



UNIVERSAL AC CONTROLLER

LD - UAC Setup Manual
(I/R4/R4A)

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1 INTRODUCTION

The LD - UAC universal AC indicator and alarm controller is ideal for monitoring and controlling input power, voltage, current or frequency in a wide variety of applications.

This controller has been designed for ease of use, with intuitive, scrolling text prompts that guide you step-by-step through the setup process. The front panel includes 5 buttons, for simple operator interface, and the large 4-digit display ensures that the figures can be easily read from a distance.

The LD - UAC is available as an indicator. It can also be customised to include an analog output and four relay outputs.

2 SPECIFICATIONS

Input range	Current: 5A Voltage: 450V AC Power factor: -1.00 to +1.00
Power supply	HV: 85-265V AC/95-370V DC or LV: 15-48V AC/10-72V DC
Accuracy	Current: $\pm 0.05\%$ of full scale Voltage: $\pm 0.1\%$ of full scale Power: $\pm 0.2\%$ of full scale Power factor: $\pm 0.5\%$ of full scale ± 0.03
Temp. drift	$\pm 60\text{ppm}/^{\circ}\text{C}$ max
Freq. resolution	$\pm 0.001\text{Hz}$
Security	Setup PIN code protected for security
Case	48mm x 96mm x 119.5mm (H x W x D) 45.5mm x 92.5mm panel cutout

OPTIONAL OUTPUTS**Analog output**

Isolated 16-bit 4-20mA/0-10V output (fully scaleable).
Window programmable over full-scale range.

Relay outputs

4 x 5A Form A relays

Setpoints

4 x setpoints

3 CASE DIAGRAMS

The LD - UAC has a 4-digit, 7-segment alphanumeric LED display, five front-panel buttons and four setpoint annunciator LED's.

3.1 Fig 1 - Front view



BUTTON PRESS FUNCTIONS

(A) **Function 1** - This button is used to access the **setup and calibration** menu. See Section 5.

(B) **Program** - This button is typically used to save your settings and advance to the next step in the setup process.

(C) **Up** - This button is typically used to scroll through options or increase values in the setup menu.

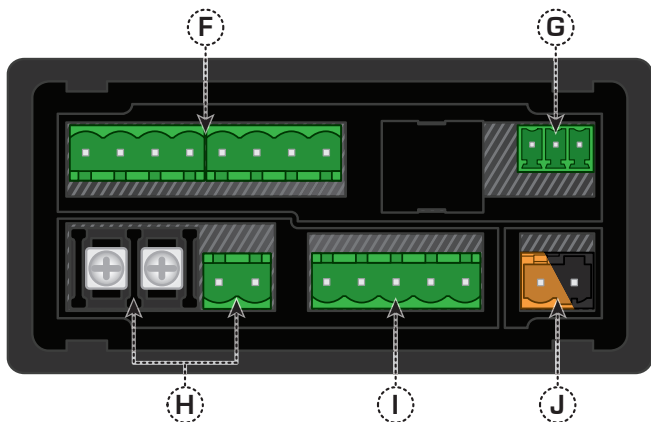
Pressing this button from the main display will show the current values for **PWR** (power), **AMP** (current), **PEAK** or **P.F.** (power factor). See Section 10.

(D) **Down** - This button is typically used to scroll through options or decrease values in the setup menu.

Pressing this button from the main display will show the current values for **ENRG** (energy), **FREQ** (frequency), **VLTS** (voltage) or **VALY** (valley). See Section 10.

(E) **Function 2** - This button is used to access the **setpoint setup** menu (see Section 6) and the **setpoint direct access** menu (see Section 7).

3.2 Fig 2 - Rear view

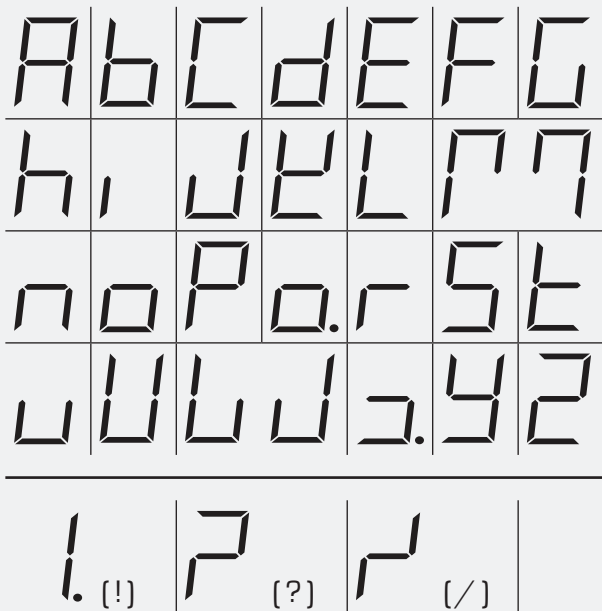


CONNECTOR PINS

- | | | | |
|----------|---|----------|--|
| F | 4 x relays -
Wiring: Section 4.3 | I | Function pins -
Wiring: Section 4.5 |
| G | Analog output -
Wiring: Section 4.4 | J | Power supply (HV/LV) -
Wiring: Section 4.1 |
| H | IW01 input module -
Wiring: Section 4.2 | | |

3.3

Fig 3 - 7-segment display characters



4

WIRING

Before you begin:

Determine whether your controller is configured for low or high voltage power supply. Make sure to check the label on the unit against the colour of the power connector:

- **Orange** = high voltage
- **Black** = low voltage

4.1 Connect your controller to the power supply

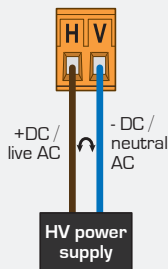
Refer to 3.2J

Wire your controller to your power supply as per the appropriate diagram below.

Remember to switch your power supply off before you begin wiring, and NEVER connect your low voltage controller to mains power.

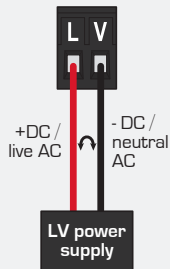
High voltage (HV) -

5-265V AC, 95-370V DC



Low voltage (LV) -

15-48V AC, 10-72V DC

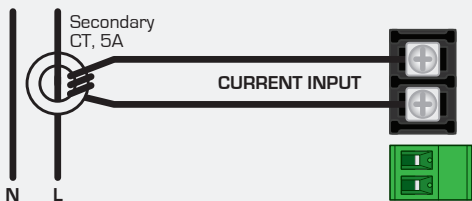


4.2 Wire your IW01 analog input module

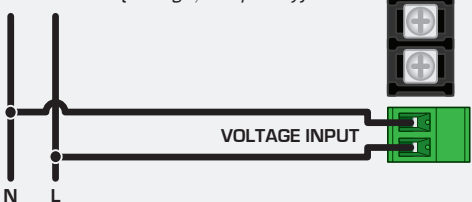
Refer to 3.2H

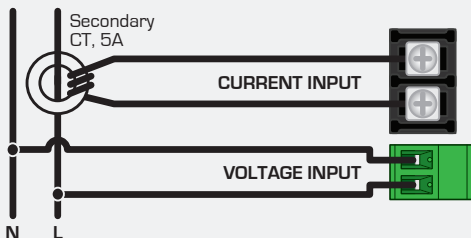
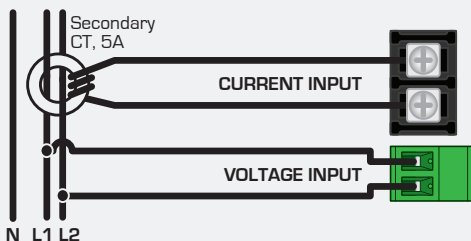
Wire your input module for your application, as shown in the following diagrams.

Single phase 2-wire (current)



Single phase 2-wire (voltage/frequency)



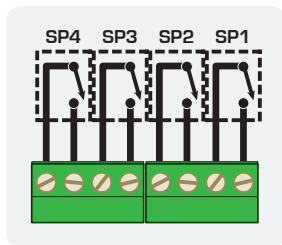
Single phase 2-wire (power/power factor)**Single phase 3-wire (power/power factor)**

4.3 Wire your relays (if fitted)

Refer to 3.2F

If your controller has relay outputs fitted, wire them as shown.

If you do not have any relays fitted, skip step 4.3.

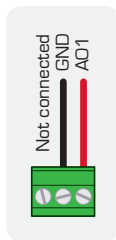


4.4 Wire your analog output (if fitted)

Refer to 3.2G

If your controller has an analog output fitted, wire it as shown.

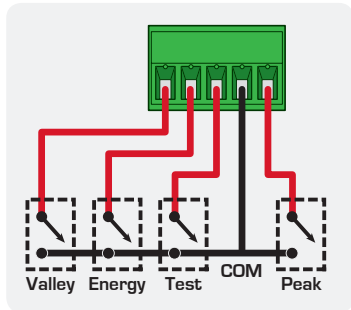
If you do not have analog output installed, skip step 4.4.



4.5 Wire your function pins (if required)

Refer to 3.21

Connect external switches as shown to enable a function to be executed when its switch is activated.



FUNCTION PINS

Valley	Activating this pin will reset the Valley value to the current display value
Energy	Activating this pin will clear the Energy value to zero
Test	Activating this pin will reset the meter
Peak	Activating this pin will reset the Peak value to the current display value

4.6 Power up your controller

Once you have completed the wiring process it is safe to switch on your power supply. Ensure that your display is functioning before you proceed.

5 SETUP & CALIBRATION

Enter the setup and calibration mode by pressing **F1**.

5.1 Enter PIN

A **_ _ _ ENTER CAL PIN NUMBER** scrolls across the display and toggles with **0**. Use the **▲** and **▼** buttons to enter your security code (factory default 1). Then press **P**. If the correct PIN is entered then the setup is started at 5.2.

If an incorrect PIN number is entered, **_ _ _ INCORRECT PIN - ACCESS DENIED** scrolls across the display and it returns to the normal operating mode.

You will be given the opportunity to change your PIN number at the end of this section (5.7). If you have forgotten your PIN number, see Section 8.

5.2 Input setup

- A ___ **INPUTSETUP** scrolls across the display and toggles with **SKIP**. Press **P** to skip to 5.3, or use the **▲** and **▼** buttons to select an input channel: **AMP** (current), **VLTS** (voltage), **PWR** (power) or **FREQ** (frequency). Press **P**.



If you selected **AMP** in 5.2A:

- B _ _ _ **DECIMAL POINT** scrolls across the display and toggles with the current selection. Using the **▲** and **▼** buttons, select: **NONE**, **0.1**, **0.12** or **0.123**. Press **P**.









If you selected **VLTS** in 5.2A:

- C ___ **DECIMAL POINT** scrolls across the display and toggles with the current selection. Use the **▲** and **▼** buttons to select: **NONE** or **0.1**. Then press **P**.



If you selected **PWR** in 5.2A:




D ___ **RESOLUTION** scrolls across the display and toggles with the currently selected resolution. Using the  and  buttons, select: **W**, **KW** or **MW**, and then press .

___ **DECIMAL POINT** scrolls across the display and toggles with the current selection. Use the  and  buttons to select: **NONE**, **0.1**, **0.12** or **0.123**. Then press .

Some combinations of power resolution and energy resolution may result in a scaling error - see 5.3B.



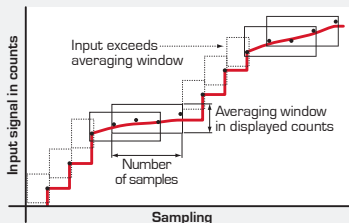
If you selected **FREQ** in 5.2A:




E ___ **DECIMAL POINT** scrolls across the display and toggles with the current selection. Using the  and  buttons, select: **NONE**, **0.1** or **0.12**. Press .

Averaging (5.2F-G)




Your controller has input signal averaging, guaranteeing stable measurement.

If the input exceeds the averaging window value it will not average, ensuring fast response.



- F _ _ _ **AVE SAMPLES** scrolls across the display and toggles with the currently selected averaging. Using the  and  buttons, alter the number of samples that the controller will average, and then press .


Increasing the number of samples will stabilise measurement, but it will also slow down response rates.

- G** _ _ _ **AVE WINDOW** scrolls across the display and toggles with the currently selected averaging window value. Using the  and  buttons, alter the signal averaging window. Then press .

If your input signal contains large noise spikes, then you can increase the size of the averaging window to ensure that these pulses are still averaged. However, increasing the averaging window too far will reduce the ability of the controller to respond quickly to real changes in input signal.

Setting the averaging window to zero will turn off the window mode and give continuous averaging as per the selected averaging samples.

- H** _ _ _ **INPUT SETUP** scrolls across the display and toggles with **SKIP**. You are now back at 5.2A. To set up another input channel, follow the instructions from 5.2A-H again.

If you have finished setting up your input channels, press  now to proceed to 5.3.

5.3 Energy setup




The energy function allows the user to see the total amount of energy that has been used in W/hr, kW/hr or MW/hr.

- A** _ _ _ **ENERGY SETUP** scrolls across the display and toggles with **SKIP**. Press **P** to skip to 5.4, or the **▲** button and then **P** to **ENTR** (enter) energy setup.
- B** _ _ _ **RESOLUTION** scrolls across the display and toggles with the currently selected resolution. Using the **▲** and **▼** buttons, select: **W**, **KW** or **MW**, and then press **P**.




_ _ _ **SCALING ERROR - CHANGE ENERGY SETTINGS!**

If you see this message, then the combination of settings that you have selected in 5.2B (power resolution) and 5.3B (energy resolution) will produce values which are too large for the controller to process or display.

To correct this, modify the settings in 5.2B or 5.3B.

- C** ___ **CUTOFF** scrolls across the display and toggles with the currently selected power cutoff value. Use the  and  buttons to adjust this value as required, and then press .

When the power input value falls below the cutoff value, the energy register will stop accumulating power and will pause until the input power is greater than or equal to the cutoff value again.

- D** ___ **ROLL OVER** scrolls across the display and toggles with the currently selected roll over setting. Use the  and  buttons to turn the roll over feature **OFF** or **ON**, and then press .

ON - *When the energy value exceeds 9,999, the display will roll to 0 and continue accumulating.*

OFF - *When the energy value exceeds 9,999, the display will read **OVER**.*

Note that the roll over feature does not produce any output pulse or other indication when it rolls over. (See section 6.2E to enable this feature.)

5.4 Display setup

- A **___ DISPLAY SETUP** scrolls across the display and toggles with **SKIP**. Press **[P]** to skip to 5.5, or the **[▲]** button and then **[P]** to **ENTR** (enter) display setup.
- B **___ DISPLAY SOURCE** scrolls across the display and toggles with the current display source. Use the **[▲]** and **[▼]** buttons to select: **AMP** (current), **VLTS** (voltage), **PWR** (power), **FREQ** (frequency), **ENRG** (energy) or **P.F.** (power factor). Then press **[P]**.

5.5 Calibrate

- A **___ CALIBRATE?** scrolls across the display and toggles with **SKIP**. Press **[P]** to skip to 5.6, or use the **[▲]** and **[▼]** buttons to select a channel to calibrate: **AMP** (current) or **VLTS** (voltage), and then press **[P]**.



If you selected **VLTS** in 5.5A:

Skip step 5.5B.




- B **___ CALIBRATION TECHNIQUE** scrolls across the display and toggles with the current selection. Use the **[▲]** and **[▼]** buttons to choose between: **AUTO**, **MAN** (manual) or **CT** (current transformer). Then press **[P]**.




AUTO - Automatic. Calibrate **current or voltage input** by applying different input signals. [Complete step 5.5C.]

MAN - Manual. Calibrate **current input** by entering the required display value at full scale. [Complete step 5.5D.]

CT - Current transformer. Calibrate **current input** by specifying the input and output current for the C.T. [Complete step 5.5E.]

**AUTO CALIBRATION:**

C **___ APPLY LOW SCALE INPUT - - - -ENTER**
LOW DISPLAY VALUE scrolls across and toggles with the current selection. Apply the required low input signal. Using the  and  buttons, enter your low display value. Then press  to accept.




___ APPLY HIGH SCALE INPUT - - - -ENTER HIGH
DISPLAY VALUE scrolls across and toggles with the current selection. Apply the required high input signal. Using the  and  buttons, enter your high display value. Press . If calibration is successful, the controller will return to the operational display.

___ CALIBRATION FAILED




A calibration failure results when the controller cannot detect any change in input signal during the calibration procedure.




After viewing this message you will be redirected to the operational display. Check your input signal and connections, and then repeat the process.

**MANUAL CALIBRATION:**

- D _ _ _ ENTER DISPLAY VALUE AT FULL SCALE CURRENT** scrolls across and toggles with the current selection. Use the  and  buttons to enter a display value for the full scale current input (typically 5A). Press  to accept and return to the operational display.

**CT CALIBRATION:**

- E _ _ _ ENTER CT INPUT CURRENT** scrolls across the display and toggles with the currently selected CT input value. Adjust using the  and  buttons, and then press .

_ _ _ ENTER CT OUTPUT CURRENT scrolls across the display and toggles with the currently selected CT output value. Adjust using the  and  buttons. Then press  to accept and return to the operational display.

5.6 Analog output setup








▶▶ 5.6 Quick Access from operating mode ▶▶



Short-press **F1**. Use **▲** & **▼** to enter PIN. Press **P** 5 times.







If your controller does not have this option installed then you will not view this section - setup will continue at 5.7.

A _ _ _ **ANALOG OUTPUT SETUP** scrolls across the display and toggles with **SKIP**. Press **P** to skip to 5.7, or the **▲** button and then **P** to **ENTR** [enter] analog output setup.

B _ _ _ **DATA SOURCE** scrolls across the display and toggles with the current analog output data source. Use the **▲** and **▼** buttons to select: **AMP** [current], **VLTS** [voltage], **PWR** [power], **FREQ** [frequency], **ENRG** [energy] or **P.F.** [power factor]. Then press **P**.

- C** ___ **LOW SCALE VALUE** scrolls across the display and toggles with the current selection. Adjust the low scale value using the  and  buttons, and then press . *This sets the display value for cal low (as at 5.6F).*
- D** ___ **HIGH SCALE VALUE** scrolls across the display and toggles with the current selection. Adjust the high scale value using the  and  buttons, and then press . *This sets the display value for cal high (as at 5.6G).*
- E** _ _ _ **CALIBRATE ANALOG O/P?** scrolls across the display and toggles with **SKIP**. If you do not wish to calibrate your analog output now then press  to skip the rest of this section and proceed to 5.7.

Otherwise, press the  button to **ENTER** analog output calibration. **Before continuing, connect a milliamp meter across the analog output connector.** Then press .

- F** _ _ _ **CAL LOW ANALOG O/P** scrolls across the display and toggles with a calibration number. Using the  and  buttons, calibrate your low analog output as required. Then press .
- G** _ _ _ **CAL HIGH ANALOG O/P** scrolls across the display and toggles with a calibration number. Using the  and  buttons, calibrate your high analog output as required. Then press .

5.7 Edit calibration PIN

- A** **_ _ _ EDIT CAL PIN NUMBER** scrolls across the display and toggles with **SKIP**. Press **(P)** to skip and return to the operational display, or the **(▲)** button and then **(P)** to **ENTR** (enter).
- B** **_ _ _ ENTER NEW CAL PIN NUMBER** scrolls across the display and toggles with the current PIN (default 1). Using the **(▲)** and **(▼)** buttons, enter your new calibration PIN number. Then press **(P)** to exit and return to the operational display.

6 SETPOINT SETUP

Enter the setpoint setup mode by pressing and holding the **F2** button for 3 seconds.

6.1 Enter setpoint PIN

A **_ _ _ ENTER SP PIN NUMBER** scrolls across the display and toggles with **0**. Use the **▲** and **▼** buttons to enter your security code (factory default 1). Then press **P**. If the correct PIN is entered then the setup is started at 6.2.

If an incorrect PIN number is entered, **_ _ _ INCORRECT PIN NUMBER - ACCESS DENIED** scrolls across the display and it returns to the normal operating mode.

You will be given the opportunity to change your PIN number at the end of this section (6.3). If you have forgotten your PIN number, see Section 8.

6.2 Edit setpoints

- A** ___ **EDIT SETPOINT** scrolls across the display and toggles with **SKIP**. Press **[P]** to skip to 6.3, or use the **[▲]** and **[▼]** buttons to select a setpoint to edit: **SP 1**, **SP 2**, **SP 3** or **SP 4**. Then press **[P]**.
- B** ___ **SP VALUE** scrolls across the display and toggles with the last setpoint value entered. Using the **[▲]** and **[▼]** buttons, adjust the display value at which the setpoint will activate. Then press **[P]**.



If you selected SP 1 in 6.2A:

Skip 6.2C and continue to 6.2D now.

- C** ___ **TRACK SP1** scrolls across the display and toggles with the currently selected tracking setting. Using the **[▲]** and **[▼]** buttons, select **OFF** or **ON**, and press **[P]**.
- If you choose **ON**, the selected setpoint will become an offset value, which is effectively added to the value of **SP 1**.*






If you selected **ON** in 6.2C:

...and you *did not* select **ENRG** for **SP1 6.2D**:

Skip all intervening steps and continue to 6.2G now

...and you selected **ENRG** for **SP1 6.2D**:




Skip 6.2D and continue to 6.2E now

D _ _ _ **SP SOURCE** scrolls across the display and toggles with the last selected setpoint source. Using the  and  buttons, select: **AMP** [current], **VLTS** [voltage], **PWR** [power], **FREQ** [frequency], **ENRG** [energy], or **P.F.** [power factor]. Then press .



If you *did not* select **ENRG** in 6.2D:

Skip all intervening steps and continue to 6.2G now.




- E** _ _ _ **ENERGY PULSE** scrolls across the display and toggles with the current setting. Using the  and  buttons to turn the energy pulse feature **OFF** or **ON**, and then press .




*If this feature is enabled, then when the setpoint is activated it will output a pulse and then clear the Energy value to zero. (This feature is only available when the setpoint source (6.2D) has been set to **ENRG**.)*






If you selected OFF in 6.2E:

Skip 6.2F and continue to 6.2G now.

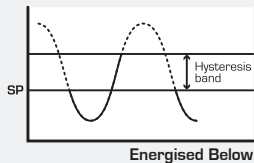
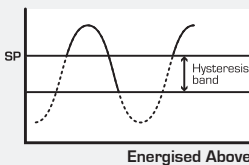
- F** _ _ _ **PULSE WIDTH** scrolls across the display and toggles with the current pulse width. Use the  and  buttons to adjust the pulse width from 0.1 to 10 seconds, and then press . **Skip all intervening steps and proceed to 6.2K now.**

- G** **___ SP ACTIVATION** scrolls across the display and toggles with the last selected setpoint activation. Using the  and  buttons, select the relay activation to operate **ABVE** (above) or **BLW** (below) the setpoint value, and then press .

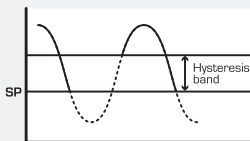
Select **ABVE** for the relay to turn on above the setpoint value and off below it. Select **BLW** for the relay to turn on below the setpoint value and off above it.

- H** **___ SP TYPE** scrolls across the display and toggles with the current selection. Use the  and  buttons to select **ALM** (alarm) or **CTRL** (control). Press .

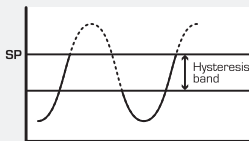
ALM - The **setpoint value** controls the point at which the setpoint will activate. The **hysteresis value** controls the point at which the setpoint will deactivate.






CTRL - The **setpoint value** controls the point at which the setpoint will deactivate. The **hysteresis value** controls the point at which the setpoint will reactivate.






Energised Above






Energised Below


- I** **___ HYSTERESIS VALUE** scrolls across the display and toggles with the current value. Use the  and  buttons to set the hysteresis value, and then press .

*The hysteresis value defines the separation band between setpoint activation and deactivation. Hysteresis will operate as per the specified type setting (**ALM** or **CTRL**) - see 6.2H.*


- J** **___ MAKE DELAY** scrolls across the display and toggles with the current make delay value. Adjust the make delay value using the  and  buttons and then press .

The make delay value defines the delay between setpoint activation and when the relay turns on. This value is in tenths of a second.

- K** _ _ _ **USER ACCESS?** scrolls across the display and toggles with the last selected direct access setting. Using the  and  buttons, select either **OFF** or **ON**. Then press .

When enabled, this option allows the setpoint value to be edited directly after pressing the  button, without needing to enter a PIN number or go through all of the other options. Each setpoint can individually have this option enabled or disabled.

- L** _ _ _ **EDIT SETPOINT** scrolls across the display and toggles with **SKIP**.

You are now back at 6.2A. To edit another setpoint, follow the instructions from 6.2A-L. If you do not wish to edit another setpoint, press  now to proceed to 6.3.

6.3 Edit setpoint PIN

- A** ___ **EDIT SP PIN NUMBER** scrolls across the display and toggles with **SKIP**. Press **P** to skip and return to the operational display, or the **▲** button and then **P** to **ENTER**.
- B** ___ **ENTER NEW SP PIN NUMBER** scrolls across the display and toggles with the current PIN (default 1). Using the **▲** and **▼** buttons, enter your new setpoint entry PIN number. Then press **P** to exit and return to the operational display.

7 SETPOINT DIRECT ACCESS

If none of the setpoints have their direct access option enabled then the **F2** button will not respond to a short press. (See 6.2K to enable.)

7.1 Setpoint direct access

- A** Begin by pressing the **F2** button for half a second. The name of the first access-enabled setpoint (**SP 1**, **SP 2**, **SP 3** or **SP 4**) will appear on the display and toggle with the current value for that setpoint. Using the **▲** and **▼** buttons, adjust the selected value. Then press **P** to accept and progress to the next access-enabled setpoint.




SP3-4 are not available for models with only two relays installed.

- B** Pressing **P** for the last access-enabled setpoint will exit and return to the operational display.

8 RESET PIN NUMBERS

If you have forgotten your PIN number, follow the procedure below to reset the calibration and setpoint entry PIN numbers to their factory default of 1.






8.1 Reset PIN numbers

- A Press ,  and  at the same time. (This key combination can be difficult to execute and you may need several tries to get it right.)
- B When successful, a factory identification text will scroll across the display, followed by: **_ _ _ ALL PIN NUMBERS RESET TO 1.**
- C Reset the calibration PIN numbers if required by following the instructions in Sections 5.7 and 6.3.

9 DISPLAY BRIGHTNESS

Follow the instructions below to adjust the brightness of your LED display.





9.1 Adjust display brightness

- A** Press the  and  buttons together from the operational display. **BRI** appears on the screen and toggles with the current brightness setting.
- B** Use the  and  buttons to adjust the brightness of the LED backlight as required, and then press . The display returns to normal operating mode.

10 DISPLAY SHORTCUTS

Use these shortcuts for quick viewing of specified parameters from the operational display.

10.1 Parameter view mode

- A** Begin by pressing the  button for half a second. **PWR** will appear on the display and toggle with the current power value.
- B** Use the  and  buttons to view the values shown below. Press  to return to the operational display.







PWR (power)
AMP (current)
PEAK
P.F. (power factor)



ENRG (energy)
FREQ (frequency)
VLTS (voltage)
VALY (valley)

10.2 Reset

- A** To reset **PEAK** or **VALY** (valley) to the current display value, or to reset **ENRG** (energy) to zero, press both the  and  buttons together while the required parameter is being displayed (as in 10.1). Press  to return to the operational display.



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LD - UAC

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