

E-Mon D-Mon[®] Installation Manual

IDR
(Interval Data Recorder)



Dear Valued Customer,

We are pleased that you chose to buy one of our products, and want you to be just as pleased with owning it. Before installing your new E-Mon product, please read the information on the following pages carefully.

We believe that you will find the E-Mon D-Mon meters easy to install and to use for monitoring and evaluating your electrical usage.

To be sure that you are 100% satisfied with your products, we provide toll-free technical and sales support Monday through Friday, 8:00 am to 7:30 pm, EST: (800) 334-3666. You may also reach us via email at info@emon.com.

If you have questions, we can handle them quickly and effectively with a telephone call. Please let us try to help you BEFORE you remove your meter. And to help us help you, we ask that you have all relevant information on hand when you call (model or part numbers, nature of difficulty, etc.)

Be sure to forward this manual to the owner after installation is complete, so that they may use it as a reference guide when reading the E-Mon D-Mon meter.

Thank you.

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1.0 Pre-Installation Information

The Interval Data Recorder (IDR) is an energy data collection device. Installation must be performed by qualified personnel only and must be in accordance with local and national electrical codes. E-Mon and its representatives are not responsible for damage or injury from improper installation.

The IDR is contained within a NEMA 12 enclosure and is designed for INDOOR USE ONLY, where ambient temperatures are between +32 and +120 degrees Fahrenheit. It is available in 8 and 16 input configurations.

The IDR must be located in an area that is central to the meters connected to it. **IMPORTANT:** The E-Mon D-Mon meter that is connected to meter jack #1 on the IDR must be within 100 feet from the IDR, as it supplies low-voltage power to operate the IDR. All other meters can be located up to 500 feet from the IDR.

NOTE: The IDR with modular jacks is designed to operate with E-Mon D-Mon meters only. Terminal input models can support the monitoring of third-party metering equipment; contact E-Mon for further information.

The IDR must be installed in a location according to these guidelines to ensure continued safe, trouble-free operation.

- Do not install near sensitive radio communication equipment or receiving antenna systems.
- Do not install near high-energy electrical fields such as those produced by welding equipment or by high-power electrical motors.
- Always install in an area that is dry, away from any potential liquid or chemical splash hazards. Never install electrical equipment in an area where flammable chemicals or vapors are present.
- The IDR enclosure's door must be kept closed once installed. Exposing the internal circuits to dust, dirt, fumes or high humidity can damage the IDR.

NOTE: All internal circuits are isolated from the AC line.

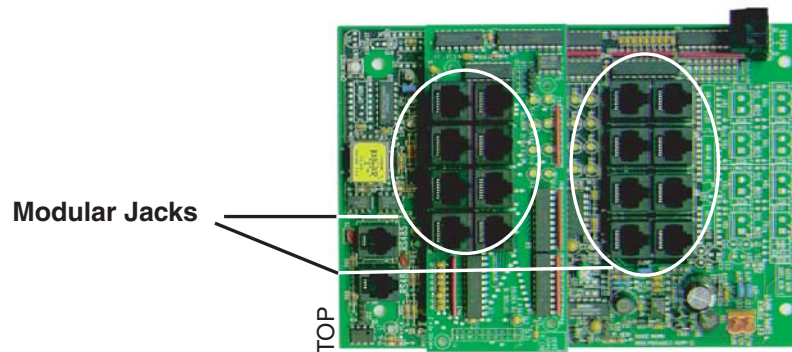
NOTE: IDRs with modular jacks can be powered from either the first E-Mon D-Mon meter or by an external power supply (requires 120 VAC). IDRs with removable screw-type connectors require an external power supply (provided.)

IDR-16's are supplied with an ID letter for each group of 8 inputs to make them compatible with E-Mon Energy™ software. The available choices are A-B, C-D, E-F, G-H, I-J, K-L, M-N, O-P, Q-R, S-T, U-V, W-X and Y-Z. No other combinations are available. When mixing 8-point and 16-point IDRs together, it may be necessary to jump a letter in the system. As an example, if you have an 8-point IDR labeled "A", "B" and "C", the 16-point IDR to choose would be the E-F unit.

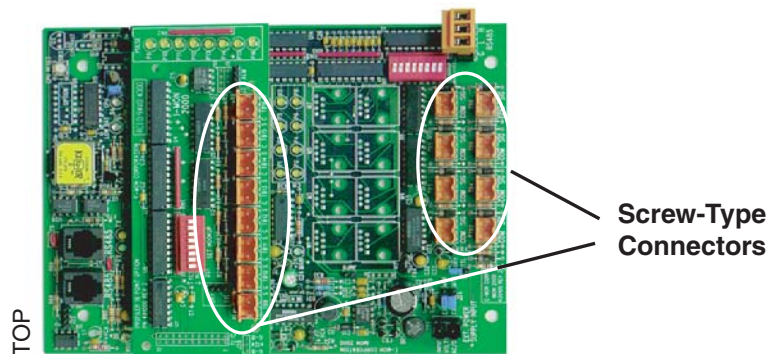
1.0 Pre-Installation Information (Continued)

The IDR is available in three configurations.

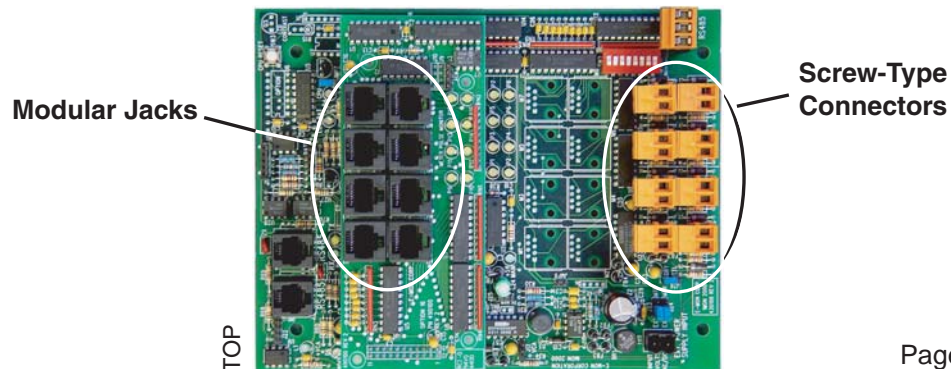
1. Modular Jacks (IDR-8 and IDR-16): Supplied with all modular jacks for use only with E-Mon D-Mon meters.



2. Plug-In Screw-Type Connectors (IDR-8 and IDR-16): Supplied with all plug-in screw-type connectors for use with third-party meters (electric, gas, water, etc.) that are provided with a dry contact pulse output. (Requires external power supply.)



3. Modular Jacks & Screw-Type Connectors (IDR-16 ONLY): Supplied with 8 modular jacks and 8 screw-type connectors. Used with a mixture of E-Mon D-Mon and third-party meters. (Requires external power supply.)



2.0 Mechanical Installation

***** IMPORTANT *****

THE INTERNAL CIRCUITS OF THE IDR CAN BE DAMAGED BY ELECTRO-STATIC DISCHARGE. BEFORE REACHING INSIDE THE ENCLOSURE, DISCHARGE YOURSELF BY TOUCHING AN EARTH-GROUNDED OBJECT.

ACCIDENTAL DISCHARGE OF STATIC ELECTRICITY ONTO THE CIRCUIT BOARD CAN RESULT IN:

- LOSS OF STORED DATA**
- A SYSTEM LOCK-UP**
- PERMANENT DAMAGE TO THE IDR**

The IDR is available in two types of enclosure systems:

A. Stand-Alone IDR (Standard Configuration)

The stand-alone IDR configuration consists of a single IDR unit. The enclosure should be mounted using the mounting flanges located at the top and bottom of the enclosure. The enclosure has three available knockouts for cable entrance/exit from the IDR.

NEVER ATTEMPT TO DRILL THROUGH THE STEEL ENCLOSURE. DOING SO MAY PERMANENTLY DAMAGE THE ELECTRONIC CIRCUITRY AND WILL VOID ALL WARRANTIES.

B. MMU (Multiple Meter Unit) Configuration

MMU units containing E-Mon D-Mon meters and IDRs have been pre-wired by the factory prior to shipment. The meters have been connected to the IDR. The installer need only make the required communications connections to the IDR and connect the main AC power input for the MMU system. See Section 6.0 for communication connections.

3.0 Connecting Meters to the IDR

E-Mon D-Mon Meter Connections

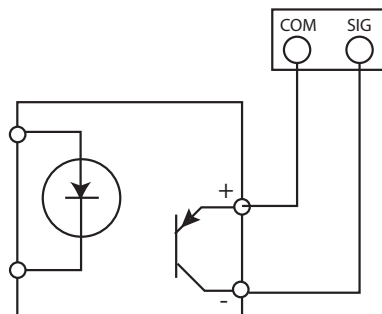
- A. Each E-Mon D-Mon meter has two modular jacks located at the top of the main circuit board. The jack on the left (RJ-45, 8-pin), labeled "IDR", is used to connect the meter to the IDR. NEVER USE THE 6-PIN JACK LOCATED ON THE RIGHT SIDE OF THE METER CIRCUIT BOARD TO CONNECT ANY IDR.
- B. * Be sure that one E-Mon D-Mon meter is located within 100 feet of the IDR. This meter will be used to supply the low-voltage power necessary to operate the IDR. Connect this meter to jack #1 on the IDR using an 8-conductor flat modular cable. (See Chapter 5.0 if the IDR has the optional AC adapter.)
- C. *All remaining E-Mon D-Mon meters must be connected to the meter jacks #2-8 using 6-conductor flat modular cable.
- D. IDR-16 - If the IDR is an IDR-16, connect the additional meters to Jacks # 9-16 on the option card using 6-conductor flat modular cable.
- E. IDR-8s or IDR-16s supplied with plug-in screw type connectors can be up to 500 feet from all meters, and utilize a pair of wires for connecting to the meter pulse output.

* See Appendix C for items B & C above.

** For more information on cable assembly, see Appendix A.

Pulse Output Meters (IDR-ST models only):

- A. Each meter is interfaced with the IDR through the plug-in screw type connectors. Any of the connectors may be used with #22-14 AWG conductors.
- B. When used with solid-state switches, correct polarity must be observed in order for that contact to be recognized. COM (or "C") on the IDR is 12 VDC that must be connected to the + side of the pulse switch. The return side of the switch is connected to SIG (or "S") on the IDR.



- C. The meter can be up to 500 feet away from the IDR.

3.0 Connecting Meters to the IDR (Continued)

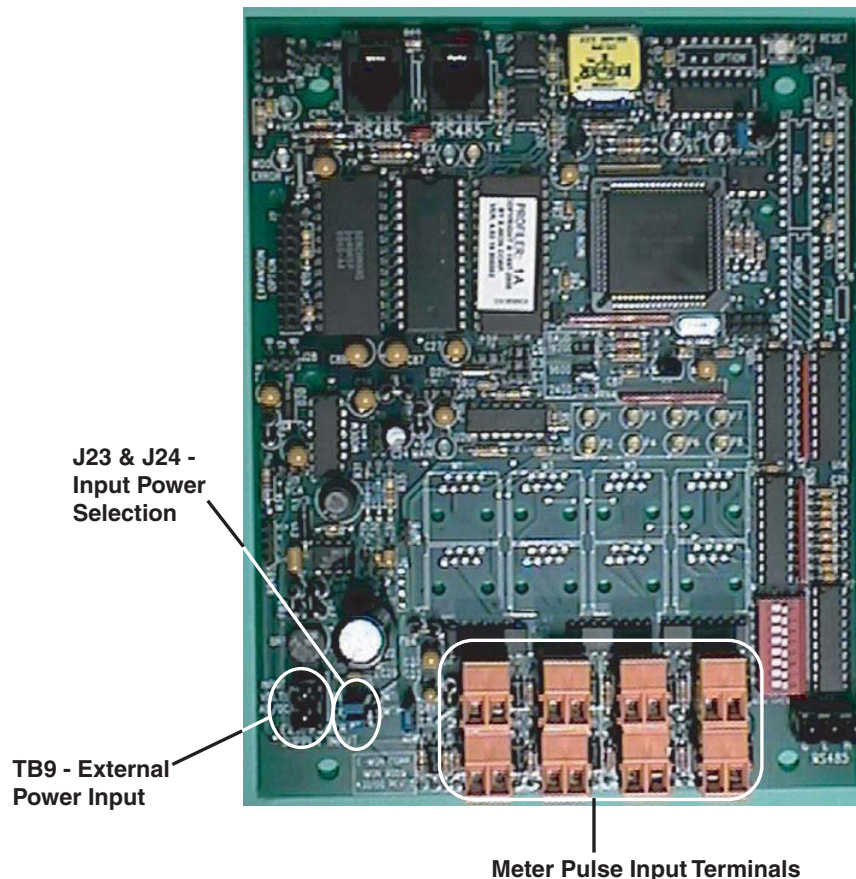
Third-Party Meter Connections

In order to connect “third-party” meters such as gas, water or utility-type meters, the IDR must be ordered with the “two-screw” connectors (designated with the suffix ST at the end of the model number) terminals instead of the modular jacks that are used with E-Mon D-Mon meters.

The IDR for third-party metering is always powered by the optional AC adapter power supply and requires an available 120 VAC receptacle to obtain the power. The receptacle must not be switched off at any time. See Section 5.0, Optional AC Adapter.

The input pulses supplied to the IDR must be non-powered, and they can be either physical (mechanical) contacts or electronic switches. When electronic switches are used, the “COM” terminal on the IDR is the “+” output and the “SIG” is the return from the switch.

The IDR with modular jacks automatically detects when an E-Mon D-Mon meter is connected to it so that it can be recognized by the software when the meters are added or removed. The third-party meter IDR uses a DIP switch to perform this function. This switch is preset at the factory and requires no further adjustment.



4.0 Main Circuit Board Visual Checks

- A. Once you have connected meter #1 to jack #1 in the IDR, the IDR should be energized. If the IDR is not energized, verify:
1. Meter #1 is turned on. (Meter #1 powers the IDR; if Meter #1 is not installed and powered up, the IDR will not function.)
 2. Verify that JMP8 on the IDR circuit board has a jumper installed.
 3. Verify that J23 & J24 on the IDR circuit board are set in the position labeled "MTR". Both jumpers should be set to the RIGHT position.
 4. Verify that the cable between Meter #1 and Jack #1 on the IDR is properly assembled. (See Appendix A for cable assembly.)

NOTE: If the IDR is being powered by the optional AC adapter instead of by Meter #1, see Section 5.0.

- B. Verify the status of the LED indicators on the IDR circuit board. (See Appendix B for locations.)
1. Power Supply Indicators
 - L3, green -> This LED is ON.
 - L1, green -> This LED is ON.
 2. System status indicators
 - D4 (CPU), red -> This LED flashes once per second. If D4 flashes twice per second, the IDR is not initialized. This will be addressed later using E-Mon Energy software.
 - D7 (Low Battery) -> This LED must be OFF. This LED indicates a low or missing battery.
 - D6 (System Error) -> This LED must be OFF.
 3. Meter pulse indicators
 - Yellow LEDs P1 through P8 may be flashing. These LEDs indicate each meter's pulse rate. The flash rate depends on how much load the meter is measuring. The faster the pulse the greater the load.

REMEMBER, IF THE METER MEASURES ZERO LOAD, THERE IS NO METER PULSE, WHEN THE PULSE RATE IS ZERO THE YELLOW LED INDICATOR WILL REMAIN EITHER ON OR OFF UNTIL THERE IS A LOAD.

NOTE: if one of the LEDs does not flash, verify the meter connection first. If the meter is properly connected, check the meter's display for a flashing load indicator.

4.0 Main Circuit Board Visual Checks (Continued)

B. Status verification of LED indicators (continued)

4. Panel Indicators

- Two LEDs are visible through the window on the door of the stand-alone enclosure. THESE LEDS ARE NOT PRESENT IN MMU STYLE IDRS.
- Green LED (Power Indicator) -> The green LED indicates that power is present at the IDR.
- Red LED (Tamper Alarm) -> The red LED indicates that the IDR door has been opened. This tamper alarm LED will be on when the door is closed, and will flash when the door is open. When the software startup is performed, the IDR will be initialized by the E-Mon Energy software and the alarm LED will turn off as long as the door remains closed. The alarm can only be reset through the software.

5. IDR 16 Option 16 Card (applies only to the IDR-16 model.)

- For each meter (9-16) installed on the options card, another set of yellow LEDs (P9-P16) will be present. These LEDs indicate the meter pulse rate for meters #9 through #16.

5.0 Optional AC Adapter (Optional External 120 VAC Power Supply)

If you are NOT using the optional AC adapter to power the IDR, proceed to Section 6.0.

Instead of powering the IDR using Meter #1, E-Mon can supply an optional AC adapter. If the IDR was provided with this option, verify the following:

1. Jumpers J23 & J24 on the IDR circuit board are set to the LEFT position (position labeled "EXT".)
2. Jumper at JMP8 MUST be removed.
3. The AC adapter's two-wire cord must be plugged into the IDR at TB9. (The polarity of these wires does not matter.)
4. Plug the AC adapter into a 120 VAC outlet.

NOTE: The AC adapter is designed to be used with a 120 VAC outlet only.

5. The IDR should now be energized. Perform the visual checks outlined in section 4.

NOTE: The AC adapter provides an isolated 18 VAC/300 mA power source for the IDR. Contact E-Mon at (800) 334-3666 if another power supply is to be used.

6.0 Serial Communications

- A. Hardwired System using the RS-232 Communication Key.
(See the hardwired system configuration diagrams in Appendix F.)

The RS-232 communications key allows you to connect IDRs to a personal computer that has E-Mon Energy software installed. The computer communicates with the IDRs through the RS-232 key.

The RS-232 key must be located within 15 feet of the host computer.

- B. Connecting the RS-232 key to the computer

The RS-232 key is supplied with:

- a. (1) 8-conductor cable fitted with RJ-45 plugs
- b. (1) DB-9 serial COM port adapter
- c. (1) AC adapter that converts 120 VAC into the 7 VAC used to power the RS-232 key.

1. Connect the 8-conductor cable to the left-side jack (labeled "RS232") on the rear panel of the RS-232 key.
2. Connect the appropriate COM port adapter (DB-9) to the serial port on the back of the computer. Plug the 8-conductor cable from the RS-232 key into the COM port adapter.
3. Connect the 7 VAC AC adapter into the rear panel input on the RS-232 key. Plug the adapter into a 120 VAC outlet. On the front panel of the RS-232 key, two LEDs will light up (POWER ON and AC ON.)

NOTE: When E-Mon Energy software is accessed on the computer, a third LED will turn on. The RS232 READY indicator will light up as soon as the E-Mon Energy software is booted up and the correct COM port is set up via the settings provided in the software's Locations menu.

- C. Connecting IDRs to the RS-232 Key using RS-485

On the rear panel of the RS-232 key, there are three jacks labeled as channels A, B and C. These are RS-485 serial communications ports used to connect the IDRs. Each of these three channels can be connected to as many as 52 individual IDRs over a total cable distance of 4000 feet. Channels are independent and must not be connected to each other. (See Appendix F.)

6.0 Serial Communications (Continued)

C. Connecting IDRs to the RS-232 Key using RS-485 (continued)

Method 1: Modular Plug Method

This method requires using 4 stranded conductors inside a cable that is fitted with an RJ-11 type plug for 4-conductor modular systems at each end of the cable.

* Do not use any pre-made telephone cables. See Appendix A for correct cable configuration.

1. Plug the 4-wire RJ-11 cable/plug assembly into Channel A on the RS-232 key. Connect the other end of this cable to the IDR at either of the two RS-485 ports at the top left of the IDR circuit board.
2. The unused RS-485 port is used to connect another cable to the next IDR. This is called a "daisy-chain" connection. This can be done repeatedly to connect as many as 52 individual IDRs. NOTE: The total combined cable length must be no more than 4,000 feet.
3. Each IDR has two LEDs (yellow and green) located directly below the RS-485 jacks. If the system is properly wired, these two LEDs will normally be OFF. These LEDs will flash when the computer and IDR are communicating.

Method 2: Terminal Block Method

IDRs may also be daisy-chained using a 3-conductor cable. Instead of using the two modular jacks for the RS-485 daisy chain, you can use J20 at the bottom right corner of the IDR circuit board.

Remove this 3-terminal plug to facilitate attaching the wires using the screw terminals that are captivated within the plug housing.

1. Daisy-chain the IDRs by connecting:
 - All HI terminals together
 - All LO terminals together
 - All GND terminals together

** This requires putting two wires into each of the 3 terminals.

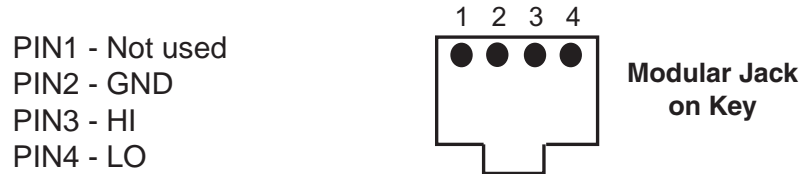
6.0 Serial Communications (Continued)

C. Connecting IDRs to the RS-232 Key using RS-485 (continued)

2. Connecting to the RS-232 key.

You will need to attach an RJ-11 modular plug to the cable that serves the RS-485 system.

On each channel on the back of the RS-232 key, the pin out for each channel is as follows:



Note: It is okay to use the J20 with the modular jacks if needed.

This completes the installation of the IDR hardwired system.

D. RS-232 key with Built-In Modem (RS-232 KEY RM)

The RS-232 key with built-in modem connects the entire RS-485 network of IDRs to a telephone line.

** Refer to the previous section, "Connecting IDRs to the RS-232 key using RS-485." Connect the RS-485 network via Method 1 or Method 2.

On the back panel of the RS-232 Key/modem, the left jack (RS232) is not used in most cases since there is no local host computer.

The two jacks at the top center of the rear panel on the RS-232 key/modem are for connecting to the phone line. Connect one of these two jacks to the telephone line.

IMPORTANT: The telephone line should be dedicated exclusively to the automatic meter reading system. Never connect to a phone line that has other modems or fax machines connected. If there are telephones connected to this phone line, the proprietor must be aware that all phones must be on "hook" in order for the modem to work. A dedicated telephone line is recommended for system reliability.

6.0 Serial Communications (Continued)

E. Using the RS-232 Key with an external modem

1. All IDRs should be connected to the RS-232 key as explained in the previous section about connecting IDRs to the RS-232 key.
2. DISCONNECT POWER TO THE RS-232 KEY. Remove the cover by removing the 2 screws from the bottom of the enclosure.
3. On the circuit board, locate jumpers J7 (MODEM) and J8 (ex-MODEM.) If these jumpers are set in the DIRECT position, you must move the jumpers so they are set in the MODEM position. Replace the cover and secure the enclosure.
4. Connect the RS-232 key to the external modem using the supplied 8-conductor flat modular cable.
5. Connect the 7 VAC adapter to the power input on the back of the RS-232 key and plug it into a 120 VAC outlet.

IMPORTANT: The modem should use a phone line that is dedicated exclusively to the AMR system. Do not use a phone line that is shared by another modem or fax machine.

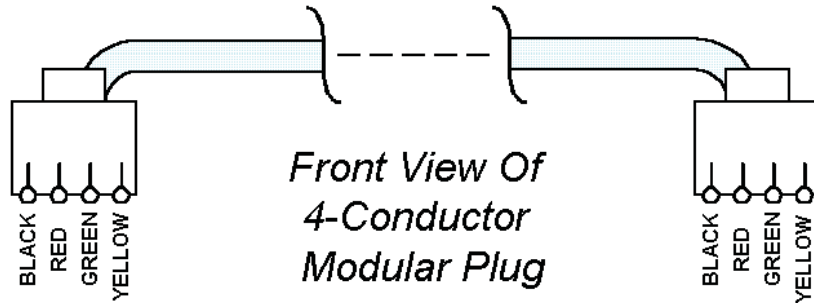
F. Baud Rate Selection

The communication baud rate is selected by means of a jumper on the circuit board (See appendix C for location.) There are three (3) selections: 19200, 9600 (factory default) and 2400.

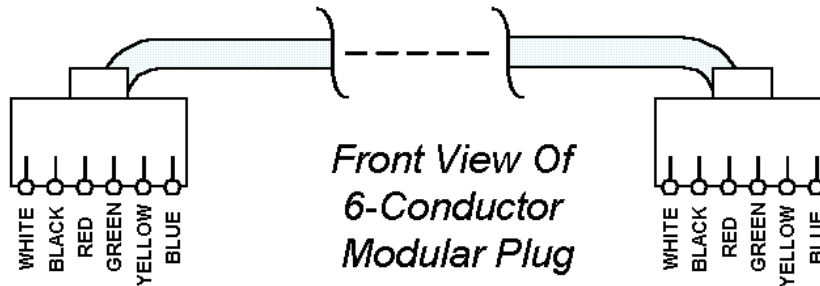
1. When using the IDR with a modem, the rate of 9600 should always be selected.
2. The baud rate on the IDR must always match the baud rate selected in the E-Mon Energy software. Communication will not work if they are not set correctly.
3. After a baud rate change, press CPU Reset (See Appendix C) to register the change in the IDR.
4. All IDRs in the “daisy chain” circuit must be set at the same baud rate.

Appendix A - Cable Configuration

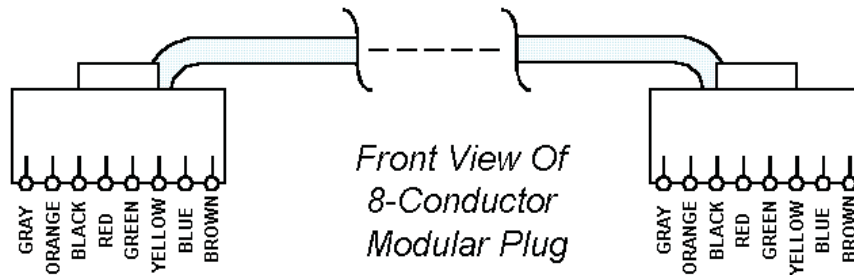
A. Four-Conductor Cables (IDR RS-485 Communication)



B. Six-Conductor Cables (Meters #2-#8, optional #9-#16)



C. Eight-Conductor Cables (Meter #1, RS-232 Key to Computer)



NOTE: All cables are wired pin-to-pin (straight through) as shown above.

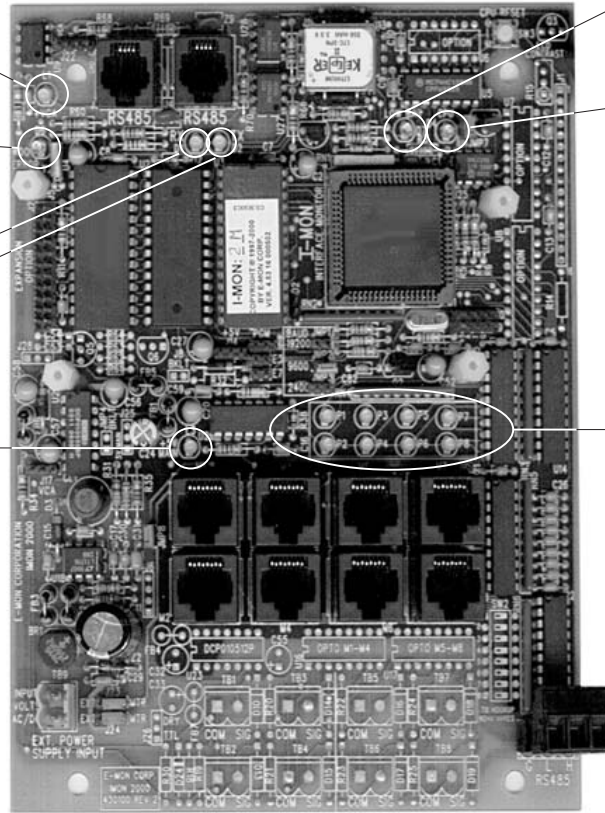
Appendix B - LED Indicators

L1-Green LED
Serial Communications
Power Supply
Always "ON"
(Indicates power supply is okay if LED is ON)

D6-Clear Red LED
System Error
Always "OFF" when system is operating normally

D1-Green LED
D2-Yellow LED
See Chapter 6
"Communications"

L3-Green LED
Main Power Indicator
Always "ON"



D7-Clear Red LED
Low Battery
MUST be "OFF"
(Indicates low battery when lit)

D4-Red LED
CPU Status
Flashes once per second

P1-P8-Yellow LED
Meter Pulse Indicators
(Indicates input pulses being received from meters)

Appendix C - IDR Circuit Board Components

J3-J4-RS-485 Communications Jacks

See Chapter 6 "Communications"
(Ports used to connect one IDR
to another IDR or Key)

Battery

CPU Reset Button

Baud Rate Selection

See Chapter 6-D
"Communications"
(Selects communication
baud rate ALWAYS set at
9600 BPS when modem
is present)

JMP-8-Meter Power Selection

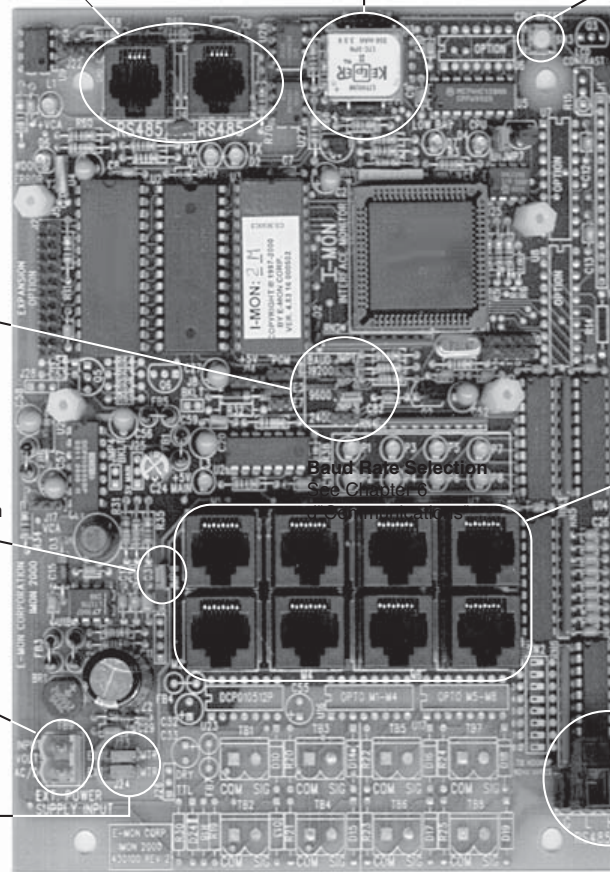
See Chapters 4 & 5
(Selects external power, or
powered from Meter #1)

TB9-External Power Input

See Section 5
(Connects external
power supply adapter)

J23 & J24-Input Power Selection

See Section 4 & 5



Baud Rate Selection

See Chapter 6

M1-M8-Meter Inputs

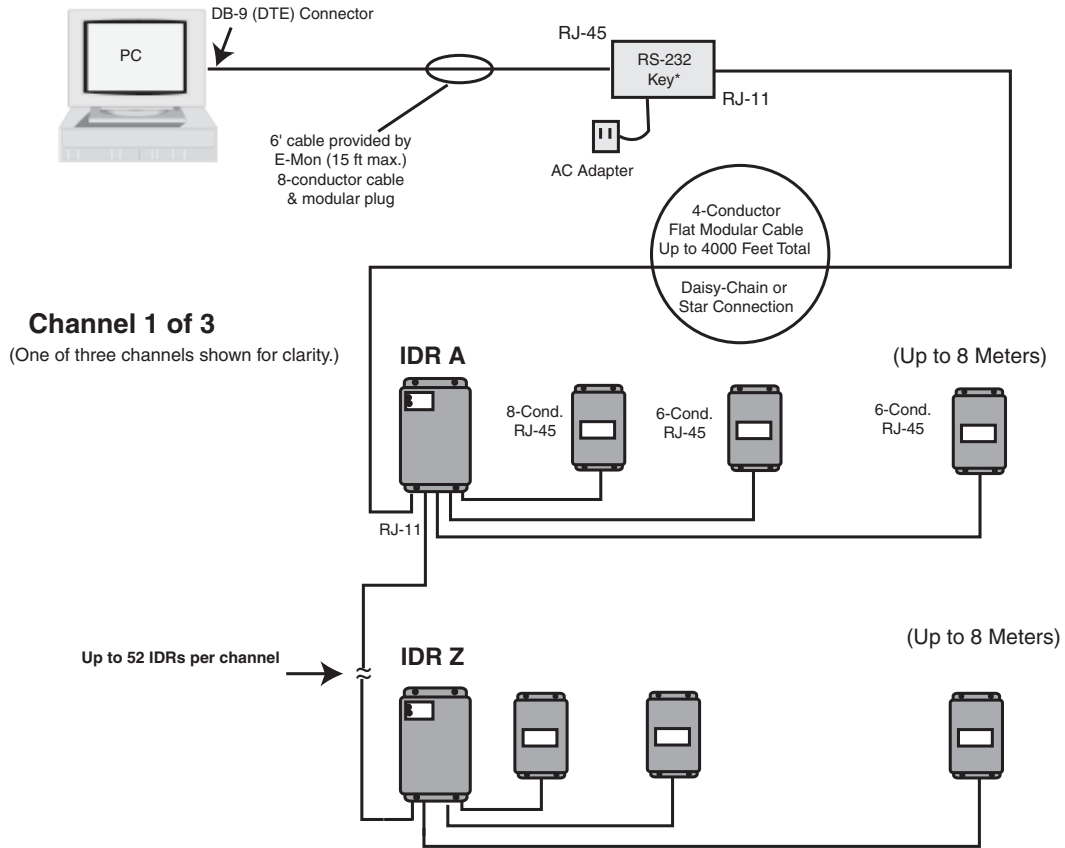
(Ports used to connect
meters to IDR)

J20-RS485

Communications
See Section 6

Appendix D - System Wiring Guides

Wiring Guide for IDR-8



CONNECTION	CABLE TYPE	CONNECTOR
IDR to E-Mon D-Mon® Meter #1	8-cond. 22-26 AWG flat modular cable	RJ-45
IDR to E-Mon D-Mon Meters #2-8	6-cond. 22-26 AWG (Pins 1 & 8 not used)	RJ-45
IDR to IDR	4-cond. 26 AWG	RJ-11
IDR to RS-232 Key 2000	4-cond. 26 AWG	RJ-11
RS-232 Key 2000 to Computer**	8-cond. 22-26 AWG flat modular cable	RJ-45/DTE
RS-232 Key 2000 to Modem **	8-cond. 22-26 AWG flat modular cable	RJ-45
IDR to Pulse Meter	2-cond. 14-22 AWG	

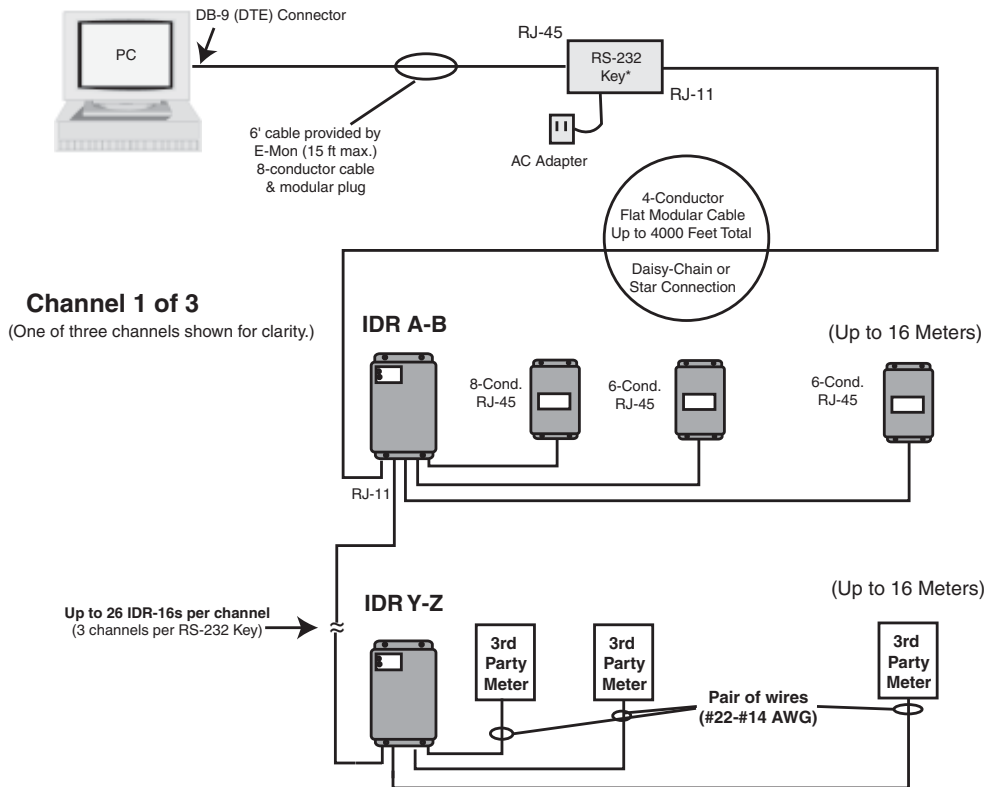
**** Supplied by E-Mon**
Note: Interior interconnecting communications are supplied with the pre-wired MMU-type metering cabinets.
Note: When constructing field-installed cables, modular cables must be made so that the individual wires go through on the same pin number.

* Contact E-Mon for USB-only connection.

Note: Meter 1 must be installed within 100 feet of IDR. Meters 2-8 must be installed within 500 feet of IDR.

Appendix D - System Wiring Guides

Wiring Guide for IDR-16



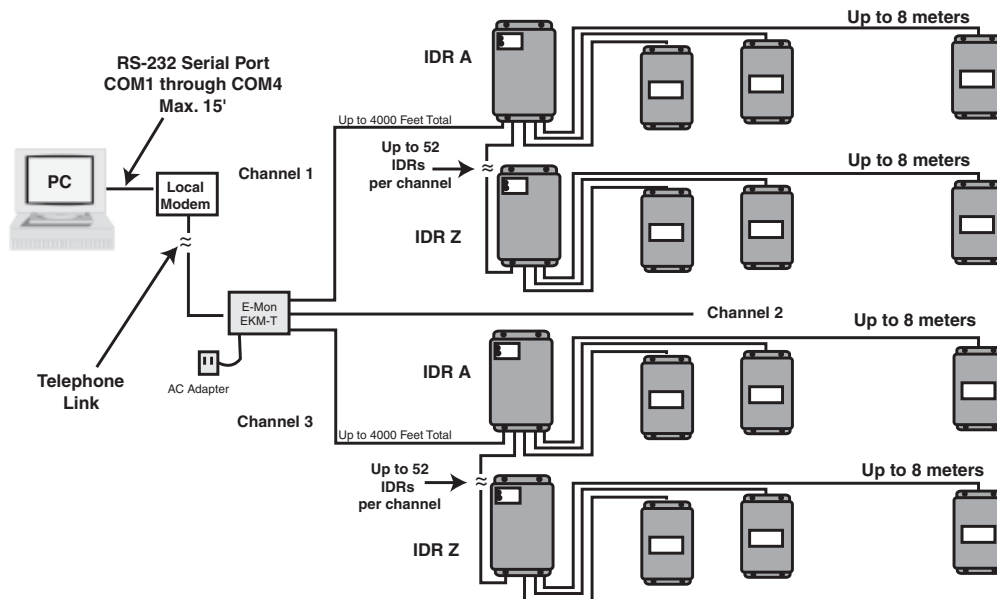
CONNECTION	CABLETYPE	CONNECTOR
IDR to E-Mon D-Mon® Meter #1	8-cond. 22-26 AWG flat modular cable	RJ-45
IDR to E-Mon D-Mon Meters #2-16	6-cond. 22-26 AWG (Pins 1 & 8 not used)	RJ-45
IDR to IDR	4-cond. 26 AWG	RJ-11
IDR to RS-232 Key 2000	4-cond. 26 AWG	RJ-11
RS-232 Key 2000 to Computer**	8-cond. 22-26 AWG flat modular cable	RJ-45/DTE
RS-232 Key 2000 to Modem **	8-cond. 22-26 AWG flat modular cable	RJ-45
IDR to Pulse Meter	2-cond. 14-22 AWG	

** Supplied by E-Mon
Note: Interior interconnecting communications are supplied with the pre-wired MMU-type metering cabinets.
Note: When constructing field-installed cables, modular cables must be made so that the individual wires go through on the same pin number.
 * Contact E-Mon for USB-only connection.

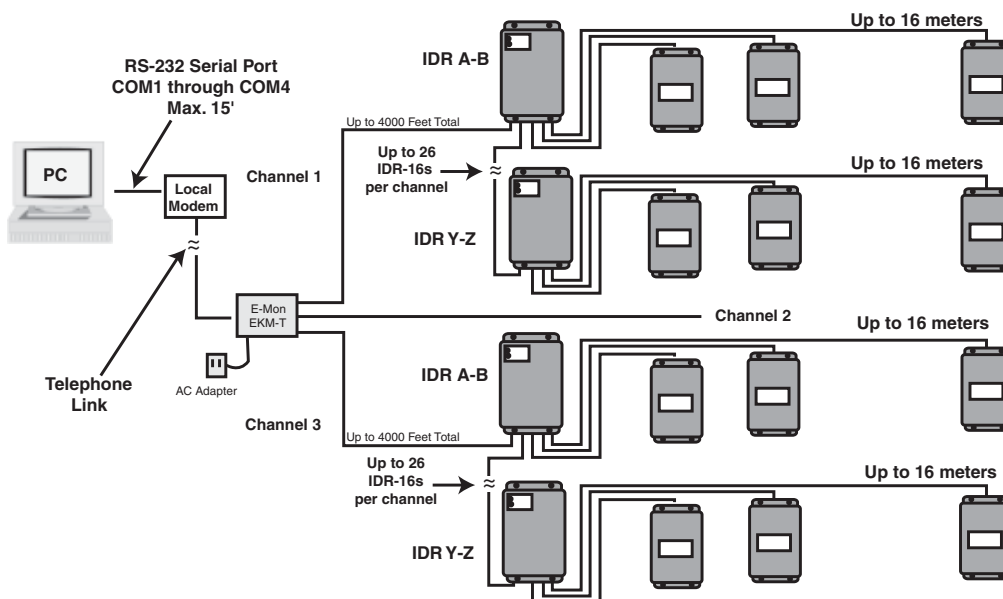
Note: Meter 1 must be installed within 100 feet of IDR. Meters 2-8 must be installed within 500 feet of IDR.

Appendix E - Modem System Configuration Diagrams

IDR-8, Using E-Mon D-Mon® Meters:



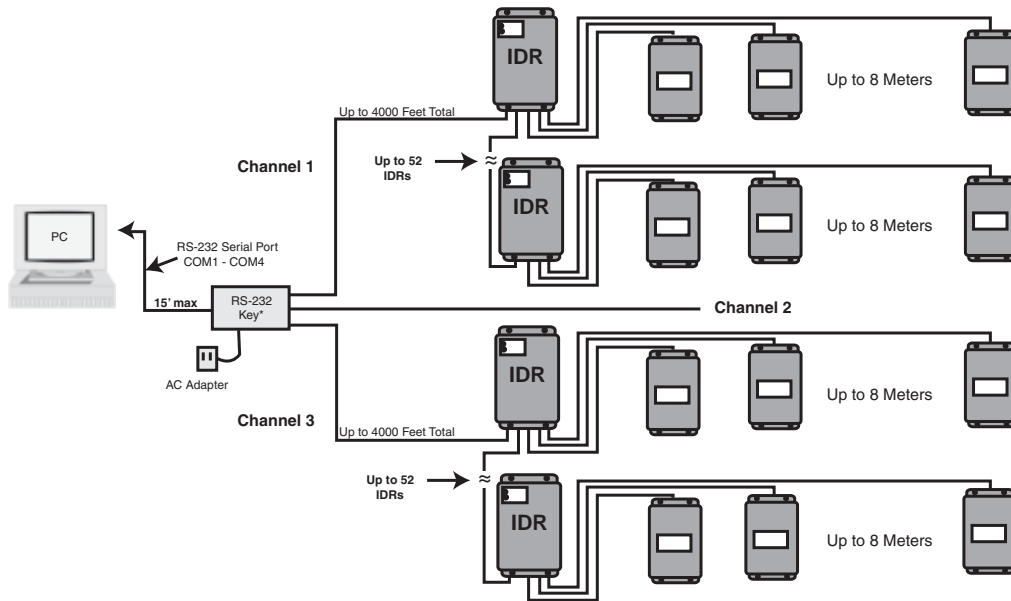
IDR-16, Using E-Mon D-Mon Meters:



NOTE: Meter 1 must be installed within 100 feet of IDR.
Meters 2-8 (or 2-16) must be installed within 500 feet of IDR.
Meter 1 uses 8-conductor cable.
Meters 2-8 (or 2-16) use 6-conductor cable.

Appendix F - Hardwired System Configuration Diagrams

IDR-8, Using E-Mon D-Mon[®] Meters:

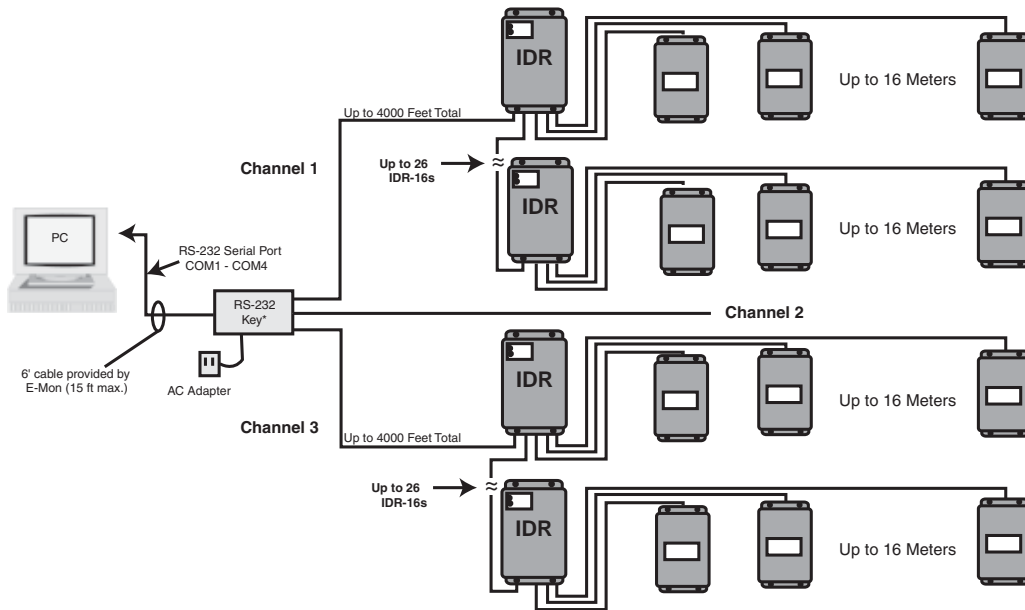


NOTE: Meter #1 must be installed within 100 feet of IDR.
Meters #2-16 must be installed within 500 feet of IDR.

Meter #1 uses 8-conductor cable.
Meters #2-16 use 6-conductor cable.

Appendix F - Hardwired System Configuration Diagrams

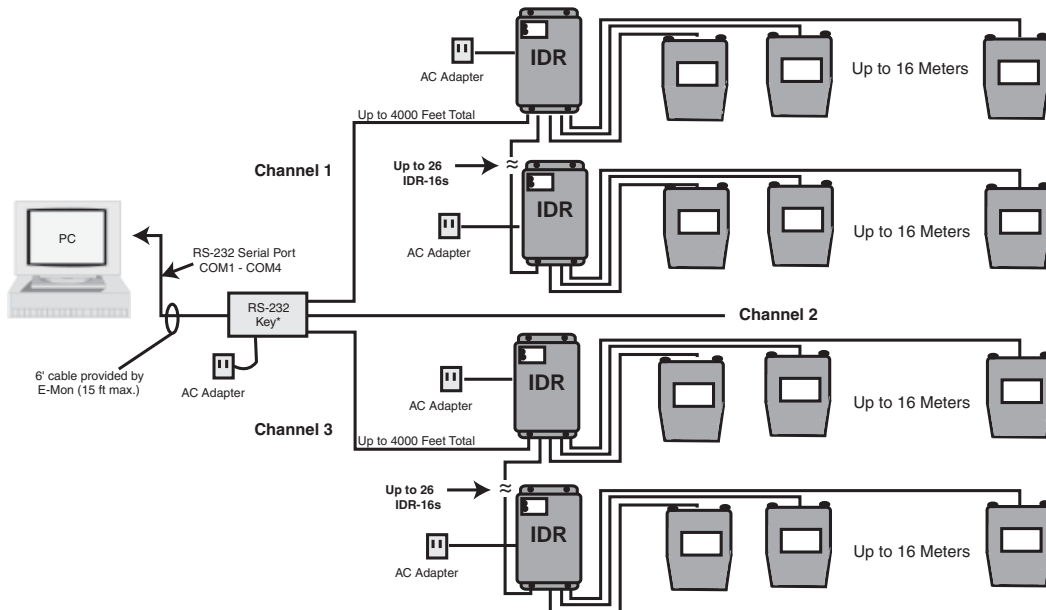
IDR-16, Using E-Mon D-Mon® Meters



NOTE: Meter #1 must be installed within 100 feet of IDR.
Meters #2-#16 must be installed within 500 feet of IDR.

Meter #1 uses 8-conductor cable.
Meters #2-16 use 6-conductor cable.

IDR-16, Using Other Utility-Type Meters (Gas, Water, Etc.)



NOTE: Meters must be installed within 500 feet of IDR.
Meter connected with a pair of #22-#14 AWG conductors.

Appendix G - IDR Technical Specifications

Enclosure:	Lockable steel JIC box NEMA 12
Dimensions:	9.5" H x 6.75" W x 3.875" D
Knockouts:	Three (3) on bottom of enclosure (3/4" Cond.)
Power Supply:	Powered by E-Mon D-Mon meter or optional 120 VAC adapter.
Back Up:	Lithium Power Cell LTC-3PN (10 year lifetime)
LED Indicators:	Input pulse, CPU operation, alarm, power, communication
Inputs:	IDR-8: Eight (8) eight-pin modular ports or Eight (8) 2-screw plug-in terminals IDR-16: Sixteen (16) eight-pin modular ports or Sixteen (16) 2-screw plug-in terminals or Eight (8) eight-pin modular ports and eight (8) 2-screw plug-in terminals
Max Pulse Input:	<600 pulses per minute (50% duty cycle)
Data Storage:	12 days @ 5-minute sampling intervals 36 days @ 15-minute sampling intervals
Interface with:	E-Mon D-Mon submeters, Electric utility meters, third-party submeters, gas meters, water meters, BTU meters and any meter equipped with a contact pulse output (using available 2-screw terminals.)
Power Consumption:	2 watts maximum, 1.2 watts typical
Processor:	8-bit; 14 MHz main clock
Real-Time Clock:	100-year clock/calendar Automatically makes changes to standard/daylight savings time.
Communications:	Serial, RS-485, 3-wire. Optically isolated from all other circuits. 9600 bps standard; provisions for 19200 or 2400 bps.

Appendix H Meter Limited Warranty

Subject to the exclusions listed below, E-Mon will either repair or replace (at its option) any product that it manufactures and which contains a defect in material or workmanship.

The following exclusions apply:

1. This Limited Warranty is only effective for a period of (18) eighteen months following the date of manufacture when installed in accordance with manufacturer's instructions by qualified personnel.
2. E-Mon must be notified of the defect within ninety (90) days after the defect becomes apparent or known.
3. Buyer's remedies shall be limited to repair or replacement of the product or component which failed to conform to E-mon's express warranty set forth above.
4. Buyer shall be responsible for all freight costs and shall bear all risk of loss or damage to returned goods while in transit.
5. This Limited Warranty does not cover installation, removal, reinstallation, or labor costs, and excludes normal wear and tear. Buyer shall provide labor for the removal of the defective component or item and installation of its replacement at no charge to E-Mon.
6. This Limited Warranty does not cover any product if: (i) a product is altered or modified from its original manufactured condition, (ii) any repairs, alterations or other work has been performed by Buyer or others on such item, other than work performed with E-Mon's authorization and according to its approved procedures; (iii) the alleged defect is a result of abuse, misuse, improper maintenance, improper installation, accident or the negligence of any party; (iv) damaged as a result of events beyond E-Mon's control or other force majeure events or (v) used in conjunction with equipment, components, accessories, parts or materials not supplied or approved by E-Mon.
7. This Limited Warranty is limited to the obligation to repair or replace the manufactured product. This is the sole and exclusive remedy for any breach of warranty. IN NO EVENT SHALL E-MON BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES (INCLUDING ANY DAMAGE FOR LOST PROFITS) ARISING OUT OF OR IN CONNECTION WITH THE FURNISHING OF PRODUCTS, PARTS OR SERVICES, OR THE PERFORMANCE, USE OF, OR INABILITY TO USE ANY PRODUCTS, PARTS OR SERVICES, SALE OF OR OTHERWISE, WHETHER BASED IN CONTRACT, WARRANTY, TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, OR ANY OTHER LEGAL OR EQUITABLE THEORY.
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