INTELLIMETER® REGISTER™

OPERATING INSTRUCTIONS

WARNING: Any work on or near energized metering equipment can present a danger of electrical shock. All work on these products should be performed only by qualified industrial electricians and metering specialists in accordance with local utility safety practices and procedures outlined in the **Handbook for Electricity Metering** (available from the Edison Electric Institute, 1111 19th St. NW, Washington, DC 20036). The Information contained within this book is intended to be an aid to qualified metering personnel. It is not intended to replace the extensive training necessary to install or remove meters from service.

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OSC/INTELLIMETER

INTRODUCTION

The Intellimeter Registers are CT-based, universal meters suitable for new buildings or retrofit projects in existing buildings. Their design makes installation simple. No meter sockets or additional hardware is needed. No expensive rewiring, either. Simply install a Register wherever you want to meter loads.
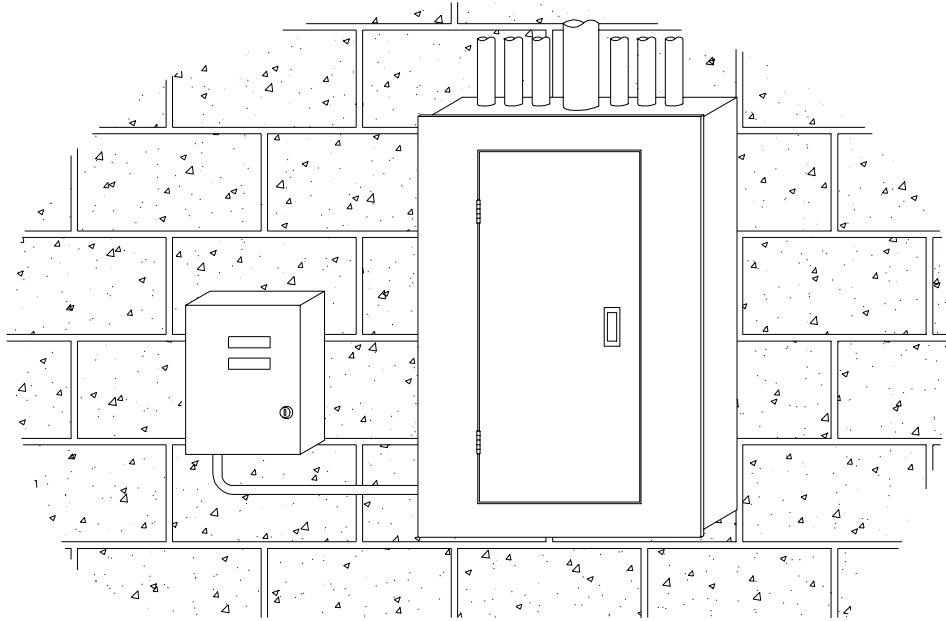
Figure 1 - Typical Installation

Register models are available for conventional 5 Amp output current transformer or low cost 0.1 Amp output current transformers, including split-core types. Using split-core current transformers, the Register can be installed without disturbing existing wiring.

The standard version of the Intellimeter Register measures kilowatthours consumption. It is available with a demand metering option as well. The demand meter is available for different demand intervals, with the standard demand interval in any geographical area determined by local rate structures. A cumulative demand register is standard on Registers equipped for demand metering. Any authorized or unauthorized reset of the demand meter will register in the cumulative demand register, preserving the demand reading.

If the Register is not installed properly or needs service, it displays a help code. It includes an "88888888" display that cycles with the dial displays so the user can always verify that the liquid crystal display is functioning properly. The Register also has test displays to enable a trained meter tester to conduct accuracy tests in the field. These consist of blinking indicators, a horizontal bar and a vertical bar that will periodically be displayed in the far left position of the display. There is also a blinking dot just to the right of the display number any time the meter is accumulating energy.

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The Register is compatible with the Intellimeter system, used for remote meter reading. Should the number of loads metered make it desirable to use a remote reading metering system, the pulse output option on the Register allows you to interface the meter with an Intellimeter Pulse Monitor for remote reading capabilities.

The optional pulse output of the Register is Standard KYZ, Form C output. It is compatible with most energy management systems which may be used with the Register for remote meter reading and load control. It is also compatible with pulse recording devices commonly used by electric utility companies for remote billing and load research.

OPERATION
CONSUMPTION METERING

Verify that the display and the Register are operating properly.

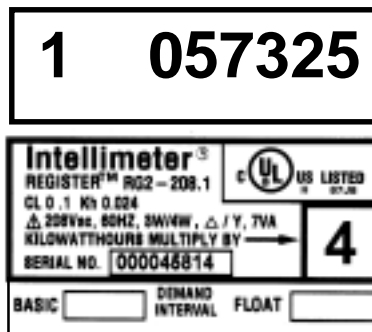The display should alternate between "88888888" displays and the actual dial reading.

Figure 2 Consumption Dial Display

See Figure 2. Note that the dial consists of the six digits to the right of the display number, 1".

If any of the "88888888" display is not shown, the liquid crystal display is defective, and the Register requires service.

If a "Help" message is displayed alternatively with the dial and "88888888", the meter has detected an internal error or wiring problem. Service is required. See page 7, "HELP MESSAGES".

Record the current dial reading and the multiplier at the beginning of a billing period.

At the end of the billing period, record the dial again.

Subtract the beginning dial reading from the ending dial reading.

Multiply the difference in readings by the multiplier to determine kilowatthours consumption.

Multiply the kilowatthours by the cost per kilowatthour to determine the final bill.

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DEMAND METERING

Verify that the display and the Register are operating properly.

The display should alternate between "88888888", the consumption dial, the current peak demand and the cumulative demand. See Figure 3. Note that "1", "2" and "3" are display numbers.

If any of the "88888888" display is not shown, the display is defective, and the Register requires service.

If a "HELP" message is displayed alternately with the dial and "88888888", the meter has detected an internal error or wiring problem. Service is required. See the section on "HELP MESSAGES".

Record the current consumption, KWD and accumulative demand dial readings and the multiplier at the beginning of the first billing period. Insert the key provided with the Intellimeter Register in the demand reset switch on the front cover. Turn the switch as far as it will go in a clockwise direction to reset the demand.

> **NOTE:** A 24 hour lockout will prevent resetting the demand more than once a day. After an interruption in power, the lockout will no longer be in effect, but the Register must be powered up for longer than a minute before the demand can be reset.

At the end of the first and all subsequent billing periods, record the consumption dial again. Also record the current peak demand and the cumulative demand. Use the key provided with the Register to reset the demand for the next billing period.

Subtract the beginning consumption dial reading from the ending dial reading.

Multiply the difference in readings by the multiplier to determine kilowatthours consumption.
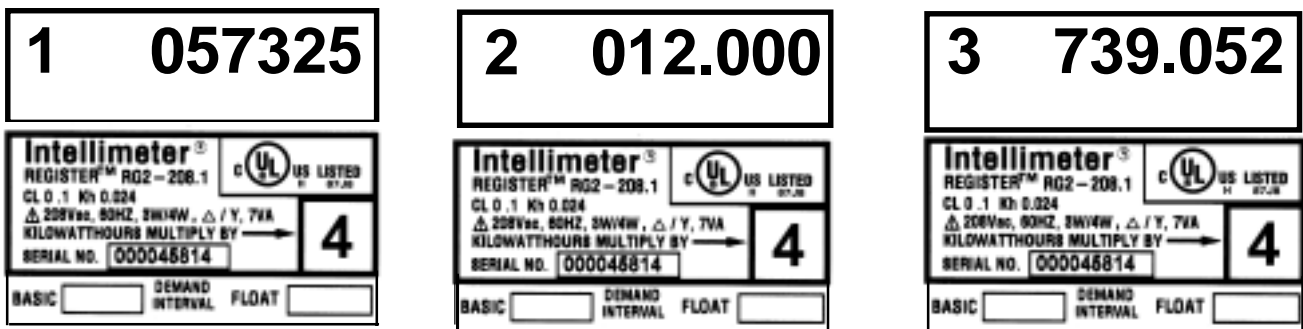

Figure 3 Demand Register Displays

Multiply the kilowatthours by the cost per kilowatthour to determine the consumption portion of the bill.

Verify that the cumulative demand recorded is equal to the previous billing period's cumulative demand plus the previous billing period's peak demand. If it is higher, the demand was reset sometime during the current billing period. Subtract the previous billing period's cumulative demand and the previous billing period's peak demand to determine what the peak demand reading was when the reset occurred. The higher of the current peak demand reading or the peak demand calculated from the cumulative register should be used for billing.

Multiply the peak demand reading by the multiplier to determine peak kilowatt demand for the billing period.

Multiply the peak kilowatt demand by the cost per kilowatt of demand to determine the demand portion of the bill.

PULSE OUTPUTS

Any pulse recording device used with the Register must be designed to accept KYZ pulses and must be capable of reading up to 6000 pulses per hour. Wiring to the pulse output option is the equivalent of making connections to single pole, double throw relay contacts. The reading device must supply voltage and power (usually 12-24VDC, 5-10mA or less; 40V, 20mA max).

        (FORM C) is the term used for KYZ pulses.
        (FORM A) is the term used for KY pulses and may also be used.

The value of a pulse in kilowatthours varies with the type of Intellimeter Register installed, and the current transformers attached to the Register in the field.

Pulse Constants:

Register	Form C Kp WH	Form A Kp WH		Register	Form C Kp WH	Form A Kp WH
RG2-120	1.2	2.4		RG2-120.1	0.024	0.048
RG2-208	1.2	2.4		RG2-208.1	0.024	0.048
RG2-240	1.2	2.4		RG2-240.1	0.024	0.048
RG2-480	2.4	4.8		RG2-480.1	0.048	0.096
RG2-600	3.36	6.72		RG2-600.1	0.0672	0.1344

> **NOTE:** Kp always has the same value as Kh with Intellimeter Registers. Kh is marked on the nameplate label and is visible after installation. Kp (in primary watthours per pulse) is secondary watthours per pulse. Kh multiplied by the current transformer ratio.

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Example current transformer ratios:

Marked Ratio	Ratio	Marked Ratio	Ratio	Marked Ratio	Ratio
100:5	20	2000:5	400	100:0.1	1000
200:5	40	2500:5	500	200:0.1	2000
400:5	80	3000:5	600	300:0.1	3000
800:5	160	3500:5	700	400:0.1	4000
1000:5	200	4000:5	800	500:0.1	5000
1500:5	300	4500:5	900	600:0.1	6000

To calculate consumption from a pulse count, first determine the difference in the total pulse count from the beginning of the billing period to the end of the billing period. Multiply the Kp listed on page 5 by the CT ratio. Divide the product by 1000 to determine the pulse multiplier.

Multiply the difference in pulse counts by the pulse multiplier to determine kilowatthour consumption.

Form C example: A type RG2-208 Register using Form C with 100:5 current transformers has a output of 10,000 pulses in a month.   (1.2 x 20)/1000 = 0.024   10,000 x 0.024 = 240 kWh

Form A example: A type RG2-208.1 Register using Form A with 100:0.1 current transformers has a output of 10,000 pulses in a month.   (.048 x 1000)/1000 = 0.04   10,000 x 0.048 = 480 kWh

The Intellimeter Pulse Monitor reports pulse counts to the Intellimeter Central Station in hundreds of pulses. If the Register is used with a Pulse Monitor, multiply the Kp listed on page 5 by the CT ratio. Divide the product by 10 to determine the pulse multiplier. Multiply the difference between current billing period's consumption dial and the previous consumption dial by the pulse multiplier to determine kilowatthour consumption.

For example, a type RG2-208 Register with 100:5 current transformers has output 10,000 pulses to an Intellimeter Pulse Monitor in a month. The difference in Pulse monitor dials will be 100.

$$(1.2 \text{ x } 20)/10 = 2.4 \qquad\qquad 2.4 \text{ x } 100 = 240 \text{ kWh}$$

Some pulse recording devices, such as the Intellimeter Pulse Monitor, calculate and report demand (in pulses). Follow the equipment manufacturer's recommendations in reading and determining demand from their device.

If the pulse recording device is the Intellimeter Pulse Monitor, determine the maximum demand as follows: Obtain the demand reading reported by the Pulse Monitor to the Intellimeter Central Station. This reading is the number of pulses recorded divided by 100.

The pulse multiplier for demands is identical to the pulse multiplier for consumption. Multiply the Kp listed on page 5 by the CT ratio. Divide the product by 10 to obtain the pulse multiplier. Multiply the demand reading by the pulse multiplier to obtain the kilowatt demand.

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For example, an Intellimeter Pulse Monitor attached to a type RG2-208 Register with 100:5 current transformers reports a demand of 5.0.

$$(1.2 \times 20)/10 = 2.4 \qquad\qquad 2.4 \times 5.0 = 12 \text{ kW}$$

HELP MESSAGES

The Intellimeter Register routinely performs tests on essential internal components and the wiring to which it is attached. If a failure or error is detected, it is displayed in a help message:

HELP XXX

The three digit code is used to indicate the problem found. Each digit is used to indicate one or two problems, as listed below.

010   Negative Watt Calculation. Check the wiring. One or more current transformers may be wired at opposite polarity. Voltage or current transformer leads may be wired to the wrong position on the Register.

020   ROM (Read Only Memory) Error. Replace the Register.

100   Hard EEPROM Error. Replace the Register.

200   RAM (Random Access Memory) Error. Interrupting the power on the Line 11 position of the Register can often clear a RAM error with no adverse effect on metering. If the error occurs repeatedly, the RAM is defective and the Register should be replaced.

Other codes are combinations of the above codes. For instance, Help 330 would indicate that all of the above errors had been detected.

ADVISORY STATEMENTS

FEDERAL COMMUNICATIONS COMMISSION RULES AND REGULATIONS, PART 15, REQUIRE THE FOLLOWING STATEMENTS: This equipment has been verified to be in compliance with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules. A properly installed Intellimeter Register will not interfere with radio and television reception. This equipment does generate and use radio frequency energy. If it is not installed in accordance with this manual, it may cause interference. If the equipment does cause radio or television interference, the cause is likely to be a loose or improper connection. Assure that all electrical connections, particularly grounding connections, are made properly and are well secured.

*If interference persists, contact **OSC/INTELLIMETER**, Pleasanton, California, for instructions.*

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