OHIO SEMITRONICS, INC.

OPERATION & CALIBRATION MANUAL

PC8 SERIES WATT TRANSDUCERS

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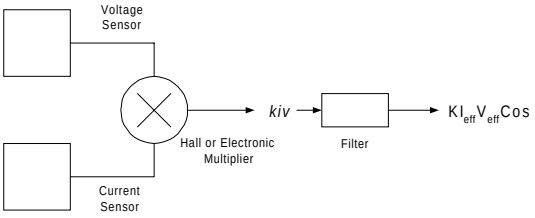
PC8-MANUAL-1100
OSI Drawing ASSIGN

PC AND P SERIES OF WATT TRANSDUCERS

All PC and P series watt transducers manufactured by Ohio Semitronics, Inc. utilize Hall effect or electronic analog four quadrant multipliers. The block diagram below shows how the PC and P series are structured.

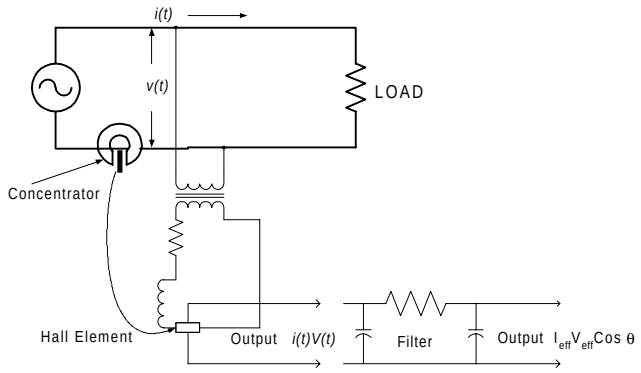


The Hall Effect

In 1879 E. H. Hall noticed that if a conducting material is placed in a magnetic field perpendicular to the current flow, a voltage perpendicular to both the initial current flow and the magnetic field is developed. This voltage is called the Hall voltage. It is directly proportional to both the strength of the magnetic field and the current. The Hall voltage results from the deflection of the moving charge carriers from their normal path by the magnetic field and its resulting transverse electric field.

Because the Hall voltage is proportional to both the magnetic field strength and the current, it may be used as an analog multiplier.

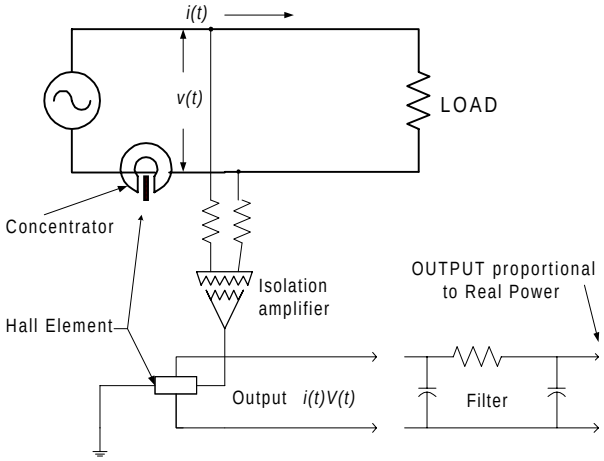
In a PC4 or PC5 watt transducer the following arrangement is used.



Notice that the Hall sensor has a current proportional to *v(t)* (the instantaneous voltage) flowing through it and a magnetic field through it that is proportional to *i(t)* (the instantaneous current). The output of the Hall sensor is proportional to both the instantaneous voltage and the instantaneous current — i*(t)*v(t)* k* where *k* is the Hall constant.

In the P and PC8 series of watt transducers the principle is the same except the potential transformer is replaced by a differential isolation amplifier.

The PC8 and P arrangement is shown below.



Again the output is proportional to *i(t)*v(t)*. This time, because the potential transformer has been eliminated, these transducers are frequency independent at least with in the limits of the isolation amplifier, core material in the current sensor, and the Hall sensor. The P has a flat response from DC through 500 hertz and the PC8 has flat frequency response from DC through 400 hertz.

CALIBRATING THE PC8 SERIES WATT TRANSDUCER

All PC8 Watt Transducers are calibrated at the factory to the specifications listed by Ohio Semitronics, Inc.

A qualified technician with actual test equipment should do calibration.

The model number for each PC8 lists the full-scale voltage and current inputs. Check specification sheet to obtain the full scale designated voltage and current inputs. The full-scale watts are derived from the multiplication of the F.S. voltage times the F.S. current.

Calibration of the PC8 Watt Transducer can be done by either of the Following two methods:

Method One - DC Calibration
Method Two - AC Calibration

Method One DC Calibration:

1. Equipment required -

(a) Constant DC voltage source capable of supplying the designated input voltage.

(b) Calibrated digital voltmeter, to measure the input voltage.

(c) Constant DC current source capable of supplying the designated F.S. current. *See Note 1*

(d) Calibrated shunt and voltmeter to measure the full scale current.

(e) Voltmeter to measure the output from models with option "D" 0 to 10 volts or a milliammeter to measure the output from models with option "B" 0 to 1 mADC or "E" 4 to 20 mADC.

2. Connections -

(a) Connect the external Current Sensor to terminals 7 through 10. Refer to connection diagram.

(b) Connect 115 VAC instrument power.

(c) Connect the milliammeter or voltmeter to terminals 1 & 2, positive on 2.

(d) Connect the constant voltage source and voltmeter to terminals 5 & 6, positive on 5.

(e) Feed the constant current source positive cable through the red dot side of the window of the current sensor and then to the shunt. Connect the cable from the negative side of the current source to the opposite end of the shunt. Connect the voltmeter across the shunt terminals.

3. Offset -

(a) Remove the plastic caps from the lid of the transducer case. Remove the lid from the case if only two trimpots are not adjustable through the lid. Some models have a third internal adjustment.

(b) Apply 115 VAC instrument power and allow 15 minutes for electronic circuitry to stabilize.

(c) With instrument power only on, the output at terminals 1 & 2 should be zero or within ±0.05% of the full-scale output. If greater than 0.05% adjust the trimpot marked "ZERO".

(d) Now, apply both F.S. current and voltage inputs and instrument power. Reduce the current input back to zero. If the output at terminals 1 & 2 is greater than ±0.05%of the

full-scale output adjust the third trimpot located either to the right of the "CAL" & "ZERO" or internally on the circuit board. Repeat 3c and 3d if necessary.

4, Final Calibration -

(a) Adjusted both voltage and current inputs to the F.S. designated values. Adjust the "CAL" trimpot for a 1-mA, ±0.05% output signal.

(b) Check linearity over the voltage and current ranges.

(d) Replace the lid into the case and insert the plastic caps. Please note: Calibrating the unit on DC normally effects the 60 & 400 Hertz power ranges less than ± 0.5% F.S.

Method Two AC Calibration:

1. Equipment required -

(a) AC calibrator or the following equipment:

(b) AC voltage source, capable of supplying the full scale designated voltage.

(c) AC current source capable of supplying the full scale designated current.

(d) AC standard wattmeter.

2. Connections -

(a) Connect the external sensor to terminals 7 through 10.

(b) Connect the 115 VAC instrument power to terminals 11 & 12.

(c) Connect the milliampere meter to terminals 1 & 2, positive on 2. For 10 Volts output connect voltmeter across terminals 1 & 2.

(d) Connect the AC voltage source to terminals 5 & 6, HI side on S. also connect the standard wattmeter to voltage input.

(e) Connect the HI side current source through the red dot side of the window of the current sensor to the standard wattmeter current input HI side. Connect the low side of the current source back to the LO side of the standard wattmeter.

3. Offset -

(a) Apply 115 VAC instrument power and allow15minutes for electronic circuitry to stabilize.

(b) With instrument power only on, the output at terminals 1 & 2 should be zero or within ± 0.05% F.S. If greater than 0.05% adjust the trimpot marked "ZERO".

B. Final Calibration _

(a) Adjust the voltage source to the full-scale designated voltage. Adjust the current source until the standard wattmeter reads the full-scale watts. Now, adjust the trimpot marked "CAL" For a 1-mA ±0.05% reading.

(b) Check linearity over the voltage and current ranges.

(c) Replace the plastic caps. This ends calibration.

Notes

1) Multiple turns through the Hall effect current transducer window may be utilized to achieve higher effective current. For example a 10-ampere source with 10 turns through the CT window will yield a total of 100 amperes through the window. This may be used to calibrate a PC8-003-01.

PC8 Transducer model numbering scheme

Input Voltage Range	CODE	**Input Current Range**	CODE	Output 0 to ± 1 mADC	Output 0 to ± 10 volts DC	Output 0 to ± 5 volts DC	Output 4 to 20 mADC	Output 4 to 12 to 20 mADC
0 to 25	001	0 to 5	08	B	D	X5	E	EM
0 to 50	002	0 to 100	01	B	D	X5	E	EM
0 to 150	003	0 to 200	02	B	D	X5	E	EM
0 to 300	004	0 to 300	03	B	D	X5	E	EM
0 to 400	005	0 to 400	04	B	D	X5	E	EM
0 to 500	006	0 to 600	05	B	D	X5	E	EM
0 to 600	007	0 to 1000	06	B	D	X5	E	EM
		0 to 2000	07	B	D	X5	E	EM

PC8 model numbers have the form: PC8-[*code for voltage range*]-[*code for current range*][*letter for output*]

Examples of PC8 model numbers:

Example 1
Input: 0 to 500 volts DC [code 006], 0 to 200 amperes [code 02]
Output required: 0 ± 10 volts DC [letter D]
0 to ± 10 volts represents 0 to ± 100,000 watts
Model: PC8-006-02D

Example 2
Input: 0 to 150 volts DC [code 003], 0 to 5 amperes [code 08]
Output required: 4 to 12 to 20 mADC [letters EM}
4 to 12 to 20 mADC represents - 750 watts to 0 to + 750 watts.
Model: PC8-006-02D

Example 3
Input: 0 to 25 volts DC [code 001], 0 to 1000 amperes [code 06]
Output required: 4 to 20 mADC [letter E]
4 to 20 mADC represents 0 to +25,000 watts
Model: PC8-001-06E

The full-scale output of a PC8 in watts is the product of full-scale voltage and full-scale current.

Special calibration and special ranges are available on request. Special models may have a "Y number" suffix or a special 4 digit model number. Please consult the factory.