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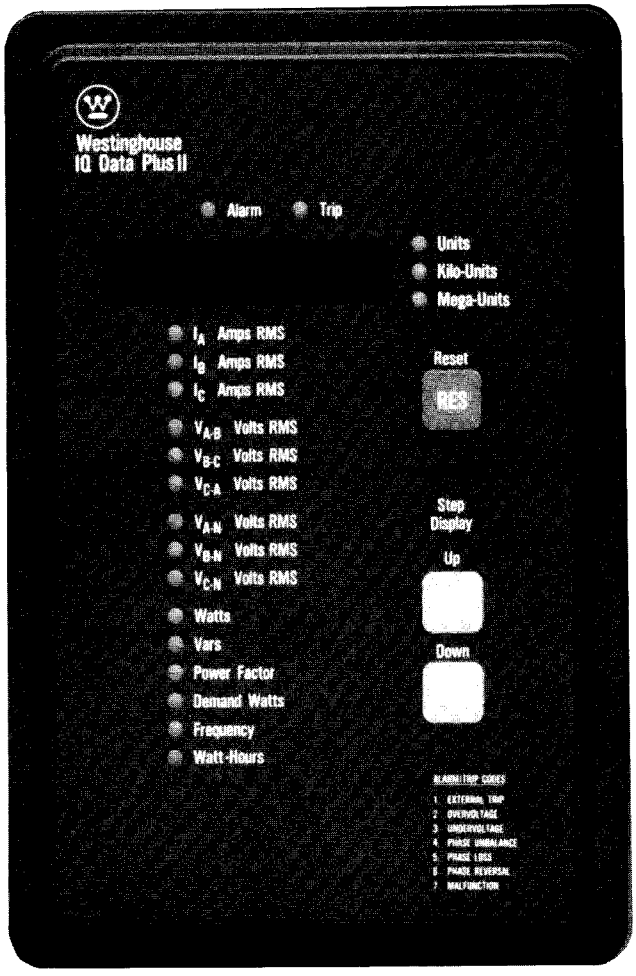
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IQ DATA PLUS II™

LINE METERING AND PROTECTION SYSTEM USER'S MANUAL



Westinghouse

Effective September, 1989

ELECTRICAL COMPONENTS DIVISION

NOTE

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

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QUICK LIST FOR IQ DATA PLUS II INSTALLATION

It is suggested that you thoroughly familiarize yourself with the IQ DATA PLUS II User's Manual before attempting installation. This list should be used to assist you.

1. The first thing to check on the IQ DATA PLUS II is that the voltage selector jumper is shorting at the correct level. **Each product is shipped from the factory at 120 volts.**

2. Using the technical manual, Sections 4.3 and 6, set the DIP switches on the back of the IQ DATA PLUS II at the desired values (CT ratio, PT ratio, nominal line voltage, protection settings).

3. Connect the power leads to the voltage inputs of the IQ DATA PLUS II – directly from the line if 600 volts or below, from PT's for up to 14.4 kV. Be sure to take special care of the phasing of the voltage. (The IQ DATA PLUS II looks for an A-B-C sequence.) The IQ DATA PLUS II is extremely phase sensitive – errant readings could occur in the power calculations if the phasing is wrong.

4. Connect CT inputs to the CT terminals of the IQ DATA PLUS II. Again be extremely careful to connect the inputs correctly and to line up the phases with the voltage. (The product could read voltage and current correctly, but read watts, vars, PF, and watthours incorrectly if the CT inputs are reversed or if the current phase does not match with the voltage phase.)

5. If installing an IQ DATA PLUS II equipped with a 3-phase power module, be sure that the voltage jumper is in the correct position. Power up the unit. If the unit does not power up or if one or more phases are reading the incorrect voltage, check the fuses located just above the voltage inputs inside the cover of the power module. The fuses should sit comfortably in their clips. Possible problems are blown fuses or fuses that have shaken loose in transit.

5. If installing an IQ DATA PLUS II with a 120/240 VAC Separate Source Power Supply Module, adjust the user-supplied jumpers to operate with at the voltage level that you are using. (See Paragraph 2.1.2, item 3, page 9.) After the DIP switch settings have been verified, apply 120/240 VAC control power to the unit at terminals 1 and 4. Power up the unit. If the unit does not power up, check the wiring diagram to ensure proper connections. If one or more phases are reading the incorrect voltage, check the fuses located just above the voltage inputs inside the cover. The fuses should sit comfortably in their clips. Possible problems are blown fuses or fuses that have shaken loose in transit.

6. If you think a problem exists, check the voltage and current readings with hand-held meters. If they are correct, the unit should be operating correctly. If an LED is not functioning, return the device to the factory for repairs. If a fuse is burned out, replace it with Buss Type KTK-R-3/4 or equivalent.

IMPORTANT

Areas in this manual shaded in gray ( ) pertain only to those units which operate with the optional 120/240 VAC Separate Source Power Supply Module (style number 2D78522G02). If your unit does not have this option, please skip these shaded areas.

Shaded area designates information that replaces or supplements applications using the 120/240 VAC Separate Source Power Supply Module.

Section 1

INTRODUCTION

1.0 General — The IQ Data Plus II™ is a microprocessor-based, self-contained, door-mounted device designed to both monitor and display electrical parameters as well as to protect industrial equipment connected to the line. (See Figure 1.1)
The electrical parameters it meters are:

- AC line current (each phase)
- AC line to line voltage (all three)
- AC line to neutral voltage (four-wire systems — all three)
- Watts
- Vars
- Power Factor
- Peak Demand
- Frequency
- Watt-hours

It monitors the AC line feeding a specific load or loads to detect conditions which exceed user-chosen electrical parameters. It may protect the loads against such conditions as:

- Phase Loss
- Phase Unbalance
- Phase Reversal
- Undervoltage
- Overvoltage



Figure 1.1 — IQ Data Plus II

Voltage may be directly monitored on 3-phase AC lines within a range of 120 to 600 VAC nominal without external potential transformers and within a range above 600 VAC to 14.4KV with external potential transformers.

Current monitoring is through external current transformers with ratios between 100/5 to 5000/5.

Typical applications for the IQ Data Plus II are:

- Incoming 3-phase AC lines
- Transformer feeder circuits
- Branch circuits
- Motor starters
- 3-phase electrical loads

A listing of the 15 monitored items appears on the unit's faceplate, as shown in Figure 3.1 on page 12.

The unit will auto-range all monitored values displayed on the screen by means of a floating decimal point and UNITS, KILO, and MEGA LED's on the device's faceplate. See Figure 3.1.

The program directing the monitoring function is permanently stored in the IQ Data Plus II, and so there is no need to reload programs after an AC power loss. Threshold setpoints, chosen by the user, are also retained throughout a power loss by means of DIP switch settings.

The non-volatile memory of the IQ Data Plus II will not only maintain programmed setpoints, it will save a "snapshot" of all metered values just before a trip condition. These values can be stepped through and recorded before resetting the unit to aid in troubleshooting the system.

The unit's monitoring and protective functions are preprogrammed in the form of software supplied as standard and resident in the IQ Data Plus II microprocessor. A complete listing of the monitored values is given in Table 3.A on page 13.

The Operator Panel, which makes up the unit's front face, supports a Display Window which visually indicates the actual value of the metered item selected for display. The Display Window is also used to visually indicate the cause of a detected trip signal. A self-diagnostic check program also initiates a malfunction display should the IQ Data Plus II detect an internal malfunction.

The unit's primary function is to monitor and display electrical parameters that are required or desired by an operator.

The unit's secondary function is to monitor a 3-phase AC line and, if the tolerances are exceeded, a protective function will enable an internal Alarm and/or Trip Relay. Contacts from these relays may be used to alert personnel, to turn off the

load device, or to do both.

In instances where a particular protective item is not necessary for the application, it can be disabled, although it remains passively resident should it be required later.

The IQ Data Plus II is available in two models. One style (2D78522G01) comes equipped with a three-phase Voltage Power Module. Power for this unit is derived from the line being monitored. The second style (2D78522G02) is packaged with a 120/240 VAC Separate Source Power Supply Module. This model of the IQ Data Plus II requires 120 or 240 VAC control power.

Since the IQ Data Plus II has only two models and very few external options, individualizing for an application is performed in the field by the user/OEM. Users choose and enter the specifications for the individual setpoints by setting a series of DIP switches. No specialized programming language is necessary.

1.1 Features and Options — A list of features and benefits is given in Table 1.A (page 6). Since the IQ Data Plus II is a standardized package, there are very few external options. The options are:

- A 36-inch Extension Cable (style number 7871A40G02) which allows removal of the Three Phase Power Module or Separate Source Power Supply Module from the chassis for separate mounting
- A Communications Module (PONI Card) See IL 17158A
- A 120/240 VAC Separate Source Power Supply Module (style number 2D78508G01)

The IQ Data Plus II is capable of carrying on external data exchanges with a computer by means of a Communication Module. Electrical operating data supplied over a two-wire communication link will support plant energy management systems. This module can be added at any time. A list of communications configurations is given in Table 1.B (page 6).

1.2 Required External Hardware — In all instances, it is recommended that the IQ Data Plus II use 3 user-supplied external current transformers, with 5 amp secondaries in order to carry out metering functions involving current. In retrofit cases where only 2 current transformers are provided, see the sample wiring diagrams in Figures 4.4C, 4.4D, 4.4I and 4.4J.

NOTE: A 2 CT arrangement will work, but will not detect a current phase loss on L2.

The CT's may be chosen from a wide range of ratios, as is indicated in Table 6.B.

For applications in which the monitored AC line is 600 VAC, or less, **no external potential transformers are required.** In those cases where the monitored AC supply line exceeds 600 VAC, user-supplied potential transformers are required to step down the voltage to match the maximum allowable voltage permitted by the unit. See Tables 6.I and 6.L for the voltage ranges the IQ Data Plus II can monitor.

1.3 Use of Manual — This manual is designed for use during installation and troubleshooting and, if necessary, unit replacement. It also has information of specific importance for the user's application engineer who is planning the overall system and who is determining the setpoint values for a specific IQ Data Plus II application.

The manual is broad enough in scope to form the basis of new employee familiarization, refresher training sessions, and on-going maintenance.

It is strongly advised that the application engineer carefully read Sections 2 thru 6 before producing the application's wiring plan drawings and filling out the Setpoint Record Sheet. Installation teams should carefully read all of Section 4 **before** starting final installation. Maintenance personnel should be familiar with Section 7 before attempting to service the IQ Data Plus II.

1.4 Level of Repair — This manual is written with the assumption that only unit-level troubleshooting will be performed. If the cause of malfunction is traced to an IQ Data Plus II, the unit should be replaced with a spare. The malfunctioning unit should then be returned to Westinghouse for factory repairs.

Table 1.A

IQ DATA PLUS II FEATURES AND BENEFITS

Feature	Benefit
• Microprocessor-based control	• Reliable service without the need for numerous external measuring instruments
• All 15 values metered available in each IQ Data Plus II	• Allows for widespread standardization of units regardless of specific metering and control application requirements
• Undesired values/functions may be disabled	• No extra cost for unused features • In-field removal/activation of protection functions
• Only two models – both monitor over a wide range of 3-phase AC line voltages	• Low inventory of spares possible • Quick, inexpensive interchangeability during maintenance
• Nonvolatile memory	• In many cases eliminates external potential transformers • No lost programs or special backup batteries • Setpoints and current values retained on trip/alarm or power loss
• Simplified setpoint entry • Simplified Operator Panel	• No special language to be learned • No elaborate, complex keyboard or confusing, multi-function readings
• Large 6-digit Display Window	• Easy-to-read values and clear indication of cause of trip/alarm conditions
• Ease of startup	• Quick assembly and installation • Simple setpoint entry
• Separate auxiliary trip and alarm relay contacts	• Allow control of external devices or loads when setpoint thresholds are exceeded

Table 1.B

COMMUNICATION ARRANGEMENTS

Feature	Benefit
• Communication to an IBM PC (or clone) personal computer. This computer acts as the master and can also be used as the interface to other microprocessor-based devices.	• A Local Area Network, Westinghouse INCOM, is formed by 2 or more IQ Data Plus IIs connecting to a personal computer via a shared twisted pair of wires. The personal computer acts as a master. In this arrangement the PONI Communication Module is mounted on each IQ Data Plus II. A CONI Communication Card is used in an expansion slot of the personal computer. A standardized software package is available for data collection and storage.
• Communications via RS232C to other microprocessor-based products or phone modems.	• Using INCOM, 2 or more IQ Data Plus IIs (or other IQ products), each with a PONI Communication Module, can be connected to the two wire network to transmit data to a single Translator Module. This module converts INCOM formatted messages to RS232C for use with other RS232C compatible devices. No software is provided in this case.

Section 2

HARDWARE DESCRIPTION

2.0 General — The purpose of this Section is to familiarize the reader with the IQ Data Plus II hardware, its nomenclature, and to list the specifications of the unit.

2.1 Hardware Description — The IQ Data Plus II is designed to be mounted through a cutout in a panel. (This will generally be a cabinet's face or door.)

The description here is divided into the following:

- Operator Panel (Par. 2.1.1)
- Rear access area (Par. 2.1.2)
- External hardware (Par. 2.1.3)

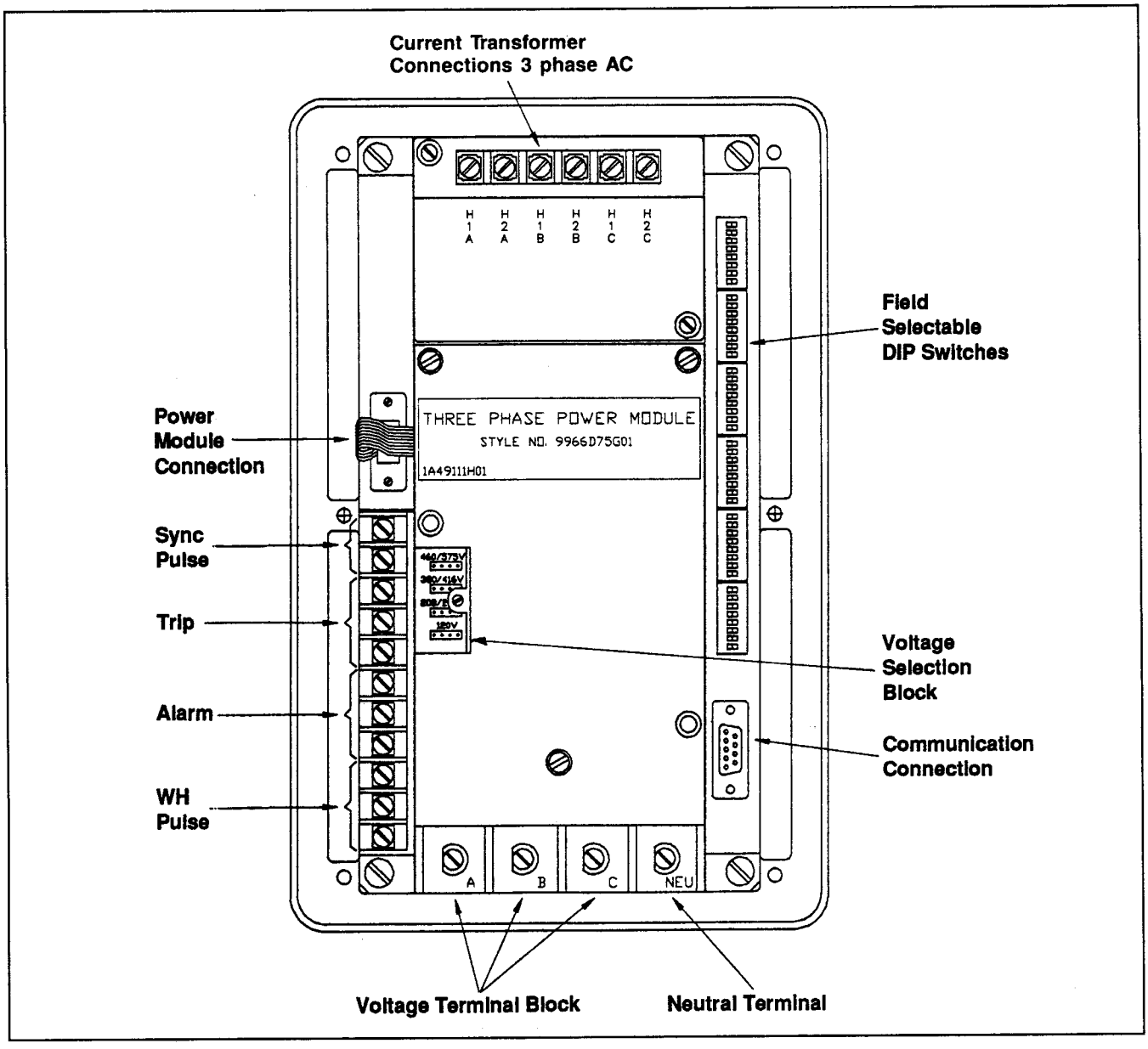


Figure 2.1A — Rear Access Area

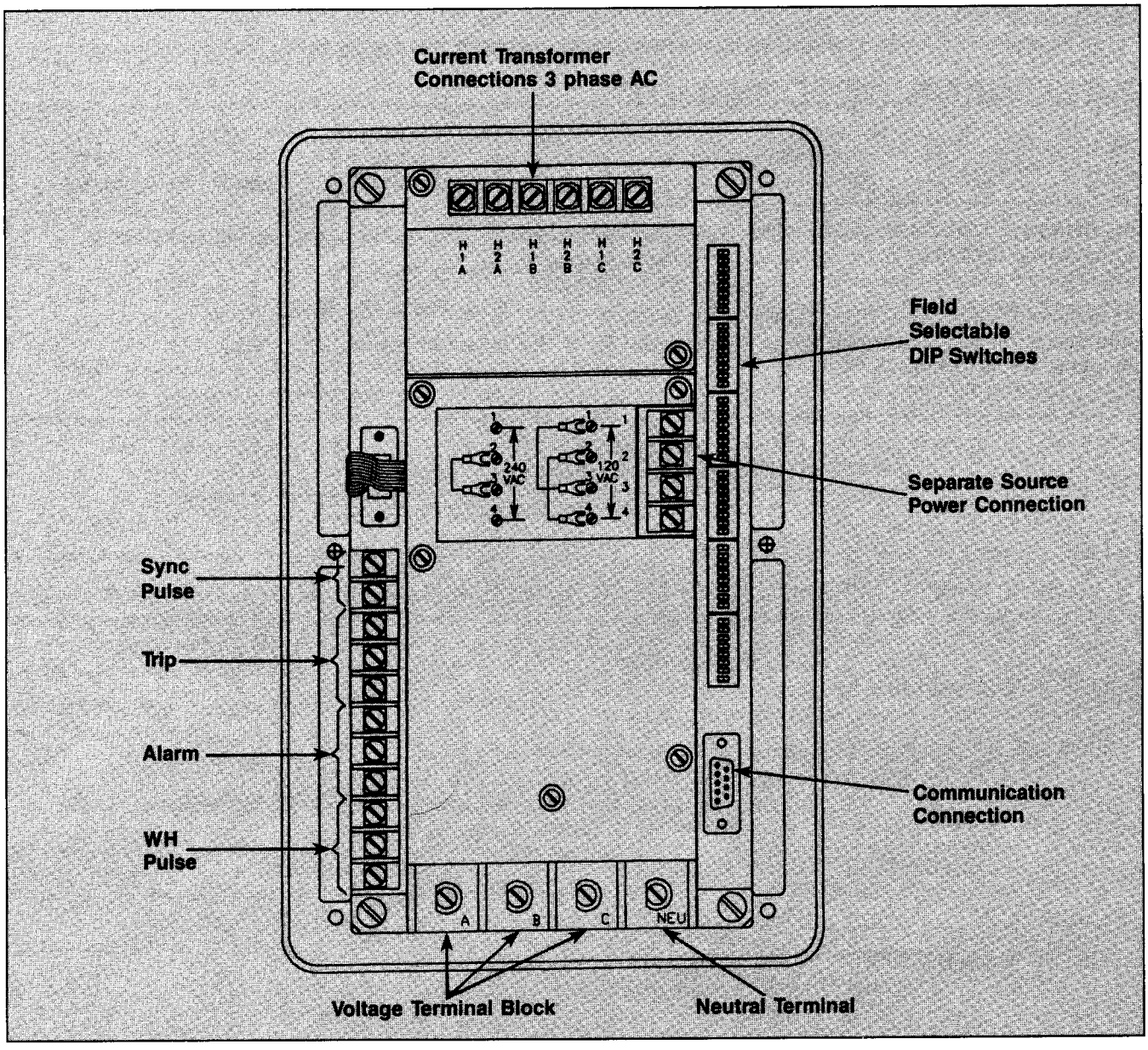


Figure 2.1B — Rear Access Area — Separate Source Power Module

2.1.1 Operator Panel — The Operator Panel, which is normally accessible from the outside of the panel or door, provides a means to:

- Monitor the actual metered values on the Display Window. (See Figure 3.1)
- Determine which metered value is being displayed by means of an illuminated LED located at the left of the monitor menu
- Step through the menu of metered items and actual values
- Determine that a trip or alarm condition exists by means of 2 distinct LEDs
- Determine the cause of a trip or alarm condition by means of a single-digit code shown in the Display Window. (The description of each code number is printed on the bottom of the Operator Panel.)
- Attempt to reset the unit after a trip or alarm condition has occurred by means of a Reset pushbutton

The use of the Operator Panel is detailed in Section 3.

2.1.2 Rear Access Area — The rear of the IQ Data Plus II is normally accessible from the rear of the panel's door. All wiring connections to the unit are made at the chassis' rear.

Study Figure 2.1 and note the following items:

Shaded area designates information that replaces or supplements applications using the 120/240 VAC Separate Source Power Supply Module.

1. The 3-phase AC line connections connect to the Voltage Terminal Block at the bottom of the IQ Data Plus II.
2. If using a three-phase power module, the Voltage Selector Jumper, essentially a shorting bar, must be positioned by the user during installation to match 1 of 4 operating voltage ranges. (Installation procedures, along with a listing of ranges, are given in Paragraph 4.1.4.) See Figure 2.1A.
3. The appropriate wiring configuration for 120 or 240 VAC operation is shown on the wiring label attached to the rear of the chassis. This is also shown in Figure 2.1B. For 120 VAC operation, jumpers must be installed from terminals 1 to 3 and 2 to 4. For 240 VAC operation, a jumper must be installed from terminals 2 to 3. The appropriate voltage should be applied across terminals 1 and 4. This will supply control power to the IQ Data Plus II independent of the AC line voltage being monitored. See Figure 2.1B.
4. Connections from the 3 required external current transformers are made at the Current Transformer Terminal Block located at the top of the chassis.
5. Connections with controlled, external devices, if used, are made at the Trip/Alarm Terminal Block.

   Trip and alarm relays energize on device power-up and de-energize on device power loss or trip condition. Terminal block label is in Trip/De-energized position. (These connections may be made at the NO or NC pairs (Form C) associated with the internal Trip and Alarm Relays.)
6. DIP switches, located on the rear right side of the chassis, tailor each IQ Data Plus II to a specific application. These DIP switches are set according to characteristics such as:
   - The external PT and CT ratios
   - The input voltage of the incoming AC line
   - Whether to trip on overvoltage or undervoltage conditions

   (A complete description of each DIP switch setting is listed in Section 6.)
7. The Power Module is factory-shipped mounted on the rear of the IQ Data Plus II chassis. However, this component may be detached from the chassis and moved up to 36 inches (91.44 cm) away if local codes prevent AC power devices being located on the cabinet door.
8. A fuse is located in series with each of the 3 incoming AC lines. The fuses are 3/4 Amp, 600 Volt, 200kA interrupting rating. These fuses are internal to the Power Module and can be accessed by removing the three screws holding the cover in place. (See Figures 2.1 and 2.3.) If it is necessary to replace fuses, make sure all voltage has been removed from the IQ Data Plus II before replacing the fuses.
9. A neutral Terminal is provided for 4-wire systems. (Where the monitored AC lines are a 3-wire configuration, this terminal is not to be wired.)
10. A Communication Port, located on the lower right of the

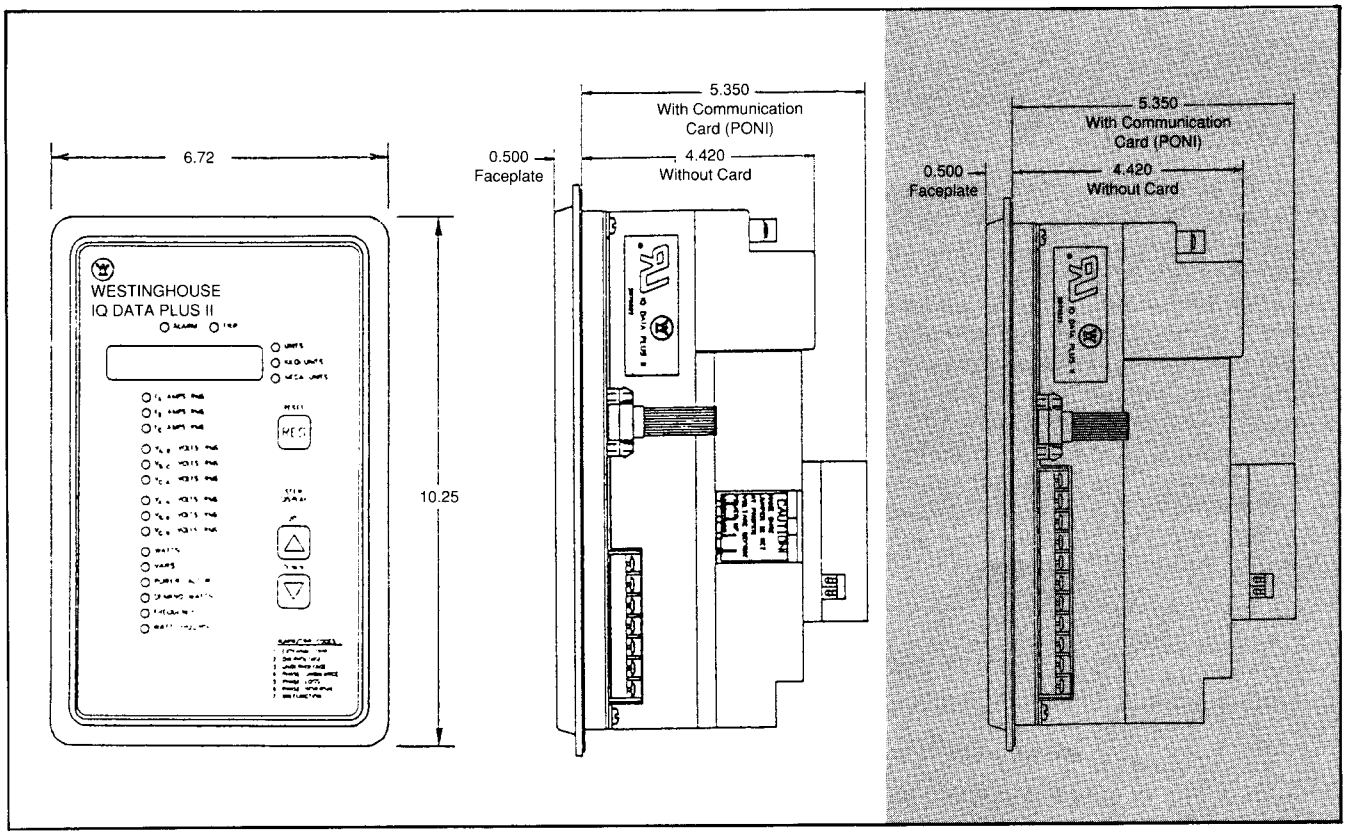


Figure 2.2 — Dimensions

Shaded area designates information that replaces or supplements applications using the 120/240 VAC Separate Source Power Supply Module.

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