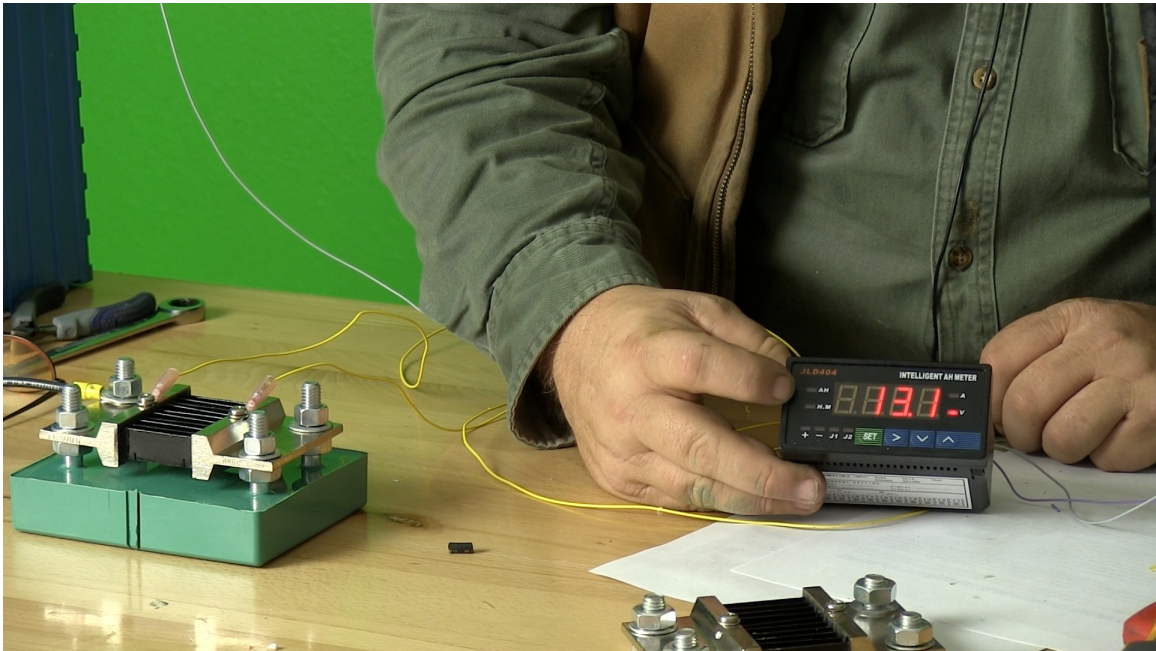


ECPC404 Intelligent Ampere Hour Meter



OPERATION MANUAL

INTRODUCTION

This Operations Manual describes the use and configuration of the ECPC404 Intelligent AH meter.

The ECPC404 allows reasonably accurate measurement of large values of DC voltage, current and the integration of ampere hours across time. It is useful for solar power installations but particularly for electric vehicles where current levels in excess of 1000 amperes and voltages as high as 500v are required.

In measuring Ampere Hours or AH, the ECPC404 can provide a numeric indication of the state of charge (SOC) of Lithium Ion batteries that can be difficult to determine using voltage measurement.

The ECPC404 provides four basic measurement functions:

1. Ampere Hours – current flow integrated over time.
2. Time – hours and minutes of elapsed time
3. DC Amperes – instantaneous current up to 9999 amps
4. DC Volts – up to 500 VDC

Additionally, the ECPC404 can perform any number of control functions via two control relays, J1 and J2, which can be activated by any of the four basic measurement functions, and EACH relay can be activated/deactivated at TWO separate values.

In this way, you can not only observe your battery state of charge, voltage, etc. but you can take action automatically based on that State of Charge level.

PACKING LIST

1. ECPC404 panel meter
2. 75 millivolt current shunt
3. This manual

SPECIFICATIONS

The ECPC404 Panel Meter offers the following features/specifications:

Current Sensor Inputs: 5A, 1A, 75mv

DC Voltage Inputs: -100/500vdc, -20/100vdc

Current Measurement: 0-9999 amperes with external shunt. 0.5%FS+3D

Voltage Measurement: -100 to +500 vdc. 0.5%FS+3D

Input Mode: common ground

Sampling Rate: 3 times per second

Ampere Hours: 0.001 to 9999

DC Accuracy: +/- 1%

Meter Operating Power: 8-30 vdc 2 watts.

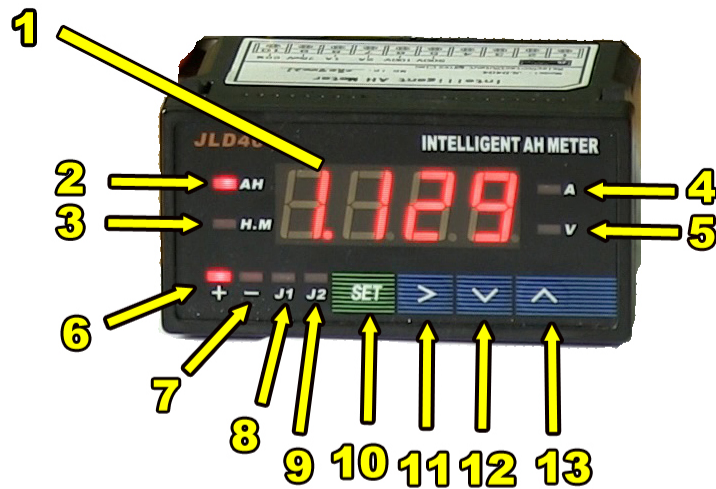
Relays: AC220/3A or DC30V/3A.

Relay Life: 10^5

Dimensions: 96 * 48 * 82 mm

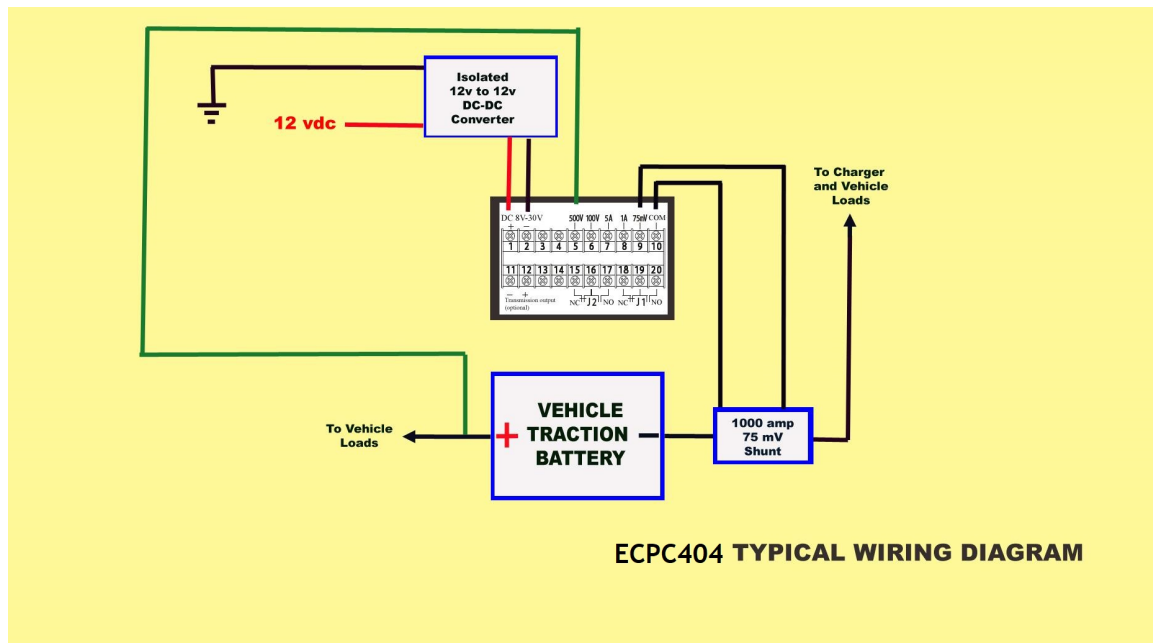
Panel Cutout: 92 * 44 mm

CONTROLS AND INDICATORS



- 1** 4 digit 0.56" bright LED value indicator
- 2** AH indicator - when lit - value indicator displays ampere hours
- 3** H.M indicator - when lit, value indicator displays elapsed time in hours and minutes
- 4** A indicator - when lit, value indicator displays current in amperes.
- 5** V indicator - when lit, value indicator displays voltage.
- 6** + indicator - when lit, indicates a positive current direction.
- 7** - indicator - when lit, indicates a negative current direction.
- 8** J1 indicator - when lit, indicates control relay J1 ENERGIZED.
- 9** J2 indicator - when lit, indicates control relay J2 ENERGIZED.
- 10** SET key used as an ENTER or SELECT function. Press once to enter menu code mode.
- 11** Right arrow key. Momentary press steps to next display function (AH/H.M/A/V). Hold for 3 seconds - Display function automatically cycles between functions. In menus moves cursor to right.
- 12** Down arrow key. In operation, hold for 3 seconds to ZERO amp hours and timer. In menus cycles DOWN menu list. When setting values, DECREASES digit under cursor.
- 13** Up arrow key. In operation, hold for 3 seconds to ZERO timer. In menus cycles UP menu list. When setting values, INCREASES digit under cursor.

WIRING INSTRUCTIONS



1. The provided 1000 ampere 75 millivolt shunt should be connected directly to the negative terminal of your traction battery pack. ALL loads of any kind normally connected to the negative terminal would then be moved to the other end of the shunt such that all current from the battery pack **MUST** go **THROUGH** the shunt to be measured.
2. Connect the COM (pin 10) of the ECPC404 to the provided measurement terminal screw on the shunt **NEAREST** the battery pack.
3. Connect the 75mv input (pin 9) to the other shunt measurement terminal screw.
4. If the positive and negative polarity of current and amp hours does not match your mental picture of which is IN and which is OUT, you may of course reverse these two shunt wires.
5. Connect the 500V input (pin 5) to the positive terminal of your battery pack.
6. See section on control relays for J1/J2 wiring instructions.

GENERAL CONFIGURATION MENU

To use the ECPC404 Intelligent AH meter a series of configuration parameters must be set before your first use. These are accessed via a menu with the display window showing one menu item at a time. This can be awkward until you become accustomed to it.

To access the menu:

1. Press SET key on front panel. Display should indicate 0000.
2. Use right arrow key > to move cursor to the third digit from the left.
3. Use UP arrow key to increment this digit to 3.
4. Use right arrow key > to move cursor to last digit
5. Use DOWN arrow key to decrement this value to 6.
6. Press SET.

You have entered the menu access code 36 to bring up the main configuration menu.

This menu lists 10 elements. You can use the up and down arrow keys to cycle between them and the SET key to select any item for review. Cycling to **End** and pressing SET exits the menu and puts you back in normal operating mode.

A - Sn	Current input sensor
APuL	Zero offset amps display
APuH	Full Scale value of amps display
Adot	Decimal Point position for amps display
u - Sn	Voltage Input Sensor
uPuL	Zero offset volts display
uPuH	Full Scale value of volts display
udot	Decimal Point position for volts display
FILt	Filter Value
End	Escape main configuration menu

A - Sn Current input sensor. This value establishes which input we will use for current sensing. Three options available:

5A	5 amp AC current transformer connected to pins 7 and 10.
1A	1 amp AC current transformer connected to pins 8 and 10.
75um	75 millivolt shunt connected to pins 9 and 10.

Cycle between these three options with either up or down arrow key and use SET to select and return to main configuration menu.

APuL Zero offset amps display. Allows entry of digits using up and down arrow keys in values -**1999** to **9999**. This is the value that will be displayed when ZERO amps is measured on the current input sensor. Enter **0.000** using arrow keys and press SET to return to main configuration menu.

APuH Full Scale value of amps display. Allows entry of digits using up and down arrow keys in values -**1999** to **9999**. This is the value that will be displayed when 75 mv is measured on your current shunt. For a 1000 amp shunt enter **1000**. For a 500 amp shunt enter **0500**. Press SET to confirm and return to main configuration menu.

NOTE

Unfortunately, the ECPC404 meter does NOT allow us to select different shunt scales and ALWAYS associates 75 mv with the full scale value entered here. But this DOES allow us to play some games with this entry.

First, we can enter various values here to use various sized 75 mv shunts. 1000 for a 1000 amp shunt and 500 for a 500 amp shunt are illustrated. However, if we for example used a 50 mv 500A shunt, we could connect that to our 75 mv input, and enter **750** amps in **APuH**. At 50 mv, we would then display the correct 500 amperes for 50 mv, and indeed our shunt should drop 75 mv at 750 amperes.

Similarly, you could connect a 100 mv 500 amp shunt to the 75mv shunt input. By setting this value to **0375**, you would show 375 amps at 75 mv which would be correct.

Note that results of input values beyond 75mv are not assured.

Adot Decimal Point position for amps display This simply sets the number of digits possible to the right of the decimal point as 0, 1, 2, or 3. Up or down arrow cycles and SET confirms to select. As we are dealing normally with quite high current values, this doesn't really do very much. Select 0 or as desired.

u-Sn Voltage Input Sensor. This selects our voltage input sensor. Values are **500** or **100** and selectable using the up and down arrows. SET to select and return to menu.

This corresponds to the 500v input pin 5 or 100V input pin 6 on the meter rear panel. For systems less than 100 volts, connect the positive terminal of battery to pin 6 on rear panel and set this value to **100**. This will allow measurement of voltages from -20 to 100vdc.

For systems with voltages over 100vdc, connect the positive terminal of your battery pack to in 5 on the rear panel and select **500** for this value. This will allow measurement of voltages from -100 to 500.

uPuL Zero offset volts display. Allows entry of digits using up and down arrow keys in values **-1999** to **9999**. This is the value that will be displayed when ZERO volts is measured on the voltage input sensor. Enter **0.000** using arrow keys and press SET to return to main configuration menu.

uPuH Full Scale value of volts display. Allows entry of digits using up and down arrow keys in values **-1999** to **9999**. This is the value that will be displayed when full scale voltage is measured on your voltage input. For a 100v input on pin 6 enter **0100**. For a 500 volt input on pin 5 enter **0500**. Press SET to confirm and return to main configuration menu.

uDot Decimal Point position for volts display. This simply sets the number of digits possible to the right of the decimal point as 0, 1, 2, or 3. Up or down arrow cycles and SET confirms to select. Select 1 or as desired. Somewhat interactive with values in **uPuH**.

FILt Filter Value. This is a rarely used but interesting feature of the ECPC404 meter. This menu item has four choices, 0, 1, 2 and 3. These represent levels of filtering that can be applied to the input sensors. These integration filters smooth the input to remove noise elements that may be present. **0** represents NO filtering with **3** representing the maximum filtering level. Increment/decrement with up/down arrows and SEL to select.

End Escape main configuration menu. Use up/down arrow keys to cycle to **End** and press SEL to return the ECPC404 to normal operation.

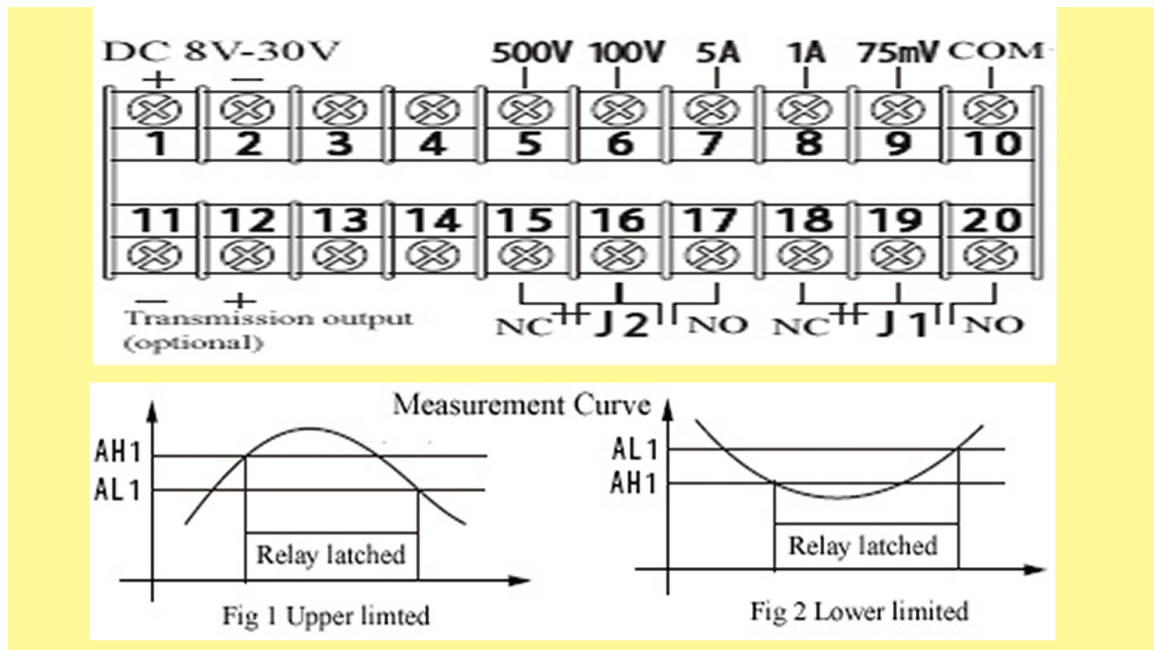
CONTROL RELAY OPERATION

The ECPC404 Intelligent AH Meter provides TWO control relays, J1 and J2 that can be energized or ACTIVATED using ANY of the four measured values, Amperes, Time, Ampere hours, or voltage.

Each relay provides access to the common pin C, the normally open contact NO and the normally closed contact NC. These relays can carry AC voltages up to 220VAC and 3 amperes or DC voltages of up to 30v and 3 amperes. They are rated for a cycle life of 100,000 operations.

These relays are accessed from the meter rear panel with J2 available on pins 15, 16 and 17 and J1 available on pins 18, 19, and 20 as shown below.

For example, relay J2 provides a constant connection between pins 15 and 16 as they are normally connected. In the event the relay is energized (latched) the connection between 15 and 16 is broken and the connection from 16 to 17 is made.



More peculiarly, these relays operate in a kind of thermostat mode with TWO threshold levels - lower and an upper. Since these are reversible, this becomes a bit confusing. But in the simplest case, the relay energizes at the AL level and remains energized until it reaches the AH level. At that point it de-energizes until the level falls back down to the upper limit AH, and it then energizes until it falls further to the lower limit AL.

Note that this is the UPPER LIMITED CONFIGURATION and is selected by entering an AH value that is HIGHER than AL.

You can actually reverse this process for cooling for example by setting AH to a lower or more negative value than AL. This results in the Lower Limited action in figure 2 above.

IF you set AH equal to AL, the relay is DISABLED entirely.

To configure your relays:

1. Press SET on JLD404AH front panel. **0000** is displayed.
2. Use arrow keys to enter the menu passcode value **0001**.
3. Press SET to enter the menu passcode.

This will select a menu with 7 items as follows:

- J1** Relay J1 inputs
- AH1** Upper activation level for J1
- AL1** Lower activation level for J1
- J2** Relay J2 Inputs
- AH2** Upper Activation Level for J2
- AL2** Lower Activation Level for J2
- End** Exit menu to normal operation.

J1 or J2 Relay J1 or J2 inputs. Selecting either J1 or J2 calls up a submenu with four selectable items. Use up and down arrow keys to cycle and SET key to select the input to be monitored for that relay.

- u** Monitor voltage input to activate relay.
- A** Monitor instantaneous current to activate relay.
- AH** Monitor accumulated net ampere-hours to activate relay.
- TIME** Monitor elapsed time to activate relay

AH1/AL1/AH2/AL2 Upper and lower limits for relays J1 and J2 as previously described. Values describe specific values of the voltage, current, amp-hours or time selected for that relay.

In this way, the two relays and the four measurement functions of the meter can be used to monitor and activate other equipment for a broad variety of purposes.