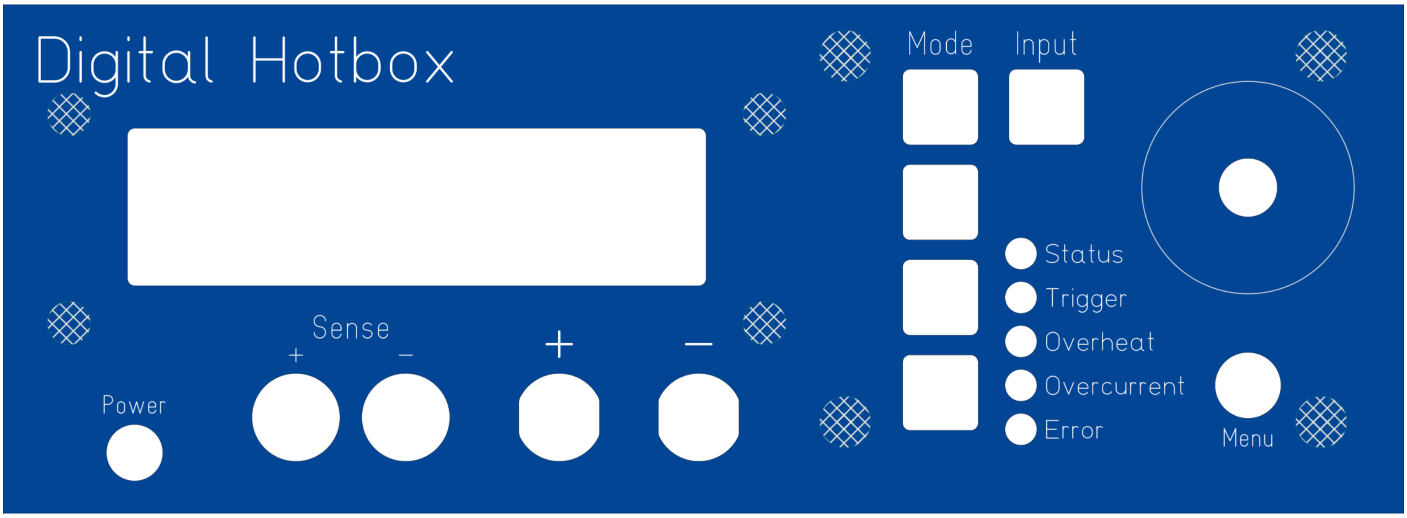
IO

Front and rear panels

Front Panel

The front panel features a few buttons, indicators, and a rotary encoder.

Overview



Note that the actual front panel board only covers the right third of the actual front panel: the area with the push buttons, indicators, and rotary encoder. It's mounted to the case via four 8mm standoffs with M2.5 thread, and should be screwed in with washers to distribute the force of button pushes more evenly across the board, rather than stressing the screw holes.

Connectors

There are two primary connections to the rest of the world on the front panel: the external voltage sense input, and the supply input.

> External voltage sense may or may not be used for measurement, depending on software control.

Supply input is made through a pair of binding posts (Cal Test CT4231) supporting up to 36A per post. The positive and negative terminals follow the standard red/black convention, and are internally connected to the driver board via thick wiring. The binding posts should use some sort of screw mount for the wire, which itself should have crimped ferrules or other terminals on the end to attach conveniently to the wire.

External sense voltage is delivered through a pair of banana jacks (Cal Test CT2240.) These do not need to carry much current (if any) and are on a yellow and black connector (for positive and negative, respectively) there. These jacks are solder mount, which should be soldered to a (possibly shielded) twisted pair wire, which in turn connects to the driver board's external voltage sense input.

Buttons

The bulk of the buttons on the front panel consists of illuminated tactile switches (Omron B3W-9 type), which are further subdivided into the mode selectors (column of four switches, each with a single yellow LED) and the input on/off button (one switch, with dual red/green LEDs.)

Additionally, the button inside the rotary encoder (triggered when the knob is depressed) is available as a switch for selecting items in menu. It works in conjunction with the circular menu button (C&K D6R type) to browse menus.

On the front panel, all buttons are connected to a XRA1203 I²C IO expander. It features an interrupt output, which is connected to the controller board so buttons needn't be polled in software.

Lastly, there is a power button in the lower left corner; this switch actually exists on the controller board, rather than the front panel. It's an illuminated, right angle tactile switch (CTS 228A type) with the appropriate power icon (the little circle with the dash on it) printed on its cap. The board is set up to support bi-color illuminated switches so that there can be a standby/active type lighting situation.

Indicators

Indicators are LEDs, which are brought out to the front panel via light pipes. These indicators consist of one RGB LED (status,) one amber LED (trigger,) and three red LEDs (overheat, overcurrent, error.) Each LED can be individually controlled, and its brightness (current) adjusted.

Each of the buttons, with the exception of the rotary encoder itself, contains at least one LED. These LEDs are available to drive the same way indicators are, via the LED controller.

All LEDs are connected to a PCA9955B constant current LED driver.

Display

Any SPI display is compatible with the front panel, though it is specifically designed for the ER-OLEDM032-1Y module (or any other compatible modules with other colors; do note that the display may need to be modified for 4 wire SPI operation, by soldering some resistors and jumpers) and its pinout.

> Regardless of the type of display, it should not consume more than roughly 350mA of current. The main board has a 500mA polyfuse for the display.

The display mounts on 6mm long M2.5 studs, with nylon stand-offs to get the correct distance between the front panel and the display surface. Then, a washer and nut are attached to the end, to fasten the display securely.

Miscellaneous

On the front panel board, there is also an I2C EEPROM (AT24CS32 type) that contains the front panel's exact configuration, including the switches available, mapping of switch inputs and LED outputs, and LED drive characteristics such as maximum current.

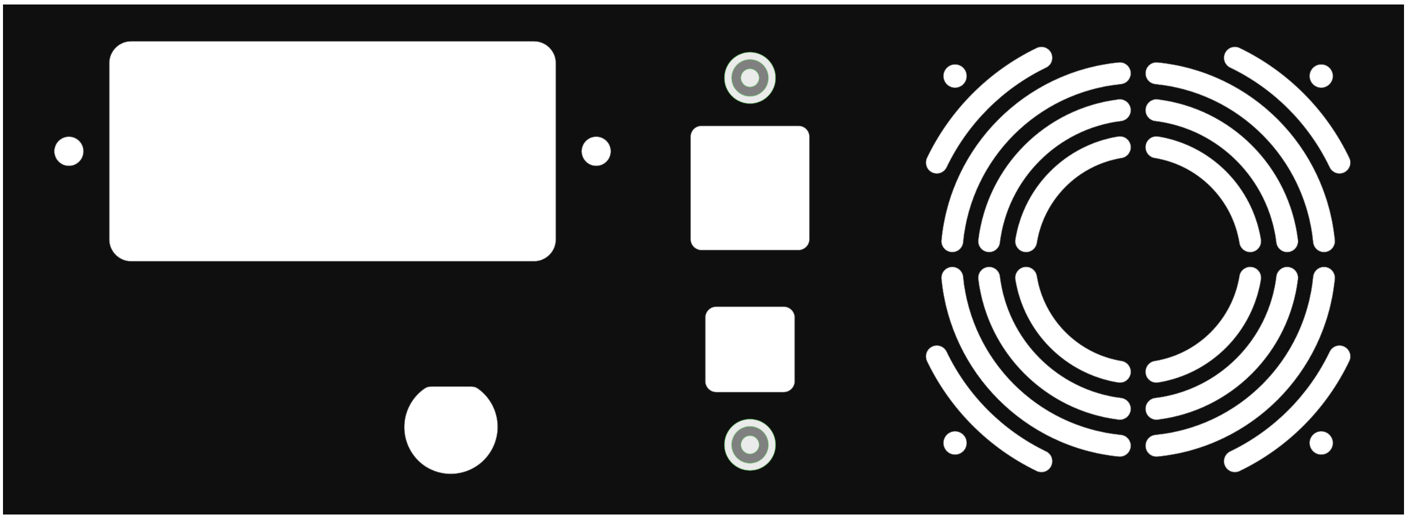
Revisions

Currently, there's just one revision of front panel, pictured above. It works, but it needs some minor rework:

- Menu button too small: needs +.4mm to diameter
- Edge machining on display cutout: A bevel would be more attractive

Rear Panel

On the rear of the device are a few auxiliary connections, including AC power input, communications (Ethernet, USB) and an external trigger input.



Rear panel, as viewed from front (inside)

Power

A cutout is provided for an IEC mains filter/input module with switch and fuse – in this case, the cutout is sized to fit the Astrodyne TDI 084 series, specifically the 084.00301.00 with a 3A fuse.

> It's very important that the IEC input module has a fuse built in; the only protection, if using the driver board's AC/DC module is a varistor to arrest surges.

Output from the filter (usually provided on spade terminals, or directly on wires) should then go via (sufficiently insulated) wires to a connector (CUI Devices TBP02P1W-381-03 or similar 3.81mm pluggable terminal block) to the driver board, which has a power module (CUI PSK-20D-12, Meanwell IRM-20-12, or similar) to produce the 12V from mains input.

Alternatively, this power module can be skipped in favor of an externally mounted power supply, in which case the mains input can be directly wired there; though take care to ensure that the case is still grounded. (The driver board has a 3.96mm JST-VH B2P-VH connector as a +12V input to accommodate external power supplies in place of a soldered power module, if that is desired instead.)

If an external supply is used, it should be capable of providing at least 1.6A at 12V with reasonably low noise.

IO Board

Ethernet and USB connectors are mounted on a small auxiliary circuit board, which mounts by means of screws on two 12mm M2.5 standoffs, and assumes a panel thickness of ~1.5mm. It serves as not much more than a simple breakout, converting from the 20 pin, 1.27mm ribbon cable coming from the controller board to these connectors.

On the USB connector, there exists basic transient filtering (via a TVS) and an I²C ADC to sense the VBus voltage. (There's no reason for a full blown ADC, but it was cheaper than an IO expander for just a single line.)

The Ethernet connector (Abracon ARJC07-111071A) is a vertical MagJack type, with the required magnetics integrated into the connector; therefore, the Ethernet side is not much more than a straight through connection, with some current limiting resistors for the connector's activity indicator LEDs.

Lastly, the board features an EEPROM (AT24CS32 type) for identification by software.

External Trigger

The last connector, near the bottom of the panel, is a cutout for a board mount BNC connector (TE 1-1634624-0) on the driver board. This connector is used as an external trigger for various custom modes; it is relatively low impedance and drives directly an optoisolator.

No special treatment is required for the connector beyond the cutout, though it may feature a nut or other retention mechanism on the other side of the panel.

Miscellaneous

For cooling purposes, the remaining area on the right side of the panel has a cutout for a 60mm fan. This fan is automatically controlled by the processor board. It should be set up to suck air out of the chassis, to encourage more intake of fresh air at the front. This works in conjunction with the smaller fan on the driver board's heatsink.

Front Panel Errata

Rev 1

- Mode/load switches footprints need soldermask pulled back from pads
  - The pads are covered by soldermask. This is bad

Rear IO Errata

Rev 1

- Copper rings around USB connector pads should be larger
- Retention holes for Ethernet jack should be slightly smaller (to accommodate push-in expansion action for mechanical stability)