

Magnus Power

LP1 1kW Single Phase

Variable Frequency Variable Voltage / Frequency Converter - Manual

LP1 Variable Voltage Variable Frequency 45Hz - 1KHz Frequency Converter, Operation and Maintenance.



Magnus Power

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CAUTION: READ THIS BEFORE OPERATING LP1

1. The LP1 Static Frequency Converter is a sophisticated piece of equipment. To ensure correct operation, please take time to read this manual carefully.
2. Choose the installation location for the unit carefully. Avoid direct sunlight or close to a source of heat. Also try to avoid exposure to dust and excessive swings of temperature.
3. **DO NOT REMOVE THE COVER.** The power electronics operate from a 320VDC supply which can remain for 10 minutes after removal of power.
4. The LP1 enters STANDBY mode when connected to an appropriate AC power source and consumes power all the time. If the unit is to be left unused for extended periods, remove the mains supply to the LP1.
5. **IMPORTANT. THE WIRES FOR THE MAINS LEAD ARE COLOURED AS FOLLOWS: BLUE NEUTRAL, BROWN LIVE, GREEN/YELLOW EARTH. IF THE MAINS PLUG IS REMOVED FROM THE POWER LEAD, ENSURE CONNECTION AS DETAILED.**
6. Take care lifting the LP1. It is a heavy unit at 22Kg.

INTRODUCTION

The LP1 Static Frequency Converter is capable of generating 45Hz-1000Hz at power levels up to 1KVA. Two output ranges provide maximum power at either 135VAC or 270VAC. The output is short circuit protected and is capable of delivering 100% overload for short periods to start difficult loads. It is powered from a nominal 230VAC or 115VAC, 50-60Hz. Control is by means of a series of "soft" push button switches on the front panel whose function changes according to the operating mode. Switch function, along with operating parameters are displayed on an easy to read LCD display. The output frequency is continuously adjustable over the full range, 45Hz to 1000Hz and is crystal referenced. Accuracy and stability are assured. Voltmeter and Ammeter functions are incorporated into the control system providing a true rms readout of output voltage and current. The output of the converter is fully isolated from the mains input and control electronics. [Remote control](#) is via an RS232 interface which is accessed via a standard 9 way 'D' connector on the rear of the converter. Control using MAGNUS POWER'S remote software is straight forward.

PREPARATION FOR USE

Packing list

Each LP1 comes complete with mains lead, output lead and handbook. If any of these items is missing, please contact MAGNUS POWER or your local representative.

Mains lead

The supplied mains lead is terminated at one end with in IEC20 socket for connection to the LP1. The other end is determined by the country of sale. UK equipment is fitted with a standard 13A plug. European equipment is fitted with a Schuko connector. If the supplied connector is incorrect and you need to change the connector, ensure that the replacement connector is wired as follows:-

BROWN	LIVE
BLUE	NEUTRAL
GREEN/YELLOW	EARTH

This equipment must be earthed at all times.

If you cut off the supplied plug, please ensure it is disposed of as a mains plug with bare wires can be dangerous.

Output lead

The supplied output lead is terminated at one end with a connector which plugs into the rear of the LP1. The other end is un-terminated. The output is on the two white wires. The green/yellow is at mains earth potential and may be used to earth one of the output wires. Alternatively it can be left unconnected. Ensure that the white wires are terminated before connecting the mains supply to the LP1.

Positioning

The LP1 is available in two formats, free standing and rack mount. In both cases, consideration must be given to air flow. At elevated power levels, a cooling fan mounted on the rear of the LP1 expels air to keep the electronics at a safe operating temperature. Cool air is drawn in through both sides. A minimum 50mm gap must be available on the sides and rear to allow adequate air flow. The rack mounted version does not have any rack runners, instead it must be supported on a shelf within the rack. Under no circumstances should the LP1 be suspended by the front panel fixings alone.

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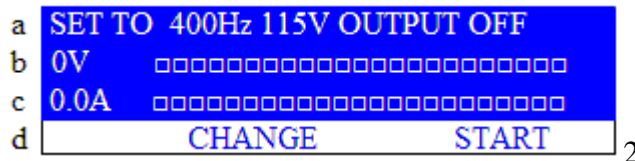
OPERATION

Power on

The LP1 does not have a conventional ON/OFF switch. Instead there are two buttons on the front panel 'INPUT ON' and 'STANDBY'. As soon as power is applied to the mains inlet on the rear of the LP1, the electronics enter STANDBY mode. This is indicated by the power LED (situated between 'INPUT ON' and 'STANDBY') glowing red. Before applying power for the first time, check that the remote ON/OFF switch on the rear of the LP1 is in the OFF position. At this stage, it is best to leave the output cable disconnected (not plugged into the rear of the LP1). With the mains supply connected the LP1 will enter STANDBY mode, red LED on. To turn on the LP1, press 'INPUT ON'. The power LED will change to green and flash at a 1Hz rate. The display backlight will illuminate and the display will read :



At the bottom of the display will be a progress bar which will give a visual indication of the time taken to initialise the electronics, typically 3 seconds. The LP1 is now 'stopped' and ready for use. Depending on the last time it was powered up, the display will read something like:-



Row a, above gives the status of the LP1. As shown, it is set to 400Hz, 115V and the output is OFF.

Row b is the voltmeter and consists of two parts. The first is an absolute reading of up to 3 digits. The second part is a bar meter which gives an easy to read indication of the relative output voltage. Note. Because the LP1 is not running, there is no output voltage and the voltmeter reads 0V.

Row c is the ammeter and is similar to the voltmeter with two digits and a decimal point.

Row d describes the function of the push buttons immediately below the prompts.

The STANDBY button can be operated at any time to shutdown the LP1.

Output Isolator

The Electronics are switched to the output connector via an electro-mechanical isolator. Control of this isolator is via the OUTPUT ON and OUTPUT OFF buttons. The status of the isolator is given by the indicator between the OUTPUT ON and OFF buttons. There are four possible states:-

- 1 Indicator flashing red. The output isolator is open and the unit is in STOP mode.
- 2 Indicator solid red The output isolator is open but the unit is RUNNING.
- 3 Indicator flashing green The output isolator is closed and the unit is in STOP mode.

4 Indicator solid green The output isolator is closed and the unit is RUNNING.

The isolator can be opened by operating OUTPUT OFF or closed by operating OUTPUT ON.

Start

At this point, the output of the LP1 is isolated from the electronics and the output is zero. Operation of the START button will ramp the output voltage up to the SET TO voltage. However, the output is still isolated from the electronics until the output isolator is closed. This is affected as described above by operation of the OUTPUT ON button. The output of the LP1 increases at a rate of 100 volts per second. If the LP1 is set to 115V the LP1 will ramp up in 1.15 seconds, and the display will read:

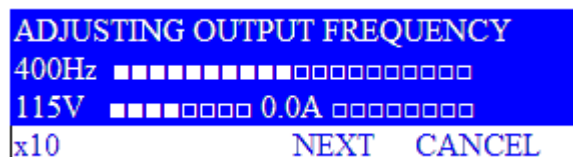


3

Notice that the function of the two buttons has changed. The START button is now STOP and CHANGE is now ADJUST. The top line displays the frequency and the output status, OUTPUT ON. The voltmeter now displays the measured output voltage as well as a graphical representation of the output voltage. As there is no load connected to the output, there is no current measured. While the LP1 is running, OUTPUT ON, it is possible to ADJUST the output voltage and frequency..

Adjust

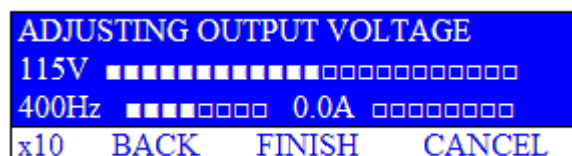
Press ADJUST and the following screen is displayed:-



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The output frequency can now be adjusted UP or DOWN in 1Hz steps by operating the UP and DOWN arrow buttons to the right of the display. By holding down the x10 button at the same time as operating the arrow buttons, frequency will change in 10Hz steps. In either case, pressing and holding an arrow button will continuously increase and decrease the frequency with the change in frequency accelerating the longer the button is held down.

Operating CANCEL at this stage will return the output frequency to its pre ADJUST setting. Pressing NEXT allows adjustment of output voltage.



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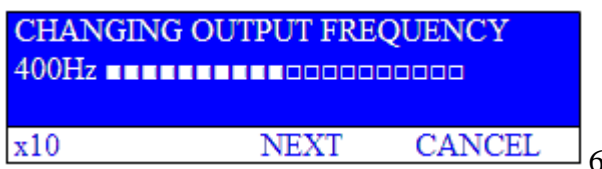
Adjustment of output voltage is similar to adjustment of output frequency. The UP and DOWN arrow buttons are used to increment and decrement the output voltage in 1V steps with the x10 button giving 10V steps. When you have reached the desired voltage, pressing FINISH will return the display to the basic OUTPUT ON screen (3). Pressing BACK will allow you to go back and readjust the output frequency. Pressing CANCEL will return the output voltage and frequency to that before ADJUST was selected.

Stop

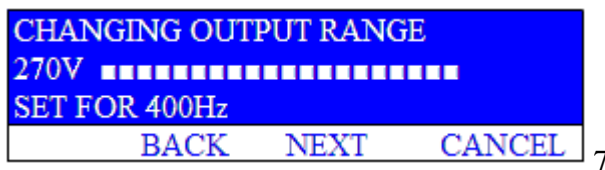
Operating STOP will return the output voltage to zero instantly.. The opening screen is now displayed (2). The set to voltage and frequency will reflect any changes you may have made.

Change

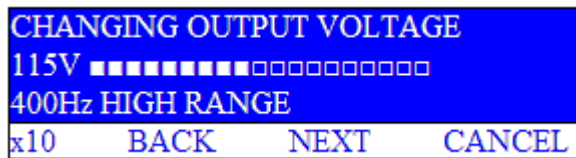
With the LP1 stopped, OUTPUT OFF, it is possible preset the state of the LP1. From the STOPPED screen (2), press CHANGE, the following screen will be displayed.



This procedure is exactly the same as ADJUSTING the output frequency, as described above, except that the output is not ON. The output frequency can now be changed UP or DOWN in 1Hz steps by operating the UP and DOWN arrow buttons to the right of the display. By holding down the x10 button at the same time as operating the arrow buttons, frequency will change in 10Hz steps. In either case, pressing and holding an arrow button will continuously increase and decrease the frequency with the change in frequency accelerating the longer the button is held down. When you have set the desired frequency, press NEXT and the following or similar will be displayed.



Exactly what is displayed will depend on the output range previously selected. Screen 7, above shows the 0-270V range selected. In this mode, the LP1 will deliver maximum power at 270VAC. It is possible to set the output voltage anywhere in the range 0 to 270V in 1V steps, however, if you will be operating the LP1 at or below 135V, you may wish to change the output range to 135V. This range allows adjustment of the range 0-135V and develops maximum power at 135V. To change range, operate the UP or DOWN arrow button. UP will select 270V range and DOWN will select 135V range. The display will change to show 135V on the second line and the bar graph will only be 50% full. Operation of BACK will ignore the change just made and return to CHANGING OUTPUT FREQUENCY. CANCEL will return the LP1 to its basic STOPPED mode. (Screen 2). Press NEXT and the following screen will be displayed.



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If the 0-135V range has been selected, line 3 will display 400Hz LOW RANGE and the bar graph would be almost 100% as the meter full scale adjusts to the range selected. The UP and DOWN arrow buttons are used to increment and decrement the output voltage in 1V steps with the x10 button giving 10V steps. Operation of BACK will ignore the change just made and return to CHANGING OUTPUT RANGE. CANCEL will return the LP1 to its basic STOPPED mode. (Screen 2). Press NEXT and the following screen will be displayed.



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This lets you set the over current trip to a level appropriate for your load. The UP and DOWN arrow buttons change the trip in 100mA steps. Holding down x 10 at the same time will adjust in 1.0A steps. If the LP1 had previously been set to the LOW range with a trip level above 4.1A, changing to HIGH range will reduce the trip level to 4.1A. The LP1 over current trip works like a resettable thermal fuse in that a small over current load can be tolerated for a long time whereas a severe over current will shut down the LP1 almost immediately. Operation of BACK will ignore the change just made and return to CHANGING OUTPUT VOLTAGE. CANCEL will return the LP1 to its basic STOPPED mode. (Screen 2). FINISH will return the LP1 to the basic STOPPED mode (Screen 2). Pressing START at this point will release the LP1 from STOP and ramp up to the pre set voltage at the pre set frequency.

Connecting a load

If you are happy with the operation of the LP1, you can now connect a load.

Put the LP1 into STANDBY mode and disconnect the mains supply. The cable supplied with the LP1 has two white cores and a green/yellow earth wire. The LP1 output is fully floating and either of the two white output wires may be connected to the earth wire or any other earth point. Connect the two white wires to the load and if the earth wire is not required, insulate it and tie it back to the output cable. Connect the mains supply to the LP1 and operate the INPUT ON button as previously described. Unless you have previously set the LP1 to the correct output voltage for your load, you should do so now by following the CHANGE procedure detailed above. If you are happy with the settings you can apply the LP1 output to the load on 1 of 2 ways. If you want the LP1 output to be "ramped up" into the load, first ensure the output isolator is closed by operating OUTPUT ON. The output indicator will flash green. Press START and the LP1 output will ramp up. If you want a "hard start", e.g. the output is switches from 0V to the preset level instantly, ensure the output isolator is open by operating OUTPUT OFF. The output indicator will flash red. Press START. The LP1 electronics will ramp up and the display will show the output voltage but this is not yet available at your load. Press the OUTPUT ON button and the output isolator will close, immediately applying power to your load. If the LP1 fails to start correctly and the message OVERCURRENT is displayed it will be necessary to change the current trip level.



OVERCURRENT

ACKNOWLEDGE

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Press ACKNOWLEDGE and then CHANGE. You will be presented with the current trip setup screen as previously shown. Remember, many items of electronic equipment have a much higher starting current than the specified normal running current. The LP1 is designed to allow for short term overloads but you may still need to increase the overcurrent trip level.

Some loads draw large currents when power is first applied to them. Typically a bridge rectifier and smoothing capacitor will present as a near short circuit when first powered. Even if the nominal load current is within the specified capability of the LP1, these large inrush currents can be problematic. If this appears to be the case with a hard start, try ramp start.

Protection

The LP1 is protected against accidental overload and short circuits applied to the output. The fast response short circuit protection may also be triggered by excessive load currents. If this protection is triggered, the message OVERLOAD is displayed and the LP1 output is returned to zero. There is no facility to increase this overload capability and if triggered, you will be prompted to RESET which returns the LP1 to its ready mode.

Cooling

The LP1 has a thermostatically operated cooling fan which expels air at the rear of the chassis. Under light load conditions, the fan may never run. If the LP1 is used at high power levels, the electronics will run warm. This is detected by thermal sensors and when a preset level is reached, the fan will operate until the electronics temperature reduces. The cooling fan may continue to run for several minutes after the LP1 is put into STANDBY mode.



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