# INSTALLATION & OPERATION
# PCR-1830V LOAD CONTROL AND POWER CELLS FOR VARIABLE FREQUENCY AND DIRECT CURRENT POWER

## POWER CELLS

Various models of the Power Cell are used to sense variable frequency and DC power. They utilize Hall effect sensors that are not affected by wave shape or frequency.



These Power Cells are matched to the load with plug-in voltage and current networks.

The output of the Power Cell goes to the PCR-1830V load control.

## FEATURES

**3 ADJUSTABLE SET POINTS**
When power reaches your selected SET POINT a built-in Relay Output is activated (tripped). Relay stays tripped (latched). You choose when to reset. The characteristics of these Set Points can be changed.

**ANALOG OUTPUT**
Hook to the Load Meter for monitoring load, easy setup and adjustment.

**EASY SETUP WITH SET READ SWITCHES**
Press the SET READ Switch and the SET POINT for that Channel is displayed on the LOAD METER.
- You **know** where the SET POINT is
- Easily verify proper operation

**BUILT-IN START-UP TIMER**
Adjustable Timer eliminates false trips while the Motor is starting.

**FILTER OUT NUISANCE TRIPS**
Adjustable On-Delay Timer. Trip won't activate until the selected delay time is exceeded. The On Delay for Set 1 can be defeated.

**RESET**
The Control can be Reset
- Automatically — when the overload is gone.
- Remotely — with switch, relay or programmable controller
- Manually

**TRIP INHIBIT**
The Control can be remotely bypassed during any part of the cycle when not required.

**Also Available**
Remote Set Point Adjustment

# SET POINT CHARACTERISTICS

## REGULAR SET POINTS

The relays trip when a Set Point is reached. Set Points can be:

High Trip — Trips when the power goes above the Set Point

Low Trip — Trips when the power goes below the Set Point

All 3 Set Points can be Regular. Set 1 can be high or low.

## COMPENSATOR™ SET POINTS

For machine tool applications such as grinder gap elimination or dull tool detection the drifts in idle or "BASELINE" power should be zeroed out.

- A limit switch or programmable controller signal tells the COMPENSATOR™ each time the machine is in the idle or "BASELINE" position.
- The COMPENSATOR™ samples this power level and retains it as a reference.
- The SET POINTS are related to this BASELINE.

In other words, the COMPENSATOR™ zeroes out the BASELINE power for each cycle. The absolute trip point changes as conditions change but always remains a fixed amount away from the BASELINE. This means no constant fine tuning. It adjusts itself. Set 1 and Set 2 can be compensated.

### Adjustment Ranges for Set Points

3%-50% — Expands the adjustment range to provide more sensitivity and precision at low loads (especially for COMPENSATED Set Points)

6%-100% — For General Use

On Delay — For Set 1, the Trip Delay can be removed from the circuit for maximum response speed - useful for grinder gap elimination.

## CHANGING CHARACTERISTICS

The factory settings for the characteristics are marked on the Control adjacent to the Serial Number on the side. To change them, remove the cover (4 Phillips screws) and find the 6 Position DIP SWITCH.

## SWITCH POSITIONS

| Set 1 | | | Set 2 | | |
|---|---|---|---|---|---|
| COMPENSATED | Switch 2 | OFF | COMPENSATED | Switch 6 | OFF |
| Regular | 2 | ON | Regular | 6 | ON |
| High Trip | 3 | OFF | 3%-50% Range | 5 | ON |
| Low Trip | 3 | ON | 6%-100% Range | 5 | OFF |
| 3%-50% Range | 1 | ON | | | |
| 6%-100% Range | 1 | OFF | | | |
| Defeat On Delay | 4 | OFF | | | |

Set 3 is always Regular with 6%-100% Range.

# INSTALLATION

**MOUNTING**

The Load Control should be mounted in a control cabinet or in a protected area. The four Phillips head screws on the Control should be removed and used for attaching the mounting brackets to the Control.

The Power Cell should be mounted so that the motor supply leads can pass through the holes. Direction is important. The Load side (the Load Controls Label) must face the load.

**INPUT CONNECTIONS TO THE LOAD CONTROL**

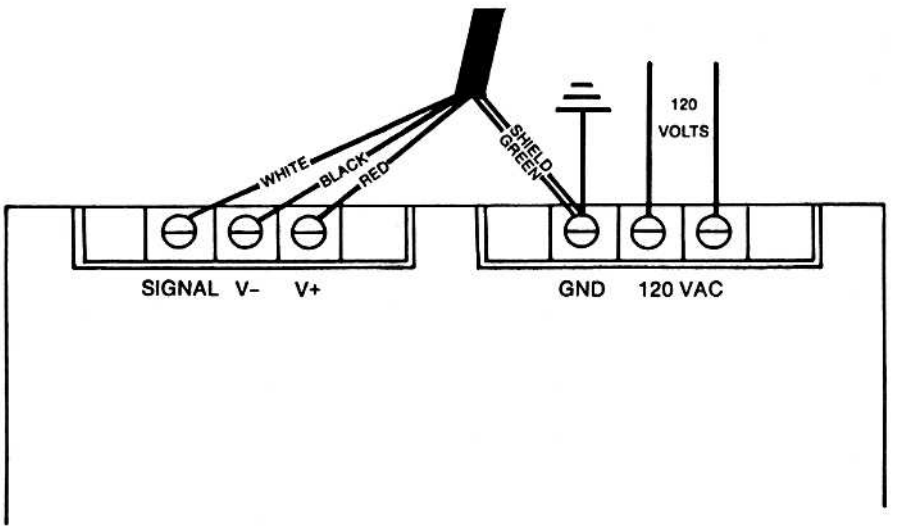
A 3 foot 4 wire shielded cable is provided to connect the Power Cell to the V Series Control. If more length is needed, use shielded cable.

| | |
|---|---|
| White | SIG |
| Red | V+ |
| Black | V- |
| Green | GND |

Shield Wire - Connected to "Chassis GND" on Load Control NOT connected at Power Cell.

**120 Volt Power**

Connect to the 120VAC terminals on the Load Control. Ground the Load Control Chassis.



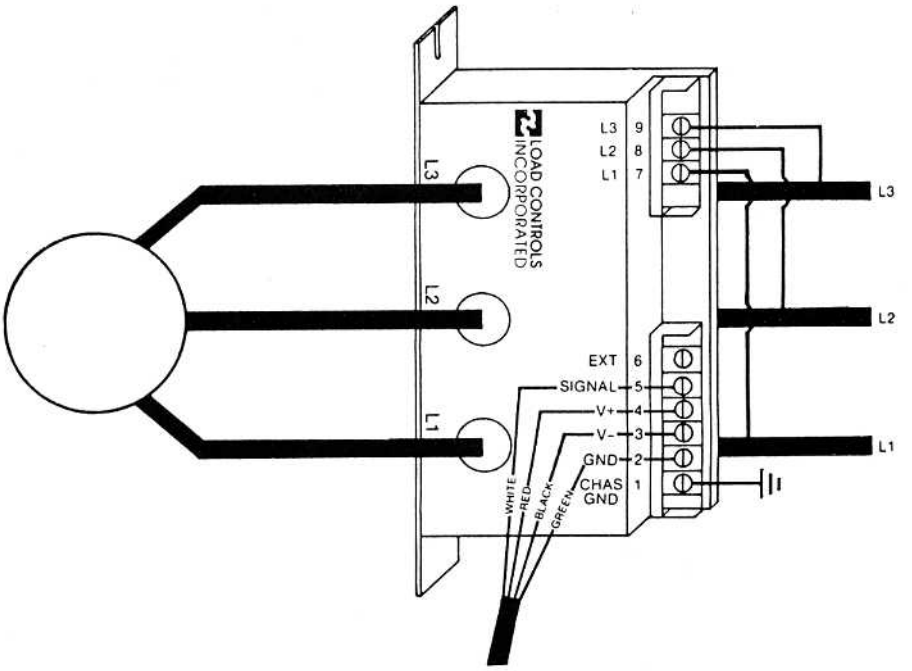
# PH-3 & PH-1000V POWER CELLS For Three Phase Power

Pass each of the phases through the L1, L2, L3 holes in the Cell. Be certain that ***DIRECTION*** is correct. The LOAD side of the Cell should face the load. The Power Cell should be on the output side of the drive.

From a convenient location provide a voltage signal for each phase with 20 gauge or larger wire. The voltage signal should also come from the output side of the Drive.

L1 to Terminal 7
L2 to Terminal 8
L3 to Terminal 9

Make sure that the voltage samples don't get switched




Hook up PH-1000V like PH-3

TERMINALS 1-6

| | | |
|---|---|---|
| | 1 | Chas. GND |
| Green | 2 | GND |
| Black | 3 | V- |
| Red | 4 | V+ |
| White | 5 | SIG |

# PH-1 & PH-1000DCV POWER CELLS For DC Power

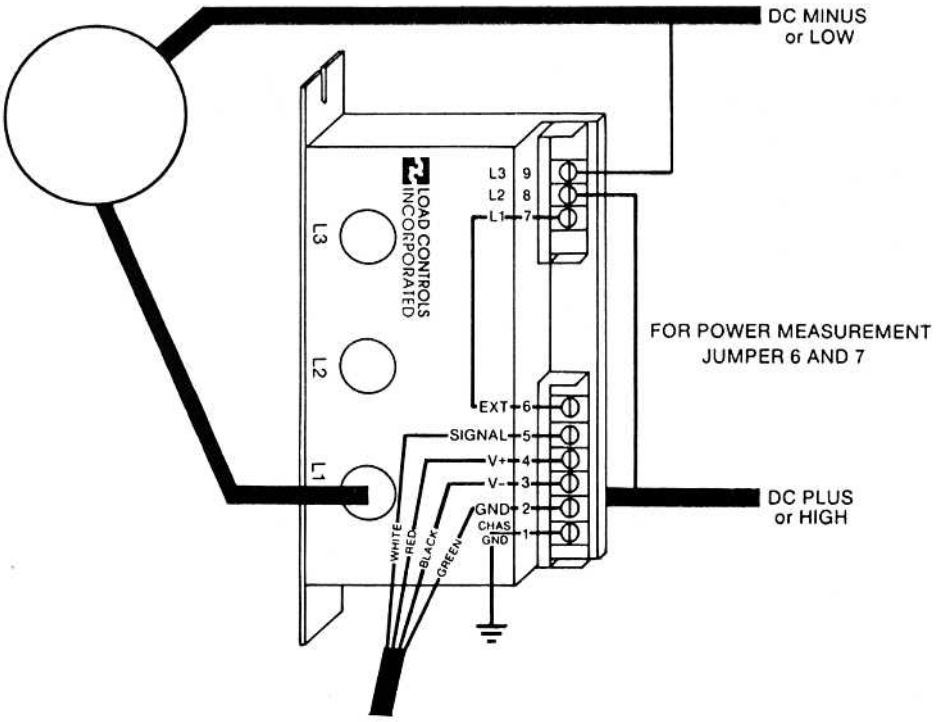
Pass the DC Plus or High through the L1 hole in the Cell. Be certain that ***DIRECTION*** is correct. The LOAD side of the Cell should face the load.

From a convenient location provide a voltage signal for each DC line with 20 gauge or larger wire.

DC Plus or High to Terminal 8
DC Minus or Low to Terminal 9

For DC Power Measurement, Jumper Terminal 6 and 7 on the Power Cell.

For Current Measurement, remove the Jumper and remove the voltage connections to Terminal 8 and 9.




Hook up PH-1000DCV like PH-1

TERMINALS 1-6

| | | |
|---|---|---|
| | 1 | Chas. GND |
| Green | 2 | GND |
| Black | 3 | V- |
| Red | 4 | V+ |
| White | 5 | SIG |

# RELAY OUTPUTS (Terminals 7-12)

The PCR-1830 has 3 Relay Outputs

| | |
|---|---|
| Set Point 1 | Terminals 7 & 8 |
| Set Point 2 | Terminals 9 & 10 |
| Set Point 3 | Terminals 11 & 12 |

They can either: • Open on Trip or Power Off
• Close on Trip or Power Off

The factory settings are marked on the Control. To Change - remove cover (4 Phillips screws) and locate the relay board.
There is a jumper for each relay.

Move all 3 Jumpers
OOT = Open on Trip
COT = Close on Trip

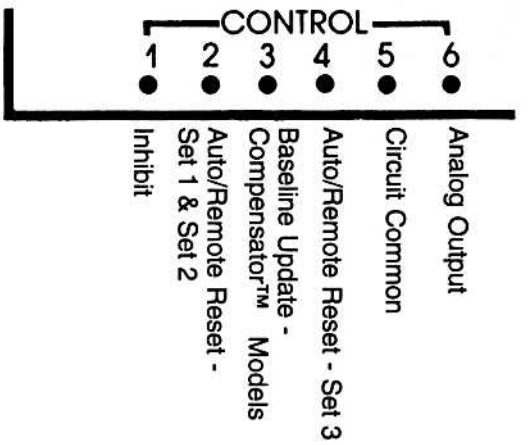
• Specifications: .01 Amps to 3 Amps at 120 Volts AC 1/20 HP at 120 Volts AC

# HOOKING UP RESET, INHIBIT AND BASELINE

The terminals for BASELINE, RESET and INHIBIT generate a small amount of current (8-12 milliamps). To activate one of these functions you just need to connect the terminal to the circuit common (Terminal 5).

The switches or relays that you use must be suitable for low current. (Gold flashed contacts, Reed Relays, Mercury Switches, Open Collectors.)

A voltage signal from a programmable controller can also be used but it must be a sink or source/sink (30 Volt max., 12 Volt min.) When in doubt, use a reed relay.




***Don't put 120 volts on Terminals 1-6! It will destroy the control.***

## RESET

Control can be reset 3 ways:

- Manually with the Reset button on the Control.
- Remotely with a remotely located Reset button.
- Automatically by jumpering the Reset Terminal. The Control will then automatically reset itself when the trip condition goes away.

## HOOKUP

**Remote Reset —**

**Momentarily Connect Terminal 2 to Terminal 5 for Set 1 & Set 2**
**Momentarily Connect Terminal 4 to Terminal 5 for Set 3**

**Automatic Reset —**

**Jumper Terminal 2 to Terminal 5 for Set 1 & Set 2**
**Jumper Terminal 4 to Terminal 5 for Set 3**

## INHIBIT

The Control can be inhibited or bypassed with the INHIBIT. This lets you ignore the Control during certain parts of the machine cycle, if you desire.

## HOOKUP

**Terminal 1 to Terminal 5**

## BASELINE

A COMPENSATED Set point needs a zero reference. This is done 2 ways: The first way is with a limit switch or programmable controller on the machine. Usually, an existing switch or controller is used as long as it is electrically compatible. The BASELINE signal should last at least 250 milliseconds but can be as long as you want. The COMPENSATOR™ remembers the last value before the BASELINE contact opens.

Secondly, the control also automatically establishes a Baseline when the Start-up timer goes off. If each machine cycle includes starting the motor, an external BASELINE is not needed.

You need a BASELINE update for each machine cycle. The green Baseline LED is on DURING the update.

## HOOKUP

**Momentarily connect Terminal 3 to Terminal 5.**

Check the Load Meter as the Baseline LED goes out. This is the value that the COMPENSATOR™ remembers. It should be the idle load of the machine.

## MANUAL BASELINE UPDATE

During machine setup it is sometimes helpful to manually update the BASELINE. Do this by momentarily jumpering Terminal 3 to Terminal 5.

# ANALOG OUTPUT AND FULL SCALE

The Analog Output is proportional to the power that is being sensed. This output is usually 0-1 milliamp but can also be 0-10 Volts or 4-20 milliamps. The output is hooked to a Percent Load Meter and the value of this signal can be calculated:

The Full Scale is proportional to the Voltage and Current Networks that are plugged into the Power Cell.

**For 3 Phase Power PH-3 & PH-1000V**

To calculate Full Scale Watts equivalent to full scale analog output:

Watts = (1.73) (Voltage Network) (Current Network)

Example: 460 Volt Network
20 Amp Network
Watts = (1.73) (460) (20) = 15,916 Watts
Horsepower = Watts/746
= 21.3 Horsepower

**For DC Power PH-1 & PH-1000DCV**

To calculate Full Scale Watts equivalent to full scale analog output:

Watts = (Voltage Network) (Current Network)

Example: 460 Volt Network
20 Amp Network
Watts = (460) (20) = 9,200 Watts
Horsepower = Watts/746
= 12.3 Horsepower

# CHECK LIST

Power Cell Load Side Must Face Load (No Analog Output, Startup Light Doesn't Go Out)

Voltage samples must match phases. (No Sensitivity)

Voltage and Current Networks—Must be firmly inserted in CORRECT DIRECTION.

Remember—The Power Cell is sensing power rather than just current. Power is low for lightly loaded motors (because the power factor is low). The output signal increases linearly as the load increases.