Aldonex AH AND AHC Controller Operation Manual

REVISED 9-28-2018

Terminology

Screen	The term screen is used to describe the appearance of the 2x16 character LCD display, with its text and associated key functionality. The operation of the unit is defined as a series of pre-defined screens. Transition from screen to screen is done with a short press of the NEXT key. The screens are arranged in a repeating loop that start back at the beginning after the final screen in the sequence.
Active Setting Mode	Many of the display screens allow the operator to make adjustments. When the screen is first arrived at, it is in a display-only, non-setting mode of operation. The operator presses and holds the NEXT key to transition into the Active Setting Mode. This is characterized with a flashing cursor on the screen. The active setting mode is terminated by pressing and holding the NEXT key again.
Setup Screens	One of the screens in the main sequence is simply labeled "SETUP". If the operator presses and holds the NEXT key at this screen, an additional sequence of setup screens can be accessed. These screens are also arranged in a loop, separate from the main display sequence.
PUMP Operation AHC Models	Output relays can be configured for pump operation. The meter tracks AH's for a PRESET interval and then energizes the output relay. The relay remains energized for an interval controlled by a TIMER setting. A non-volatile memory allows all counts and timers to continue where they left off if power is removed and then restored later.
RECTIFIER Operation AHC Models	When RECTIFIER is selected for a relay configuration, it will behave differently than when it is configured for PUMP operation. When the PRESET count of AH expires, the relay is energized, and remains energized until reset. Depending on settings, reset might occur on next power-up, or with RESET key press.

General Screen Operating Details

1) The operation of the AH meter is active at all times, regardless of display screen or active setting mode operation. Operation is not suspended during adjustments or changes. Relays, timers and counters always continue to function, based on current active settings, regardless of operation selection of display screen, or keypad activity.
2) The NEXT, CHANGE and RESET keys will respond to short key presses. Only the NEXT key has additional functions associated with a longer press and hold.
3) Pressing the RESET key from any screen (when not in Active Setting Mode) will return operation to the default display screen.
4) Pressing then RESET key while in Active Setting Mode will typically clear counts to zero, or restart counts at their configured reload values, depending on the specific setting. For configuration screens, the RESET key will load default values for settings.
5) Status information characters are shown in the lower right corner of some screens. This includes an indicator when an active analog input is sensed, and the meter is actively counting Amp Hours/Minutes/Seconds. This also includes indicators for the two relay outputs, showing when they are energized. These information characters aren't shown on all screens.
    a. Setting screens don't show the status information.

   b. Any screen in Active Setting Mode does not show the status information.
6) There is no automatic timeout feature for the screens on the main screen sequence. If the operator changes the screen to show one of these other screens, the display will remain at that screen until another operator selection, or power is cycled.
7) When in active setting mode, and no key is pressed for the inactivity timeout interval, the active setting mode will cancel, and the setting changes that were made up to that point are accepted.
8) If the display is left on one of the screens in the setup loop, it will cancel after an inactivity timeout interval and return to the default screen in the main sequence.

Meter Display / Keypad Timing

AH Count Update	Approximately once per second.
Long Key Press Timing	4 Seconds
Setting Screen Timeout	2 Minutes
Inactivity Timeout	2 Minutes

List of Screens

Power Up Screen

This screen displays software version number and current shunt configuration values

Main Display Sequence

This group of displays reports the present status of the unit. It represents all of the run-time information including the active counts that are controlling the relay outputs.

1. Cumulative Amp-Hour Total (HOME Screen)
2. Resettable Amp-Hour Total
3. Total Run Time
4. Prime Pump
5. Preset 1
6. Preset 1 Count Remaining
7. Timer 1
8. Timer 1 Count Remaining
9. Cycle Count 1
10. Preset 2
11. Preset 2 Count Remaining
12. Timer 2
13. Timer 2 Count Remaining
14. Setup Entry

Setup Screen Sequence

1. Shunt Size
2. Relay 1
3. Relay 2
4. Rectifier Power On Reset

Power Up Screen

This screen will be visible for a two seconds immediately after power-up.

```
Aldonex AH Meter
Version 1.0
```

Cumulative Amp-Hour Total Screen (HOME Screen)

Normal display formatting:

```
0000000000000
AH TOTAL   R12⚡

0000000000000
AM TOTAL   R12⚡

0000000000000
AS TOTAL   R12⚡
```

When special “decimal AH” feature is enabled:

```
00000000.000
AH TOTAL   R12⚡
```

Description

This screen shows the non-resettable cumulative, increasing count of amp hours. This is the default screen after power-up. The time-out screen reset function and the RESET key will return operation to this screen.

The on-screen count increases at a rate of roughly 1Hz, with some allowable variation in update rate. The "AH" descriptor (lower left) will be exchanged with "AM" when Amp-Minutes are selected or "AS" when Amp-Seconds are selected.

When "decimal AH" are factory enabled, additional digits will be displayed as shown.

Control Button Operations – Active Setting Mode

This display screen has no active setting mode operations.

Resetting Rectifier Relay Output using RESET Key

The HOME screen will have a special functionality for the RESET key. It will allow the operator to de-energize output relay(s) that have been latched on as RECTIFIER control outputs. AHC Models.

When assigned as RECTIFIER output relays, there will be no TIMER function. When the PRESET count down expires, the relay(s) will energize and latch on until they are reset. There are two ways to clear this latched condition. First, the power-on reset feature can be enabled. In that case, when power is cycled, the relay outputs assigned to RECTIFIER are turned off and the PRESET count starts over at the beginning.

If the Power-On Reset feature is disabled, a latched condition will not be cleared by cycling power. Instead, the RESET key can be used at the HOME display screen. For this to work, the following conditions must be true:

- A relay must be assigned to the RECTIFIER output function.
- That relay must be latched on because the PRESET count interval has expired.
- The HOME screen must be showing.
- The Power-On Reset function must be disabled.

Under those conditions, pressing the RESET key will cause the latched relay output to release, and the PRESET count remaining for that relay will be reloaded back to its starting value.

Status Information Characters in Lower Right Corner

On the display screens, there are status characters that are shown in the lower right-hand corner. These characters show the status of the analog input and the relay outputs, for quick reference.

The analog input status will be shown using a lightning bolt symbol "⚡". When this symbol is shown, it means that there is an active, non-zero, voltage present at the analog input and the AH/AM/AS count is actively incrementing.

The relay status is shown with the letter "P" (pump) and either the number '1', '2' or both "12". When no relays are turned on, there is no letter "P" and no numbers, the characters are blank. "P1" means just relay 1 is on. "P2" means just relay 2 is on. "P12" means that both relay 1 and relay 2 are on.

Analog signal present, both relays on:

```
|0|0|0|0|0|0|0|0|0|0|0|0|  |  |  |  |
|A|H|  |T|O|T|A|L|  |  |  |  |R|1|2|⚡|
```

Analog signal present, no relays on:

```
|0|0|0|0|0|0|0|0|0|0|0|0|  |  |  |  |
|A|H|  |T|O|T|A|L|  |  |  |  |  |  |  |⚡|
```

No analog signal, no relays

```
|0|0|0|0|0|0|0|0|0|0|0|0|  |  |  |  |
|A|H|  |T|O|T|A|L|  |  |  |  |  |  |  |  |
```

Analog signal present, just relay 1:

```
|0|0|0|0|0|0|0|0|0|0|0|0|  |  |  |  |
|A|H|  |T|O|T|A|L|  |  |  |  |R|1|⚡|
```

Analog signal present, just relay 2:

```
|0|0|0|0|0|0|0|0|0|0|0|0|  |  |  |  |
|A|H|  |T|O|T|A|L|  |  |  |  |R|2|⚡|
```

9 Resettable Amp-Hour Total Screen

When special “decimal AH” feature is enabled:

```
|0|0|0|0|0|0|0|0|0|.|0|0|0|  |  |  |
|R|E|S|E|T|T|A|B|L|E|  |  |R|1|2|⚡|
```

When setting mode is active the screen changes as follows:

```
|A|H|  |T|O|T|A|L|  |R|E|S|E|T|  |  |
|  |0|0|0|0|0|0|0|0|0|0|0|  |  |  |

|A|M|  |T|O|T|A|L|  |R|E|S|E|T|  |  |
|  |0|0|0|0|0|0|0|0|0|0|0|  |  |  |

|A|S|  |T|O|T|A|L|  |R|E|S|E|T|  |  |
|  |0|0|0|0|0|0|0|0|0|0|0|  |  |  |
```

When special “decimal AH” feature is enabled:

```
|A|H|  |T|O|T|A|L|  |R|E|S|E|T|  |  |
|  |0|0|0|0|0|0|0|0|0|.|0|0|0|  |  |
```

Description

This screen shows the resettable cumulative AH/AM/AS count. When in active setting mode, the screen changes, and the operator is able to individually select the numeric digits individually and change them. The operator is not forced to clear the value to zero, but can change the count to any value, digit by digit.

Control Button Operations – Active Setting Mode

NEXT	Selects digits to adjust.
CHANGE	Increments digits that are selected. Wraps around from 9 to 0.
RESET	Clears count to zero.

Total Run Time Screen

Display Mapping

```
|0|0|0|0|0|0|0|0|:|0|0|:|0|0|  |  |
|T|I|M|E|  |T|O|T|A|L|  |  |R|1|2|⚡|
```

Description

Count increases whenever active analog input reading is detected. Count is divided into hours, minutes and seconds. This count is not adjustable or clearable by the operator.

Control Button Operations – Active Setting Mode

This display screen has no active setting mode operations.

Prime Pump Screen

AHC Models

11.1 Display Mapping

```
|P|R|I|M|E|  |P|U|M|P|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |R|1|2|⚡|

|P|R|I|M|E|  |P|U|M|P|1|  |  |  |  |  |
|D|I|S|A|B|L|E|D|  |  |  |  |  |  |  |  |

|P|R|I|M|E|  |P|U|M|P|1|  |  |  |  |  |
|E|N|A|B|L|E|D|  |  |  |  |  |  |  |  |  |
```

Description

This screen allows pump 1 and pump 2 relay outputs to be manually turned on and off. When in Active Setting Mode, the pump output can be enabled (relay energized) or disabled (relay de-energized). When exiting the Active Setting Mode, the default relay output operation resumes.

Control Button Operations – Active Setting Mode

AHC Models

NEXT	Changes from PUMP1 to PUMP2
CHANGE	Toggles the pump output from ENABLED to DISABLED
RESET	Changes output to DISABLED

Preset 1 / Preset 2 AHC Models

Display Mapping

```
 000.000          R12⚡

PRESET1
 0000000          R12⚡
```

When special “decimal AH” feature is enabled:

```
PRESET1
 000.000          R12⚡
```

Description

Each of the relay outputs has their own copy of this screen. This screen is not shown if the relay is disabled.

The PRESET is the reload value for the AH/AM/AS count down that will trigger the output relay to turn on. For pump operation, this would be the repeating interval desired for the pumps to run a cycle. For the rectifier operation, this would be the output interval before the power supply was shut down.

When PRESET value is changed, the PRESET COUNT LEFT count is automatically reloaded with the new value.

Control Button Operations – Active Setting Mode

NEXT	Selects digits to adjust.
CHANGE	Increments digits that are selected. Wraps around from 9 to 0.
RESET	Clears count to zero.

Preset 1 Count Left / Preset 2 Count Left AHC Models

Display Mapping

```
PRESET1  REM  CNT
 0000000          R12⚡
```

When special “decimal AH” feature is enabled:

```
PRESET1  REM  CNT
 000.000          R12⚡
```

Description

Each of the relay outputs has their own copy of this screen. This screen is not shown if the relay is disabled.

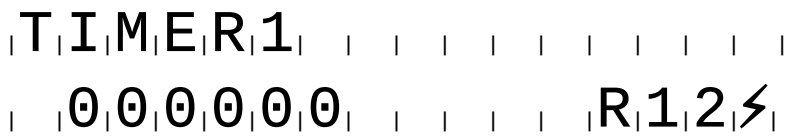
This screen shows the active count down until the preset interval ends. It is started using the configured PRESET count, and then it counts down to zero. When it reaches zero, it automatically and immediately reloads back to the PRESET setting value and continues counting.

Control Button Operations – Active Setting Mode

NEXT	Selects digits to adjust.
CHANGE	Increments digits that are selected. Wraps around from 9 to 0.
RESET	Clears count to zero.

Timer 1 / Timer 2 AHC Models

Display Mapping



Description

Each of the relay outputs has their own copy of this screen. This screen is not shown if the relay is disabled. This screen is not shown if the relay is configured for RECTIFIER operation.

The TIMER value controls how long the relay is active when it is triggered. The time value is in units of seconds.

A value of 0 is allowed. The relay output does not trigger when this is set to 0. The cycle count does not increment.

When timer value is changed, the TIMER COUNT LEFT count is not adjusted in any way. It does not act like the PRESET/PRESET COUNT LEFT setting in this way.

Control Button Operations – Active Setting Mode

NEXT	Selects digits to adjust.
CHANGE	Increments digits that are selected. Wraps around from 9 to 0.
RESET	Clears setting to zero.

Timer 1 Count Left / Timer 2 Count Left AHC Models

CHANGE Increments digits that are selected. Wraps around from 9 to 0.

RESET Clears count to zero

Display Mapping

```
|T|I|M|E|R|1|  |R|E|M|  |C|N|T|  |  |
|  |0|0|0|0|0|0|  |  |  |  |  |R|1|2|⚡|
```

Description

Each of the relay outputs has their own copy of this screen. This screen is not shown if the relay is disabled. This screen is not shown if the relay is configured for RECTIFIER operation.

This is the countdown that is reloaded with the TIMER setting above. It times how long the relay is active when triggered. When the countdown reaches zero, the relay is de-energized.

There is a special case situation when the PRESET count expires while the relay is still energized from the previous triggering. In this special case, the TIMER COUNT LEFT is extended by adding the TIMER value to the existing TIMER COUNT LEFT. The relay can thereby run longer than the TIMER setting in that case. Note that there is no special attention given to conditions that would allow the time value to overflow with too many additions. It is simply allowed to overflow and wrap around.

Control Button Operations – Active Setting Mode

NEXT Selects digits to adjust.
CHANGE Increments digits that are selected. Wraps around from 9 to 0.
RESET Clears count to zero.

Cycle Count 1 / Cycle Count 2 AHC Models

1Display Mapping

```
|C|Y|C|L|E|  |C|O|U|N|T|1|  |  |  |  |
|  |0|0|0|0|0|0|  |  |  |  |  |R|1|2|⚡|
```

Description

Each of the relay outputs has their own copy of this screen. This screen is not shown if the relay is disabled. This screen is not shown if the relay is configured for RECTIFIER operation.

The number of times the relay has cycled is counted. The count increments when the relay de-energizes as the end of the TIMER interval. The cycle count does not increment for pump priming. The cycle count does not increment if the TIMER setting is 0.

Control Button Operations – Active Setting Mode

NEXT Selects digits to adjust.
CHANGE Increments digits that are selected. Wraps around from 9 to 0.
RESET Clears count to zero

Setup

Display Mapping

```
|S|E|T|U|P|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
```

Description

This is the entry screen into the meter setup display sequence. Pressing and holding the NEXT key causes the screen to change to the first screen of the setting sequence.

Control Button Operations – Active Setting Mode

This display screen has no active setting mode operations.

Shunt Configuration

Display Mapping

Amp Hours:

```
|S|H|U|N|T|  |S|I|Z|E|  |  |  |  |  |
|0|0|0|0|0|0|H|  |  |0|0|0|m|V|  |
```

Amp Minutes:

```
|S|H|U|N|T|  |S|I|Z|E|  |  |  |  |  |
|0|0|0|0|0|0|M|  |  |0|0|0|m|V|  |
```

Amp Seconds:

```
|S|H|U|N|T|  |S|I|Z|E|  |  |  |  |  |
|0|0|0|0|0|0|S|  |  |0|0|0|m|V|  |
```

Decimal Amp Hours:

```
|S|H|U|N|T|  |S|I|Z|E|  |  |  |  |  |
|0|0|0|0|0|0|.|H|  |0|0|0|m|V|  |
```

High-Range 0-10V Analog Input

```
SHUNT SIZE
000000H    00.0V
```

Description

This screen is the main analog range configuration setting for the meter. It defines how the meter will measure amps as they are sourced from the power supply. The page allows four types of settings to be made:

1) Amps at full scale input
2) Amp Hour ("H"), Amp Minute ("M"), Amp Seconds ("S") operation or Amp Hours with decimal point.
3) Millivolts (or volts) that represent a full-scale input.
4) Millilvolts input range, or Volts input range

Setting ranges allowed:

Amp Hours:	10-30,000 Amps Full Scale (No decimal Display)
Amp Hours:	1-100 Amps Full Scale (Decimal Display)
Amp Minutes:	1-500 Amps Full Scale
Amp Seconds:	1-15 Amps Full Scale
Millivolt Range:	25mV – 199mV
Volts Range:	1.5V - 10.0V

To change from the millivolt input range to the voltage input range, the operator can move the cursor to the "mV" or "V" characters and press the CHANGE key. This will allow the mV or V display to toggle back and forth so that a selection can be made.

The default settings, loaded when the RESET key is pressed, are 30,000A, AH and 50mV full scale with the 0-200mV analog input range.

When leaving the Active Setting Mode, the logic will verify the range of the full scale amps setting. If the setting is above the valid range, the logic will change the value to the maximum allowed setting. If the setting is below the valid range, the logic will change the value to the minimum allowed setting.

Control Button Operations – Active Setting Mode

NEXT	Selects digits or setting to adjust.
CHANGE	Increments digits that are selected. Wraps around from 9 to 0.
RESET	Loads default values for all setting fields.

Relay 1 Configuration / Relay 2 Configuration AHC Models

Display Mapping

```
RELAY1
PUMP
```

```
RELAY1
RECTIFIER

RELAY1
DISABLED
```

Description

The meter has two 10A output relays that operate fully independently with each other. This setting allows each of the two relays to be configured for operation as either a PUMP control output or a RECTIFIER control output, or disables the relay output entirely.

Control Button Operations – Active Setting Mode

NEXT	No effect in Active Setting Mode
CHANGE	Toggles between the three available settings.
RESET	Sets pump to DISABLED.

Power On Reset Setting AHC Models

Display Mapping

```
Rect P-on RESET
ENABLED

Rect P-on RESET
DISABLED
```

Description

Power On Reset is a function that relates to the RECTIFIER function of the output relays. When this setting is enabled, any relay assigned to the RECTIFIER function will be reset, with its PRESET count down restarted, every time the meter is powered up. If this function is not enabled, the RECTIFIER PRESET count down will be allowed to continue where it left off, and any latched relay output condition will be left latched.

When Power On Reset is disabled, the RESET button will have special functionality on the display HOME screen. See details for that screen.

Control Button Operations – Active Setting Mode

NEXT	No effect in Active Setting Mode
CHANGE	Toggles between the two available settings.
RESET	Power On Reset = Enabled.

Electrical Specifications

Power Input:	12-24VDC Nominal Meter draws about 2W of power, both relays on. Reverse polarity protected. Using our external module you can up the Input to 96-246VAC
Minimum Analog Input:	About 250uV for 200mV Range About 25mV for 10V Range
Input Impedance:	200K input resistance for 200mV range. 100K input resistance for 10V range.
Relay Outputs:	Relays have 10A rated contacts 10A Slow-Blow Fuses on Board, 3AG, Replaceable

Standard Features

- 12 Digit Non-Resettable cumulative amp/hour total
- 12 Digit Resettable cumulative amp/hour total
- EPA Accumulated non-resettable time total
- .000 Amp Hour Resolution (user selectable up to 100A for MIL Spec applications)
- Supports rectifier shunt sizes from 1A to 30000A (25-200mV)
- If not using a Shunt we have a 1-10VDC User scalable input!
- Blue/White Backlit Display (Great for low light viewing!)
- Dimensions: 3 1/2" X 3 1/2" X 2.2" Outside Bezel Dimensions: 3 3/4" X 3 3/4" (2.2" of depth, 3.1" with terminals! Beats the competition!)
- Permanent memory without batteries.
- Corrosion resistant plastic
- Superior Accuracy compared to the competition!
- Supports 12-24VDC (2W) Power Input AND 96-264VAC 1 Phase Input with an included AC module.

Controller Option (AHC Models)

- Includes wo 10A relays for rectifier and or pump control (Beats the competition!)
- Each relay has independent set points/controls.