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Nominal use case:

This PCB is believed to be a correctly sized asset for many common room geometries.

Calculations here show a thermally lossy room of:

36’ × 26’ × 9.5’

Requires a quiescent max of: 12.2 kW. So at 1 kW per radiator; we expect 12.1 kW / 1 per:

12 fan radiators

An on/off Input Point:

It is a well known problem that some systems that allege to be parts of energy conservation technology continue to dissipate considerable power even when they appear to be in a low energy mode.

The *CONTROL IN pin 3* functionality is built to take its energy conservation role seriously. This state, when off, will set the drive voltages to < 0.1 V and consume less then 100 mW as a system.

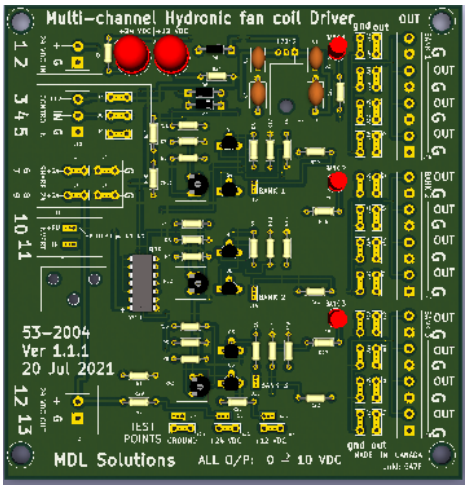
Lab measurements and documentation for **LEED Credentials** will be supplied and corroborated.

A Fan Coil Solution

After considerable experimentation, MDL has refined a technology offering for analog control of multiple fan coil speed controls.

This latest in a series of PCB designs has four potentiometers which control three banks of four coils. . . a total of 12 devices.

Special considerations include: independence from power supply variations, on/off control, and gradated air volume transfers by analog voltage controls set directly on the PCB with four potentiometers.



The board is organized into **three banks each with four coils**, so a potentiometer adjusts up to four coils at the same time.

The floor plans of buildings, (possibly without exception), have endless symmetries; It is very simple to select fan sets that work perfectly in this scheme.

Also a **single switch point** controls all the fans so a flow switch or control from other systems can stop fans with ease.

Success in Field Installations is the Goal

Every feature in the design of the board has been optimized to achieve satisfactory system installs without difficulties.

Obviously different implementations of this board, (to do less and run fewer coils), are logically part of a **Small family of product**. However, ***REGARDING THIS BOARD:***

- LEDs to show all power states to avoid the need to have a voltmeter for quick assessment of state.
- One linear numbered line of connections for control, the other edge for connect to coils.
- LED per bank which fades with setting and shows control state for all on/off functionality.
- Local power supply so wiring is extremely uncritical, regarding losses and therefore wire gauge and length.

It is a firm objective to synchronize the numbers, names and functions in any compatible board in this product family. Daisy chaining is supported to **avoid extra wiring** . . . It is particularly carefully implemented.

Redundant Connectors and Daisy Chaining

Spade lugs and tie down screws are both supported on the PCB and most signals are presented to both connector form factors. All connections conform to **International Package Commission Specifications** for low voltage wiring.

Daisy chain powering is supported in both connector form factors. This eliminates up to eleven home run wiring spans, a sizable reduction in wiring if the designer exploits this facility.

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About System Connections

It is **vitally important** to demystify the low voltage connections that many site workers find difficult to manage during installation and provisioning.

Each region Identified on the PCB is described here; Together these compromise a maximum of thirteen wired connections. However, a system is functional with as few as four in use.

1. 24 VDC IN: This part of connections is simply the connection to the sourced power supply.
2. Control IN: This allows a external system to turn off the fans entirely. A few ways are devised to make the voltage source work for many input ranges. It also supplies +12 Vdc so a flow switch can be connected with two wires to the PCB.
3. SHARE 24: This is a jumper area for high reliability connectors to allow daisy chaining for 24 VDC IN and OUT. This reduces possible long runs for powering and saves capacity in conduits.
4. INVERT: If the CONTROL IN signal is "backwards" this connection can flip it. A pull-up resistor can be utilized so some odd circumstances for level conversion can be fixed without messy improvising. An external resistor is probably a rare requirement.
5. 24 VDC OUT: The kind of connector for the SHARE 24 signal is a spade lug. If the situation is contrary to using those, this screw terminal pair can be used with less fussing over the termination. A daisy chained scheme saves a lot of wiring, but of course the reliability of each connection in series matters more then home run wiring.

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Precise Connection Nomenclature

Each connection is clearly labeled by sequential number on the PCB art. This is to simply production of drawings to be issued to the construction workers:

1.	*24 VDC IN*	+
2.	*24 VDC IN*	G
3.	*CONTROL IN*	+12
4.	*CONTROL IN*	In
5.	*CONTROL IN*	G
6.	*SHARE 24*	G
7.	*SHARE 24*	+24
8.	*SHARE 24*	G
9.	*SHARE 24*	+24
10.	*INVERT*	+PU
11.	*INVERT*	IN
12.	*24 VDC OUT*	+
13.	*24 VDC OUT*	G

The outputs to the coils are redundantly configured; Spade lugs or tie down connections are duplicated for each coil connection.

Labels on PCB art match the LED and Pot Identities; They are:

BANK1 **BANK2** **BANK3**

Each is labeled: **GND** and **OUT**.

IT IS IMPORTANT TO REGARD POLARITY SO AIRFLOW MOVES IN THE DESIRED DIRECTION.

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