CALCULATIONS::**

**CAUTION!** This timer/controller operates on 120 VAC and must be installed by a certified electrician. Any service must be performed by trained personnel. There are no user serviceable parts in the timer or pump motor.

**SEE 5.1.3 PRIOR TO OPERATION OF THIS UNIT!**



**WARNING! EXPLOSION HAZARD. DO NOT OPEN COVERS OR DISCONNECT THIS DEVICE WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.**  
AVERTISSEMENT : RISQUE D'EXPLOSION. NE PAS OUVRIR LE COUVERCLES NI DÉBRANCHEZ CET APPAREIL PENDANT QUE LE CIRCUIT EST SOUS TENSION, SAUF SI L'ENVIRONNEMENT EST CLASSÉ NON DANGEREUX.



**WARNING! AVERTISSEMENT!**

No User serviceable parts inside. L'intérieur ne contient pas de composants. 120VAC, 5.0A, 60HZ MADE IN USA

*“Dedicated to providing  
“State of the Art” Metering Solutions  
for all your chemical treatment needs.”*



There ain't no better pump

**107 Commission Blvd., Lafayette, Louisiana 70508**  
**P.O. Box 80769, Lafayette, LA 70598-0769**  
**(337) 235-9838 / Fax (337) 235-9852 • [www.sidewinderpumps.com](http://www.sidewinderpumps.com)**

Manufacturer Disclaimer

Manufacturer recommends not using poly tubing, copper tubing, or seamed tubing as a discharge line. Manufacturer recommends using 316 SS seamless tubing rated for maximum discharge pressure of the specific pump model being used. Use of incorrect material may result in discharge line failure leading to personal injury, death, and/or compromise to intended injection objectives. Good engineering practices and the manufacturer recommend placement of a properly sized pressure relief valve on pump discharge line for safety purposes.