



Instructions for Installation, Operation, and Maintenance of Cutler-Hammer IQ 200 Electrical Distribution System Meter



Table of Contents

SECTION 1: INTRODUCTION	1
1.1 PRELIMINARY COMMENTS AND SAFETY PRECAUTIONS	1
1.1.1 Warranty and Liability Information	1
1.1.2 Safety Precautions.....	1
1.1.3 Factory Correspondence.....	2
1.2 PRODUCT OVERVIEW	2
SECTION 2: HARDWARE DESCRIPTION.....	4
2.1 GENERAL	4
2.1.1 IQ 200 Display Module.....	4
2.1.2 IQ 200 Base Module	4
2.1.3 Installation.....	4
2.2 OPERATOR PANEL	5
2.3 BASE MODULE REAR ACCESS AREA	5
2.3.1 Current and Voltage Inputs	6
2.3.2 Power Supply Input.....	6
2.3.3 Local Display Connection.....	6
2.3.4 INCOM™ Communications	6
2.4 EXTERNAL HARDWARE.....	7
2.4.1 Current Transformers.....	7
2.4.2 Potential Transformers.....	7
2.4.3 External Fuses	7
2.5 PRODUCT SPECIFICATIONS	7
2.5.1 Regulatory/Standards Compliance	8
2.6 ORDERING INFORMATION	11
SECTION 3: INSTALLATION.....	12
3.1 INTRODUCTION	12
3.2 PANEL PREPARATION.....	12
3.2.1 Mounting the IQ 200 Modules as a Single Unit	13
3.2.2 Mounting the IQ 200 Display and Base Modules Separately..	13
3.3 WIRING.....	16
3.3.1 Wiring System Current and Voltage.....	16

3.3.2	Wiring Diagrams for Various System Configurations.....	16
3.3.3	INCOM™ Network Communications.....	22
3.3.4	KYZ Pulse Initiator	22
SECTION 4: OPERATION.....		25
4.1	GENERAL.....	25
4.2	BUTTONS.....	25
4.3	CONTRAST.....	26
4.4	DISPLAYED SIGN CONVENTIONS	26
4.5	USING THE OPERATOR PANEL	27
4.6	SYSTEM DATA DISPLAY MODE	28
4.6.1	3 Wire System and 4 Wire System.....	28
4.7	PHASE DATA DISPLAY MODE.....	28
4.7.1	3 Wire System.....	28
4.7.2	4 Wire System.....	29
4.8	MIN/MAX DATA DISPLAY MODE.....	29
4.8.1	3 Wire System.....	29
4.8.2	4 Wire System.....	30
4.9	VIEW SETPOINTS (3 and 4 wire systems).....	31
4.9.1	View All.....	31
4.9.2	Password Setup.....	31
4.9.3	INCOM™ Setup	32
4.9.4	System Frequency	32
4.9.5	Wiring Configuration.....	32
4.9.6	CT Ratio	33
4.9.7	PT Ratio	33
4.9.8	Demand Window.....	33
4.9.9	KYZ Setup	33
4.9.10	Exit.....	33
4.10	Edit Setpoints (3 and 4 wire systems).....	34
4.10.1	Edit All.....	34
4.10.2	Password Setup.....	34
4.10.3	INCOM™ Setup	35
4.10.4	System Frequency	36

4.10.5	Wiring Configuration	36
4.10.6	CT Ratio	36
4.10.7	PT Ratio	37
4.10.8	Demand Window	38
4.10.9	KYZ Setup	38
4.10.10	Exit	39
4.11	RESET VALUES	39
4.12	CONTRAST ADJUST	40
4.13	DIAGNOSTICS	40
4.14	EXIT MENU	40
SECTION 5: TROUBLESHOOTING AND MAINTENANCE		41
5.1	GENERAL	41
5.1.1	Level of Repair	41
5.1.2	Maintenance and Care	41
5.2	REMOVAL AND REPLACEMENT	41
5.2.1	General Safety Precautions	42
5.2.2	IQ 200 Display Module	42
5.2.3	IQ 200 Base Module	42
5.3	GENERAL TROUBLESHOOTING PROCEDURES	43
5.4	TECHNICAL ASSISTANCE	44
5.5	RETURN PROCEDURE	44

List of Figures

Figure 2.1	IQ 200 Display Module.....	4
Figure 2.2	IQ 200 Base Module	4
Figure 2.3	Operator Panel	5
Figure 2.4	Base Module (Rear Face View).....	5
Figure 3.1	Securing the IQ 200 Display Module.....	13
Figure 3.2	Mounting the IQ 200 Base Module to the IQ 200 Display Module.....	13
Figure 3.3	Typical Mounting Options for Mounting the IQ 200 Base Module.....	14
Figure 3.4	Mounting Hole Pattern for the IQ 200 Base Module.....	15
Figure 3.5	3 Phase 3 Wire Configuration (Up to 600 Volts)	17
Figure 3.6	3 Phase 3 Wire Configuration (Above 600 Volts).....	17
Figure 3.7	3 Phase 3 Wire, 2 CT Configuration (Up to 600 Volts).....	18
Figure: 3.8	3 Phase 3 Wire, 2CT Configuration (Above 600 Volts)	18
Figure: 3.9	3 Phase 4 Wire Configuration (Up to 600 Volts)	19
Figure 3.10	3 Phase 4 Wire Configuration (Above 600 Volts).....	19
Figure 3.11	3 Phase 3 Wire Configuration (Above 600 Volts) Line Powered ..	20
Figure 3.12	3 Phase 4 Wire Configuration (Up to 600 Volts) Line Powered ...	20
Figure 3.13	Single Phase 3 Wire Configuration (Up to 600 Volts).....	21
Figure 3.14	Single Phase 2 Wire Configuration (Up to 600 Volts).....	21
Figure 3.15	Securing INCOM™ Cable to Shroud.....	22
Figure 3.16	2-Terminal (K-Y) Configuration.....	24
Figure 3.17	3 Terminal (K-Y-Z) Configuration.....	24
Figure 4.1	System Power Values Relationships.....	27
Figure 4.2	Main Menu.....	27
Figure 4.3	System Display 3 and 4 Wire Systems.....	28
Figure 4.4	Phase Display 3 Wire Systems.....	29
Figure 4.5	Phase Display 4 Wire Systems.....	29
Figure 4.6	Min/Max Data Display, 3 Wire System	30
Figure 4.7	Min/Max Data Display, 4 Wire System	31
Figure 4.8	No Password Required	32
Figure 4.9	Password Required.....	32

Figure 4.10	INCOM™ Setup	32
Figure 4.11	System Frequency.....	32
Figure 4.12	Wiring Configuration	32
Figure 4.13	CT Ratio	33
Figure 4.14	PT Ratio.....	33
Figure 4.15	Demand Window	33
Figure 4.16	KYZ Setup	33
Figure 4.17	Password Entry	34
Figure 4.18	Password Setup	34
Figure 4.19	INCOM™ Setup	35
Figure 4.20	System Frequency.....	36
Figure 4.21	Wiring Configuration	36
Figure 4.22	CT Ratio	36
Figure 4.23	PT Ratio.....	37
Figure 4.24	Demand Window	38
Figure 4.25	KYZ Setup	38
Figure 4.26	Reset Values.....	39
Figure 4.27	Reset Energy	39
Figure 4.28	Reset Amps Min/Max	39
Figure 4.29	Contrast Adjust.....	40

List of Tables

Table 2.1 IQ 200 Safety Specifications 8
Table 2.2 IQ 200 Operating Specifications 9
Table 2.3 IQ 200 Metering Accuracy 10
Table 2.4 IQ 200 Measurement Ranges 10
Table 2.5 IQ 200 Physical Characteristics 11
Table 2.6 IQ 200 Ordering Information 11

Cutler-Hammer

IQ 200 Electrical Distribution System Meter

Installation, Operation, and Maintenance

SECTION 1: INTRODUCTION

1.1 PRELIMINARY COMMENTS AND SAFETY PRECAUTIONS

This Technical Document covers most aspects of installation, operation, and unit-level maintenance of the IQ 200. This document is a guide only for authorized and qualified personnel who select and use the IQ 200. Please refer to the specific WARNING and CAUTION in this section before proceeding. If you require further information regarding a particular installation, application, or maintenance activity, contact your Cutler-Hammer representative.

1.1.1 Warranty and Liability Information

No warranties, expressed or implied, including warranties of fitness for a particular purpose of merchantability, or warranties arising from course of dealing or usage of trade are made regarding this information, recommendations, and descriptions contained herein. In no event will Cutler-Hammer be responsible to the purchaser or user in contract, in tort (including negligence), strict liability, or otherwise for any special, indirect, incidental, or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information and descriptions contained herein.

1.1.2 Safety Precautions

All safety codes, safety standards, and/or regulations must be strictly observed in the installation, operation, and maintenance of this device.



WARNING

THE WARNINGS AND CAUTIONS INCLUDED AS PART OF THE PROCEDURAL STEPS IN THIS DOCUMENT ARE FOR PERSONNEL SAFETY AND PROTECTION OF EQUIPMENT FROM DAMAGE. AN EXAMPLE OF A TYPICAL WARNING LABEL IS SHOWN ABOVE IN REVERSE TYPE TO FAMILIARIZE PERSONNEL WITH THE STYLE OF PRESENTATION. THIS WILL HELP TO ENSURE THAT PERSONNEL ARE ALERT TO WARNINGS WHICH MAY APPEAR THROUGHOUT THE DOCUMENT. IN ADDITION, CAUTIONS ARE ALL UPPER CASE AND BOLDFACED AS SHOWN ON THE NEXT PAGE.



CAUTION

COMPLETELY READ AND UNDERSTAND THE MATERIAL PRESENTED IN THIS DOCUMENT BEFORE ATTEMPTING TO INSTALL, OPERATE OR USE THE EQUIPMENT. IN ADDITION, ONLY QUALIFIED PERSONS SHOULD BE PERMITTED TO PERFORM ANY WORK ASSOCIATED WITH THE EQUIPMENT. ANY WIRING INSTRUCTIONS PRESENTED IN THIS DOCUMENT MUST BE FOLLOWED PRECISELY. FAILURE TO DO SO COULD CAUSE PERMANENT EQUIPMENT DAMAGE.

1.1.3 Factory Correspondence

For additional information, technical assistance, or referral to a local authorized distributor, contact Power Management Application Support (PMAS) at 1-800-809-2772, option 1.

1.2 PRODUCT OVERVIEW

The IQ 200 is a microprocessor based monitoring device that provides single phase, 2 or 3 wire, and 3 phase, 3 or 4 wire electrical metering designed to replace numerous individual meters and recorders. It is compact, consisting of a panel-mounted Display Module and a Base Module that can be attached to the Display Module or mounted remotely. It communicates information over the Cutler-Hammer IMPACC network. The IQ 200 is password protected, menu driven, and displays a variety of user-selected electrical system values and provides control over certain measurement and data output functions. The IQ 200 Base Module communicates with the IQ 200 Display Module, providing access to view and reset system, phase, and min/max values, and providing for viewing and editing of setpoints.

The IQ 200 monitors system and phase values in the following typical system wiring configurations.

3 Phase 4 Wire	3 Phase 3 Wire	3 Phase 3 or 4 Wire	Single Phase 2 or 3 Wire
208Y/120VAC	240VAC	220/380VAC	120/240VAC
480Y/277VAC	480VAC	230/400VAC	
600Y/347VAC	600VAC	240/415VAC	

The IQ200 displays the following values:

Values Displayed		
System	Each Phase	Minimum/Maximum
Power	Current	Currents
Frequency	Current Demand	Line to Line Voltages
Apparent Power Factor	Current Peak Demand	Line to Neutral Voltages
Displacement Power Factor	Line to Line Voltage	System Power (W, vars, VA)
Watt Hours	Line to Neutral Voltage	System Frequency
var Hours	Watts	System Apparent Power Factor
VA Hours	vars	System Displacement Power Factor
Demand (W, var, VA)	VA	
Peak Demand (W, var, VA)	Apparent Power Factor	
	Displacement Power Factor	

The IQ 200 provides the following data outputs:

- INCOM™ communications to provide information to the network master device (see *section 4.9.3 and 4.10.3* for details)
- KYZ Pulse Output proportional to the energy consumed by the system being monitored (see *section 4.9.9 and 4.10.9* for details)

SECTION 2: HARDWARE DESCRIPTION

2.1 GENERAL

This section describes the IQ 200 hardware, its functions and nomenclature, and lists the IQ 200 specifications. The IQ 200 consists of two components, the Display Module, figure 2.1, and the Base Module, figure 2.2. Do not attempt to disassemble or open the case of either the IQ 200 Display Module or the IQ 200 Base Module. The units contain no user-serviceable components.

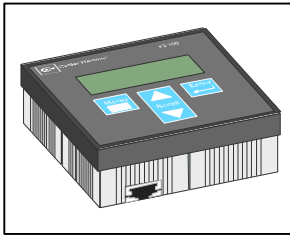


Figure 2.1 IQ 200 Display Module

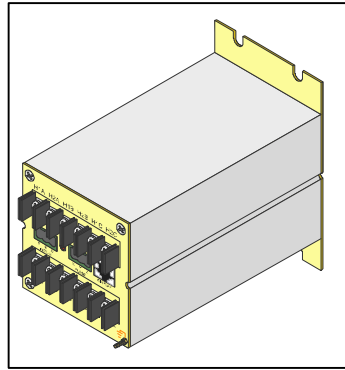


Figure 2.2 IQ 200 Base Module

2.1.1 IQ 200 Display Module

The Display Module screen presents system values and functions. The *Menu*, *up/down Scroll*, and *Enter* buttons allow the operator to view, change, and reset system parameters. The port for connecting to the IQ 200 Base Module is located on the bottom side of the IQ 200 Display Module.

2.1.2 IQ 200 Base Module

The IQ 200 Base Module measures system values and provides metering data. Current and voltage input terminals, power supply terminals, the display port, the KYZ pulse initiator port, the INCOM™ communications port, and an INCOM™ transmit indicator LED are all located on the rear face of the IQ 200 Base Module.

2.1.3 Installation

The IQ 200 is usually mounted inside an environmentally suitable electrical switch-gear enclosure. The IQ 200 Display Unit and the IQ 200 Base Module can be mounted together or separately in a variety of ways, described fully in *SECTION 3: INSTALLATION*.

2.2 OPERATOR PANEL

The Operator Panel is the front face of the IQ 200 Display Module. It is usually installed so that it is visible and accessible from the outside of the panel or door into which it is mounted.

The *Menu*, *up/down Scroll*, and *Enter* buttons allow the operator to view, change, and reset various system parameters:



Figure 2.3 Operator Panel

- Display measured system, phase, and min/max values
- View and edit all or individual setpoints
 - Password
 - INCOM™ network address and baud rate
 - System frequency
 - Wiring configuration
 - CT and PT ratios
 - Demand window
 - Energy tracking (KYZ pulse output)
- View and reset energy, peak demands, and all or individual minimum and maximum values.
- Change the display contrast for best viewing

The Operator Panel is an integral part of the IQ 200 Display Module. Do not attempt to remove it from the IQ 200 Display Module.

2.3 BASE MODULE REAR ACCESS AREA

All wiring connections are made from the rear face of the chassis, shown in figure 2.4 below.

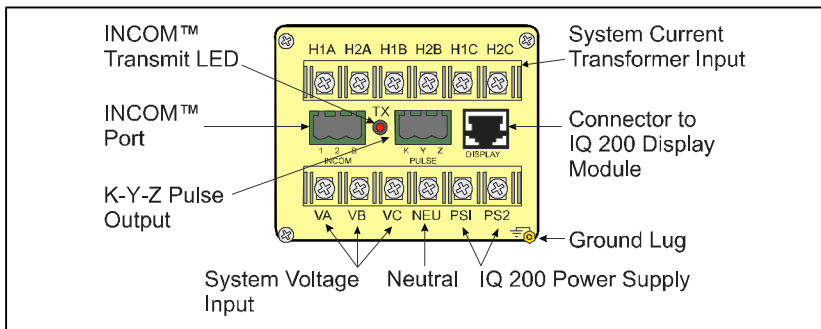


Figure 2.4 Base Module (Rear Face View)

Note: For sections 2.3.1 through 2.3.4 refer to figure 2.4.

2.3.1 Current and Voltage Inputs

The voltage terminal block is located at the bottom rear of the chassis. It has four terminals for wiring the phase voltages and the neutral, as shown below. The neutral terminal *must* be connected to system neutral or ground depending on system configuration. All connections must be made in accordance with national and local requirements and codes.

Phase	Voltage Terminal
A	VA
B	VB
C	VC
Neutral	NEU

The current transformer terminal block is located at the top rear of the chassis. It has six terminals, grouped into three pairs: one pair for each phase current transformer, as shown below.

Phase	CT Terminal Pair
A	H1A, H2A
B	H1B, H2B
C	H1C, H2C

2.3.2 Power Supply Input

The IQ 200 power supply input is connected to the *PS1* and *PS2* terminals on the lower right rear of the Base Module chassis. The IQ 200 requires 90 to 600 VAC or 48 to 250 VDC, and may be wired directly to the monitored system if the voltage is within range.

2.3.3 Local Display Connection

The supplied *Category 5 cable* connects to the *DISPLAY* port located on the middle right rear of the chassis and to the port on the IQ 200 Display Module. *Do not route the Category 5 cable in the same enclosure or cable tray as 600V system wiring.*

2.3.4 INCOM™ Communications

The IQ 200 Electrical Distribution System Meter is an IMPACC (Integrated Monitoring, Protection, And Control Communications) compatible device. As such, it can be remotely monitored and functionally modified.

IMPACC is a noise-immune communications system that permits communication to and from a master computer and the IQ 200 or other devices using a high frequency carrier signal transmitted over a properly terminated, shielded twisted pair cable.

Consult *TD17513 IMPACC Wiring Specification Base Rules* for detailed information on proper installation and termination of network cable.

The following functions can be performed remotely when the IQ 200 is connected to an external IMPACC compatible network:

- Display measured system, phase, and min/max values
- View and edit setpoints
 - System frequency
 - Wiring configuration
 - CT and PT ratios
 - Demand window
 - Energy tracking (KYZ pulse output)
- View and reset energy, peak demands, and all or individual minimum and maximum values

2.4 EXTERNAL HARDWARE

2.4.1 Current Transformers

The IQ 200 requires at least two user-supplied external *instrument class* current transformers with 5 amp secondaries. These transformers must be connected to the current transformer terminals on the IQ 200 Base Module as detailed in *section 3.3*.

2.4.2 Potential Transformers

The IQ 200 requires user-supplied potential transformers if line voltage is above 600 volts. These transformers must be connected to the voltage terminals on the IQ 200 Base Module as detailed in *section 3.3*.

2.4.3 External Fuses

It is recommended that user-supplied fuses be installed as described below to protect the IQ 200 and related components from damage.

2.4.3.1 IQ 200 Power Supply

External fuses should be installed in the IQ 200 power supply lines, near the IQ 200 Base Module. The fuses should be ½ Amp, 600 volt, BUSS type KTK-R-1/2 Fast Acting or equivalent.

2.4.3.2 Potential Transformers

External fuses should be installed in the potential transformer lines as specified in the National Electric Code for the specific application.

2.5 PRODUCT SPECIFICATIONS

Refer to tables 2.1 to 2.5 for all IQ 200 specifications.

2.5.1 Regulatory/Standards Compliance

The IQ 200 meets UL, CUL, and CE requirements.



Table 2.1 IQ 200 Safety Specifications

Safety	
IEC 1010-1 (1990) Incl. Amend 1&2 (1995)	
EN61010-1 (1993)	
CSA C22.2 #1010.1 (1992)	
UL3111	
EMC	
<i>Emissions</i>	
FCC Part 15 Class A	
CISPR 11 (1990) / EN55011 (1991) Group 1 Class A	
<i>Immunity</i>	
Electrostatic Discharge	
EN61000-4-2 (1995) / EN50082-2 (1995)	4kV CD 8kV AD
Electrical Fast Transient	
EN61000-4-4 (1995) / EN50082-2 (1995)	2kV PL 2kV SL
Radiated Immunity	
EN61000-4-3 (1997) / EN50082-2 (1995)	10V/m
Conducted Immunity	
EN61000-4-6 (1996) / EN50082-2 (1995)	10Vrms
Power Frequency Magnetic Field	
EN61000-4-8 (1995)	30 A/m

Table 2.2 IQ 200 Operating Specifications

Control Power		
Input Range	90-600 VAC±10%	48-250 VDC±10%
Frequency Range	50/60 Hz	–
Burden	180 mA	7 W
Environment		Indoor use only
Maximum Operating Altitude	3000 meters	
Operating Temperature		
<i>Base Unit</i>	-20° to 50° C	
<i>Display Module</i>	0° to 50° C	
Storage Temperature		
<i>Base Unit</i>	-30° to 85° C	
<i>Display Module</i>	-20° to 60° C	
Maximum Relative Humidity:	(80% for temperatures up to 31° C)	
<i>Base Unit</i>	decreasing linearly to 50% at 50° C	
<i>Display Module</i>	decreasing linearly to 50% at 50° C	
Current Inputs	5 amp nominal, 10 amp maximum	
<i>Input Impedance</i>	0.01 Ω	
<i>Burden</i>	0.25 VA	
<i>Overload Withstand</i>	150 Amps ac 1 second	
<i>Accuracy Range</i>	0.5% to 200% of nominal full scale	
Voltage Inputs	90 to 600 volts nominal \pm 10%	
<i>Input Impedance</i>	2 M Ω	
<i>Overload Withstand</i>	660 VAC continuous	
Communication Speeds	1200 Baud ASK 9600 Baud FSK	
KYZ		
<i>Input Voltage</i>	240 VAC/300 VDC	
<i>Maximum Current Rating</i>	96 mA	
<i>Input/Output Isolation Voltage</i>	3750 V _{rms}	
Transient Overvoltage Category	OVERVOLTAGE CATEGORY III	
Pollution Degree	2 (IEC 664)	

Table 2.3 IQ 200 Metering Accuracy

Parameter	Accuracy
Current (< 5 amps)	± .5% of Full Scale
Current (> 5 amps)	± .5% of Reading
Voltage, line-to-line	± .5% of Full Scale
Voltage, line-to-neutral	± .5% of Full Scale
Watts (< 5 amps)	± 1% of Full Scale
Watts (> 5 amps)	± 1% of Reading
vars (< 5 amps)	± 1% of Full Scale
vars (> 5 amps)	± 1% of Reading
VA (< 5 amps)	± 1% of Full Scale
VA (> 5 amps)	± 1% of Reading
Power Factor	± 2% of Full Scale
Frequency	± 0.1 Hz
Energy	± 1%

Table 2.4 IQ 200 Measurement Ranges

Parameter	Max Data Range
Current	0... 65,535 amps
Voltage	0... 2,097,120 volts
Power	
Watts	-1,073,709,057... +1,073,709,056 Watts
vars	-1,073,709,057... +1,073,709,056 vars
VA	0... 2,147,450,880 VA
Energy	
Fwd / Rev Wh	0... 999,999,999 kWh
Fwd / Rev varh	0... 999,999,999 kvarh
Net Wh	-999,999,999... +999,999,999 kWh
Net varh	-999,999,999... +999,999,999 kvarh
Net VAh	0... 999,999,999 kVAh
Power Factor	-1.00... +1.00
Frequency	0... 255.996 Hz

Table 2.5 IQ 200 Physical Characteristics

Dimension	Display Module	Base Module
Length	1.84 in. ⁽¹⁾	6.74 in. ⁽²⁾
Height	3.78 in.	3.56 in. ⁽³⁾
Width	3.78 in.	3.56 in.
Base Unit Terminals		
Wire Size	#12-22 AWG	
Screw Size	#6-32	
Torque Rating	9 in.-lbs. Maximum	
Distance Between Barriers	0.32 in.	
Weight		
Display Module	0.60 lbs.	
Base Module	2.35 lbs.	

⁽¹⁾ includes 0.50 in. bezel and 0.37 in. ground lug terminal

⁽²⁾ includes 0.06 in. front face mounting plate and 0.62 in. terminal block

⁽³⁾ centered on front face mounting plate

2.6 ORDERING INFORMATION

When ordering IQ 200 components, please refer to the Catalog Number listed in table 2.6.

Table 2.6 IQ 200 Ordering Information

Description	Catalog Number
IQ 200 Base Module	IQ220TRAN
IQ 200 Display Module	IQ200D
IQ 200 Base Module and IQ 200 Display Module	IQ220
3 foot long Category 5 Cable	IQ23CABLE
6 foot long Category 5 Cable	IQ26CABLE
10 foot long Category Cable	IQ210CABLE

- Contents: **Base Unit Package**
- (1) IQ 200 Base Unit
 - (1) DIN Rail Clip
 - (4) ½?#10 (10-32) screws
 - (1) Phoenix Contact Cable Housing
 - (1) 3?DIN Rail
 - (1) L-Bracket
 - (4) ¼?#8 (8-32) screws

- Display Unit Package**
- (1) IQ 200 Display Unit
 - (1) 1' shielded Category 5 patch cable
 - (1) Gasket
 - (4) Panel Mount Jacks
 - (4) Thumbscrews