INSTALLATION

PH-3A POWER CELL POWER TRANSDUCER
PH-1000 POWER CELL POWER TRANSDUCER

POWER CELL

The Power Cell is designed to sense 3 phase power and works on both fixed frequency and variable frequency power.

It is used as a stand alone transducer with an analog output (0-5 Volts, 0-10 Volts, 4-20 Milliamp, 0-1 Milliamp).

The Power Cell has 3 balanced Hall Effect devices, each with a flux concentrator. Each of the 3 phases passes through a flux concentrator. A voltage sample is also taken from each of the phases. No external current and voltage transformers are needed for the power sensing. This improves accuracy by eliminating the large phase shift errors from the CT's and PT's at low power factors.

HALL EFFECT DEVICES

To measure power with odd shapes and frequencies 3 balanced Hall Effect sensors are used. A Hall Effect sensor has these two characteristics:

- It senses a magnetic field which is proportional to the current flowing in the conductor.

- The Hall Effect semiconductor can multiply two signals. Each sensor is excited with a signal that comes from the voltage sample for that phase. The Hall device multiplies the voltage and current signals.

This is a vector multiplication which also calculates the lag or lead of the current (Power Factor). The resulting output is then proportional to power (Volts × Amps × Power Factor).

The signals for each of the 3 phases is summed and the analog output signal is proportional to the 3 phase power. (Horsepower or Kilowatts)

MOUNTING

The Power Cell is direction sensitive.
Locate the Power Cell so that the three motor electrical supply lines can be passed through the cell. The TERMINAL side of the Cell faces the LOAD. Mount the external transformer in a convenient location.

INPUT CONNECTIONS

Pass each of the phases through the L1, L2, L3 holes in the Cell. Be certain that ***DIRECTION*** is correct. The TERMINAL side of the Cell faces the LOAD.

Provide a voltage sample for each phase with 20 gauge or larger wire. When a variable frequency drive is being used, locate the Power Cell on the output side of the drive. Take the voltage samples on the output side also.

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

MAKE CERTAIN THAT THE VOLTAGE SAMPLES DON'T GET SWITCHED.

EXTERNAL TRANSFORMER CONNECTIONS

An external AC transformer is supplied with each Power Cell. Connect 120 Volts to transformer bottom 2 Connectors.

Hook the transformer Secondary to Terminals 2, 3, and 4.

Outside Connections	Terminals 3 and 4
Center Tap	Terminal 2
Twist the Wires — 20 gauge or larger	

MAKE CERTAIN THAT THE CENTER TAP ON THE TRANSFORMER IS CONNECTED TO TERMINAL 2.

CHASSIS GROUND

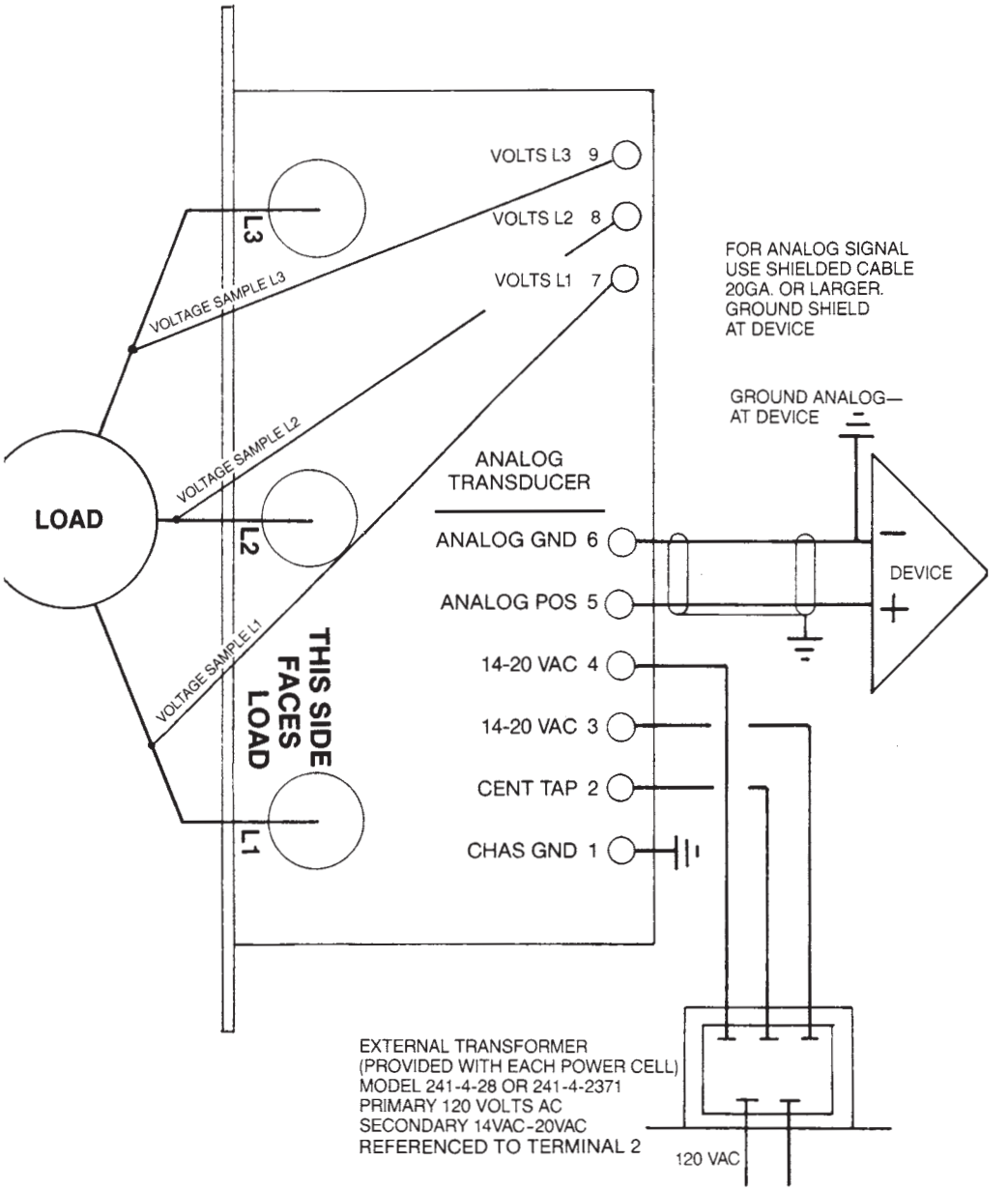
Ground the Power Cell Chassis Terminal 1

ANALOG OUTPUT

Analog Output Positive	Terminal 5
Analog Output Ground	Terminal 6 (Ground at device)

TERMINAL 6 NEEDS TO BE GROUNDED — Preferably at the device (computer, meter, recorder, controller, etc.) For devices with differential inputs, TERMINAL 6 can be connected to TERMINAL 1. Use shielded cable 20 gauge or larger for the analog output. Shield is ungrounded at Power Cell. Grounded at device.
The Analog Output is powered by the Power Cell.

Terminals MUST face load.
Terminal 6 MUST be grounded.
The Voltage sample from the wire that goes through the L1 hole must go to terminal 7, L2 hole to terminal 8 and L3 hole to terminal 9.

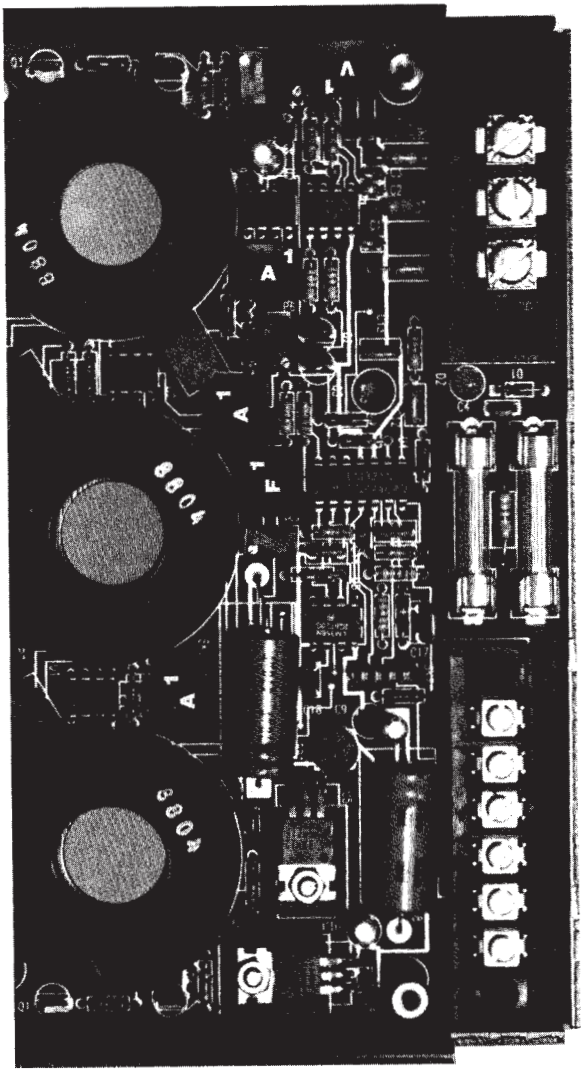


CHANGING CAPACITY OF THE POWER CELL

The capacity for each of the Hall Sensors is set with 8 pin resistor networks. These are easily changed in the field. This lets you match the Power Cell to the load. Cost: $10 each.

In the 3 phase Power Cell there are:

- 3 Current Networks
- 1 Voltage Network
- 1 Function Network for the 0-5 Volt and 0-10 Volt Outputs
- An additional circuit board for the 4-20 milliamp and 0-1 milliamp Outputs



1 = Location of Pin 1

V = Voltage Network
A = Current Network
F = Function Network
(0-10V or 0-5V output)

Function network in photo is shown plugged in for PH-3A Analog Output Transducer. To convert to PH-3 for use with Load Control, reverse the Function network.

For 4-20MA output, no function network is used.

WHEN CHANGING THE NETWORKS, PLUG THE NETWORKS BACK IN THE CORRECT DIRECTION!

FULL SCALE POWER

The Voltage and Current Networks provide a Full Scale Calibration Point.

The Power Cell senses the Actual Voltage and Current. The Networks operate accurately from 0 to 130% of marked value.

Full Scale Capacity - 460 Volt Network

Model	Current Network	Full Scale
PH-3A-HG	4.2 AMP	4.5 HP
PH-3A	10(9.54) AMP	10 HP
PH-3A	15(13.34) AMP	14 HP
PH-3A	20 AMP	21 HP
PH-3A	30 AMP	32 HP
PH-3A	40 AMP	43 HP
PH-3A	50 AMP	53 HP
PH-3A	60 AMP	64 HP
PH-3A	70 AMP	75 HP
PH-3A	80 AMP	85 HP
PH-3A	90 AMP	96 HP
PH-3A	100 AMP	107 HP
PH-3A-350	140 AMP	149 HP
PH-3A-350	175 AMP	187 HP
PH-3A-350	210 AMP	224 HP
Above 210 Amps check conductor size, maximum opening is ¾"		
PH-3A-350	245 AMP	261 HP
PH-3A-350	280 AMP	299 HP
PH-3A-350	315 AMP	336 HP
PH-3A-350	350 AMP	373 HP
PH-1000	100 (95.4) AMP	102 HP
PH-1000	200 AMP	213 HP
PH-1000	300 AMP	320 HP
PH-1000	400 AMP	427 HP
PH-1000	500 AMP	533 HP
PH-1000	600 AMP	640 HP
PH-1000	700 AMP	747 HP
PH-1000	800 AMP	853 HP
PH-1000	900 AMP	960 HP
PH-1000	1000 AMP	1067 HP

KW=(HP)(.746)

Additional Turns

The capacity can be reduced by taking additional "turns" through each hole for each phase.

Example: A 10 HP unit is reduced to 5 HP by taking 2 turns through each hole. It is reduced to 3.33 HP with 3 turns, etc.

To Calculate Full Scale Capacity For Other Voltage Networks

Full Scale Watts = (Voltage Network) (Current Network) (1.73)
Horsepower = Watts/746

OVERLOAD DAMAGE

The Power Cell is designed so that it is ***NOT DAMAGED*** by overloads. At about 20% above full capacity, the internal circuitry latches up. This prevents damage to attached meters, etc. It also means that the Power Cell can be sized to match the running load without worrying about inrush current.

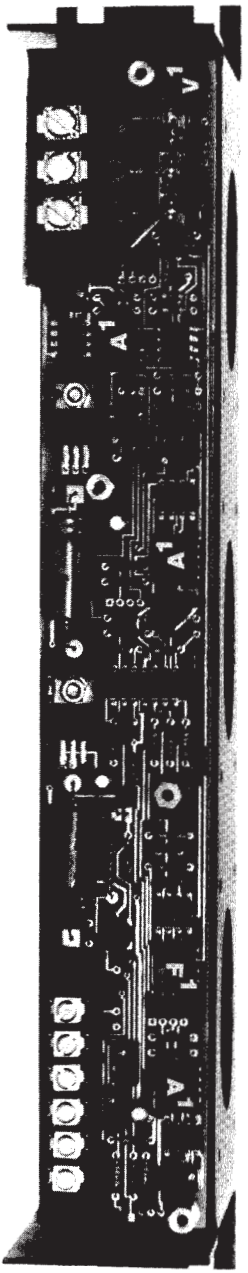
PH-1000 POWER CELL

For loads over 210 Amps or conductor size greater than .75″, the PH-1000 is used.

HOOK UP IS LIKE PH-3A.

CHANGING CAPACITY PH-1000

	Terminal Designations
9	L3 Volts
8	L2 Volts
7	L1 Volts



1 = Location of Pin 1

V = Voltage Network
A = Current Network
F = Function Network

Function network in photo is shown plugged in for PH-1000 Analog Output Transducer. To convert to PH-1000 for use with Load Control, reverse the Function network.

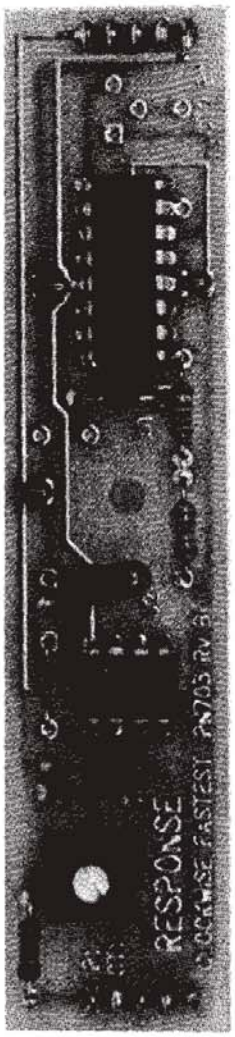
For 4-20MA output, no Function network is used.

1	Chassis Gnd
2	Center Tap
3	14-20 VAC
4	14-20 VAC
5	Analog Pos
6	Analog Gnd

4-20 MILLIAMP OUTPUT BOARD FOR PH-3A AND PH-1000

A plug-in circuit board is used for 4-20 Milliamp output.

For field change to 4-20MA output, remove the Function network before plugging in the board.



OPTIONAL RESPONSE ADJUSTMENT

In some cases, an average power signal may be more useful than instantaneous power. The Optional Response Adjustment slows the response of the Power Cell.

OPTIONAL RESPONSE ADJUSTMENT

CLOCKWISE IS FASTEST

CHECK LIST

Power Cell Terminals Must Face Load.

Voltage samples must match phases.

Analog Output Ground must be grounded.

External Transformer — 14-20 Volt AC Terminals 3 and 4. Referenced to Terminal 2.

Fuses — 1/2 Amp — 3AG Fast Acting

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

Open Delta Wiring Systems — Some older transformer hook-ups were Open Delta. An isolation transformer is available from Powertek for a nominal cost for these systems.

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.

SPECIFICATIONS

FREQUENCY
3Hz to 1KHz
Derate above 1KHz

RESPONSE
15 Milliseconds (.015 seconds)
.060 Seconds to 1 Second with optional response adjustment

ACCURACY/REPEATABILITY
2.5% of Full Scale
.25%

COMPLIANCE/IMPEDANCE
Compliance: 6 Volts
10 Volt Output: 2K ohm minimum connected impedance
4-20MA Output: 300 ohm maximum connected imedpance
High Compliance units available — Special order

TEMPERATURE
55 degrees C maximum

CURRENT NETWORKS AVAILABLE FOR PH-3A and PH-1000
SEE PAGE 5

VOLTAGE NETWORKS AVAILABLE FOR PH-3A and PH-1000

115 Volt	185 Volt	230 Volt	255 Volt
350 Volt	380 Volt	460 Volt	580 Volt

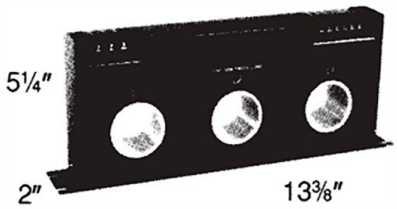
SPECIFY CURRENT NETWORK VOLTAGE NETWORK AND OUTPUT WHEN ORDERING POWER CELL

DIMENSIONS

PH-3A POWER CELL

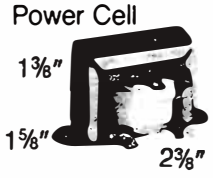
Maximum conductor ¾″ with grommets removed
Mounting: (2) #10 screws 8½″ on center

PH-1000 POWER CELL



Maximum Conductor: 1¾″
Mounting: (4) ¼″ screws 12¾″ x 1¼″ on centers
Weight: 12 pounds

EXTERNAL TRANSFORMER
Provided with each Power Cell



Mounting: (2) #10 screws 2″ on center

Powertek

Powertek UK Limited
Unit 13B, Southview Park, Marsack Street
Reading, RG4 5AF, United Kingdom
Tel: +44 (0)118 370 2004 Email: info@powertekuk.com
Web: www.powertekuk.com

Powertek US Inc
7, 3rd Street, Holbrook,
NY, 14711, USA.
Tel: +1 631 824 4666 Email: info@powertekus.com
Web: www.powertekuk.com