

Getting Started: Troubleshooting a non-functioning computer-readable meter system can be a frustrating experience. Because there are so many things that can go wrong, we suggest you test each phase as you go. Begin in your office with a meter, 4810 RS-232 Interface, 4820 Power Line Interface if you have EZ Meter Plus meters, and your computer. Use short extension cords with the receptacle end cut off to connect everything to a power strip without any surge protection. Install the software and be sure you can read and set the one meter you are working on.

Once you are able to read a meter on your desk, you are ready to test the meters in the field. If you will be using a telephone modem or ethernet/RS-232 interface, we suggest using a portable computer to test communication with the installed meters before trying to communicate with the modem or ethernet.

Planning the System: Anyone planning a large system with EZ Meter Plus meters is advised to buy one Plus IO meter first and test the power line communications capacity of the electrical system. This prevents installation of a system that will possibly never perform adequately and allows a suitable system to be installed, either wired or without automatic reading capability.

Installing the Meters: The meters must be installed in the same manner as the stand-alone meters as described in the *EZ Meter Operating Instructions and EZ Meter Installation Instructions* brochure. EZ Meter Plus meters need no further installation other than connecting the computer to the power line (see below). EZ Meter Plus IO meters can be connected either through the power line or through a twisted pair of wires. In addition, the EZ Meter Plus IO meters have three Input/Output ports that may be connected for various control functions or reading other meters.

Connecting the RS-232 Interface: The 4810 RS-232 Interface can be connected to any RS-232 port. Most often, it will be directly to a nine-pin connector on the back of a computer running Windows 98 or later. It may also be connected to a telephone modem, a radio, or an ethernet-RS-232 interface module. All these methods are supported by the EZ ReadIt Gold software. Additional methods of connection are possible with third party software.

When connecting to a Windows computer, a standard nine-pin extension cable is used. If connecting to a modem or radio, a null modem adaptor may be needed or soldered in jumpers can be installed on the 4810 printed circuit board.

When placing the 4810 Interface module, it works best if it can be seen by the computer operator. Being able to see the LEDs aids troubleshooting if communication cannot be established.

During the initial setup, we suggest connecting a computer directly to the 4810 rather than using a modem or other device. The modem can be phased in once you know you can read and set meters with the direct connection.

Any power supply with a compatible plug that outputs 300-1000 ma and 6-9 volts AC or DC will work with the 4810.

Connect a twisted pair to the PC+ and PC- terminals on the 4810. The best wire to use is unshielded Category 5 LAN wire made for computer networks. Telephone wire will probably work, but communication may be sporadic, particularly if there is crosstalk from telephone conversations on nearby lines. If your cable has a shield, attach it to the SHLD terminal. Do not ground the shield or attach it to anything else anywhere along the line.

Connect the other end of the twisted pair to a 4820 Power Line Interface if you will be using power line communications or connect directly to the PC+ and PC- terminals on EZ Meter Plus IO meters.

Connecting via the Power Line: Since the meters communicate through the power line, no extra connection is required at the meter. The 4820 Power Line Interface must be connected somewhere in the electrical system. The best location is at or near the main panel where easy access is available to all legs of the power system. Connect the 4820 to the power grid using 12to 22 gauge wire. Connect the twisted pair coming from the 4810 RS-232 Interface to the PC+ and PC- terminals. Observe the color codes at both ends of the twisted pair.

IMPORTANT. In almost all installations, capacitors must be installed across the hot lines at major distribution points and the ends of long wires. The capacitors absorb reflections in the lines and couple the signal to different phases. How many capacitors are needed depends on the layout and condition of the electric system. Do not install the capacitors between power and neutral or ground. That will bleed the signal to ground and you will not be able to read the meters.

CAUTION - Certain electrical devices contain circuits that cancel the 132 Kh signal used for communication. We have seen problems with ground fault interrupters (GFIs), battery backup systems, surge protectors and other electric meters. In some cases, these devices do not create a problem and in others they make power line communication impossible. Try to keep meters and the 4820 as far from these devices as possible.

If you are dealing with a large facility, there may be multiple step down transformers scattered around the facility. If this is the case, you must install a separate 4820 on the low voltage side of each transformer. The twisted pair can daisy chain from one 4820 to another or they can be arranged in a star configuration or any combination thereof.

Connecting via a Twisted Pair: Using twisted pair communication eliminates the uncertainties of power line communication at the expense of having to run wire and slightly higher cost per meter. When using the Plus IO meters, the twisted pair cable from the 4810 RS-232 Interface can be daisy chained from one meter to the next or it can be installed in a star configuration or a combination of daisy chain and stars, or even stars on stars. With a radio frequency signal you are not limited to the typical RS-485 configurations. Simply connect the twisted pair to the PC+ and PC- terminals using a consistent color scheme throughout the facility. You can also connect 4820 Power Line Interface modules into the system so that some meters are being read over the power line and some are read by twisted pair.

Since the standard configuration for the Plus IO meters allows both power line and twisted pair communication, there is a possibility that a serious source of noise on the power line could disrupt a meter so badly that it could not communicate even when connected to the twisted pair. If this happens, you can disable the power line communication by clipping the lead to the small brown capacitor as shown in the photo below.

Connecting the I/O Ports: The three IO ports on the Plus IO meters can be used to read a switch position, to control a relay or light an LED, or to count pulses from a water or gas meter. It can also count the number of times a switch is opened or closed; useful if you need to know how often a gate or door is opened and closed. Simply connect your switch or relay input across the COMN and IO#1, IO#2 or IO#3 terminals.

CAUTION - Any device connected to the COMN and IO ports on the EZ Meter Plus IO should have 300 or 600 volt insulation since the COMN is referenced to neutral and not to ground. If you have faulty wiring, you could get a hot neutral and put 120 volts or more on the device connected to the meter. Consult your local electrical code.

The switches should be simple dry contact closure devices, whether used for determining switch position or counting pulses.

The output to drive relays is very limited. In its standard configuration, it provides enough power to light an LED. Resistors can be added to the circuitry to increase the amount of current available to drive relays. Specify how much current you will need and the port number when ordering meters and your meters will be modified to meet your requirements. The trade off is that the meter will draw more current. The power supply is not big enough to power three low power relays at once. The output is +5 VDC referenced to neutral. Current up to ___ ma is available. Electronic relays from Crydom are available from DigiKey (<http://www.digikey.com>) and Mouser Electronics (<http://www.mouser.com>).

EZ Meter Plus Operating Instructions

The EZ Meter Plus and Plus IO meters can be read in the same manner as the stand-alone meters. See the EZ Meter Operating Instructions brochure for details. The big difference is that these meters can be read by a computer using the EZ ReadIt Gold program furnished by Davidge Controls or another program furnished by others.

EZ Meter Plus Hardware Installation

The EZ Meter Plus meters are installed exactly the same as the stand alone meter

EZ Meter Installation Instructions

The EZ Meter consists of an electronics module, one or more current transformers (CTs), and one or two electro-mechanical display counters. The electronics module should be mounted in a NEMA enclosure suitable for the location. The CTs and display counters may be mounted in the same enclosure or mounted remotely. A common practice is to mount the CTs in a breaker panel and mount everything else in a separate adjacent enclosure. Both the CTs and counters can be mounted 100 feet or more from the electronics module by extending the wire.