

# I-METER<sup>®</sup> 45 INSTALLATION AND USER MANUAL



 **i-meter<sup>®</sup>**  
*Innovative Metering Solutions*

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## **WARNING**

Field electrical installers must follow proper safety precautions and all local electrical code requirements during electrical installation, meter wiring, and CT installation. During normal operation of this device, hazardous voltages are present which can cause severe injury or death. It is strongly recommended that only qualified, properly trained personnel should perform installation and servicing.

## **DISCLAIMER**

The information presented in this publication has been carefully checked; however, Intellimeter Canada Inc. (ICI) assumes no responsibility for inaccuracies. The information provided in this document is subject to change without notice.

## **CUSTOMER SUPPORT**

To report any issue, please contact ICI at 905.839.9199. Prior to returning any merchandise to ICI, a return material authorization (RMA) number should be obtained from ICI.

## **STATEMENT OF CALIBRATION**

The accuracy and calibration of our instruments are traceable to Measurement Canada, a division of Industry Canada.

## **CONFIGURATION**

The i-meter<sup>®</sup> 45-meter series can only be configured by Intellimeter Canada Inc. at ICI's factory according to the customers provided panel schedule.

## **INSTALLATION CHECKLIST**

Make sure you have received the right meter as per your order and packing list.

## **INSTALLATION DISCLAIMER**

INTELLIMETER does not accept any responsibility and will not be liable for any loss or damage or expense of any kind whatsoever and howsoever caused by improper installation of its products, be it indirect, special, incidental or consequential damages (including but not limited to damages for loss of business, loss of profits, interruption or the like). Please refer to Intellimeter's Terms and Conditions of Sale available at <https://intellimeter.ca/pages/terms-of-service-privacy-statement>

## **ELECTRICAL CODE**

Installer is responsible for ensuring that all safety and local electrical codes are followed.

## 1. PRODUCT DESCRIPTION

The i-meter®45 is a next generation multi-customer metering system (MCMS) It supports up to 45 current inputs, programmable for single or poly-phase applications. From 120V to 347V (60/50Hz) Line to Neutral Voltages

(L-N). The i-meter®45 uses the latest generation of DSP (Digital Signal Processor) technology to provide an extended range of software configurable features, alphanumeric display and power quality monitoring in real time; with multiple communication options.

The i-meter®45 is a self-powered meter using a wide range switching power supply. It has been approved by Measurement Canada (MC) and Measurement California, and certified by CSA & UL.



i-meter®45 meter

### 1.1. Applications

The i-meter®45 is designed for a wide variety of applications. In Multi-Customer Metering systems (MCMS) applications, property managers can use the data for cost allocation and demand side management.

This meter can be programmed for different service types. They are:

- Single phase two wire: metering capability of up to 45 meters
- Single phase three wire: metering capability of up to 22 meters
- Two phase three wire: metering capability of up to 22 meters
- Three phase four wire: metering capability of up to 15 meters
- Or any combinations of above

The meter provides cumulative energy consumption data for each meter.  
All current transformers(CTs) are self-protected.

**Note:** Any changes to the original configuration will need to be coordinated with Intellimeter Canada Inc. Please contact [service@intellimeter.ca](mailto:service@intellimeter.ca) for inquiries and assistance.

## 1.2. Specifications

<b>Dimensions (Inches)</b>	16.5 H x 4.5 W x 2 D
<b>Dimensions (Millimeters)</b>	420 H x 115 W x 45 D
<b>Mounting Options</b>	Externally mount with loose CT's
<b>Meter Current Inputs</b>	1 to 45
<b>Voltage Rating</b>	Auto range 120-347VAC (L-N), -20% to +10% of rating
<b>Rated VA</b>	< 12 VA
<b>Current Range</b>	CTs Primary 0 – 600A, CTs Secondary 0 – 0.1A
<b>Meter Constant (K<sub>h</sub>)</b>	1Wh, 1VAh or 10Wh, 10VAh or 100Wh, 100VAh
<b>Service type:</b>	1Φ2W, 1Φ3W, 2Φ3W, 3Φ4W, 3Φ3W (Delta*)
<b>Current Transformers</b>	Secondary Max 80/100mA CTs, Self-Shorting Protection
<b>Instrument Transformers Interface</b>	Yes
<b>Measurements</b>	<ul style="list-style-type: none"> <li>•Total Energy: kWh, kVAh are accumulated in non-volatile memory on the meter</li> <li>•Real Time Measurements: V, I, kW, kVA, kVar, pf, Hz, Per phase V &amp; I Total Harmonic Distortion (THD), Per phase V &amp; I individual harmonic order up to 23rd</li> </ul>
<b>Communication</b>	ModBus RTU or TCP/IP, BACnet MSTP or TCP/IP and pulse output.
<b>Frequency</b>	45 to 65 Hz
<b>Accuracy Class</b>	0.5 (Meets ANSI C12.20)
<b>Total Energy</b>	kWh, kVAh are accumulated in non-volatile memory on the meter
<b>Real Time Measurements</b>	V, I, kW, kVA, kVar, pf, Hz, Per phase V & I Total Harmonic Distortion (THD), Per phase V & I individual harmonic order up to 23 <sup>rd</sup>
<b>Operating Temperature</b>	-10°C to +53°C
<b>Regulatory Compliance / Approvals</b>	Measurement Canada, cCSA <sub>us</sub> , cUL <sub>us</sub> , CTEP (CA)
<b>Patent</b>	U.S. Patent No. 8,049,488

## 2. INSTALLATION

You can visit <https://intellimeter.ca/pages/downloads#videos> / **Intellimeter i-meter®45 Installation & Troubleshooting** to get detailed information about the installation process.

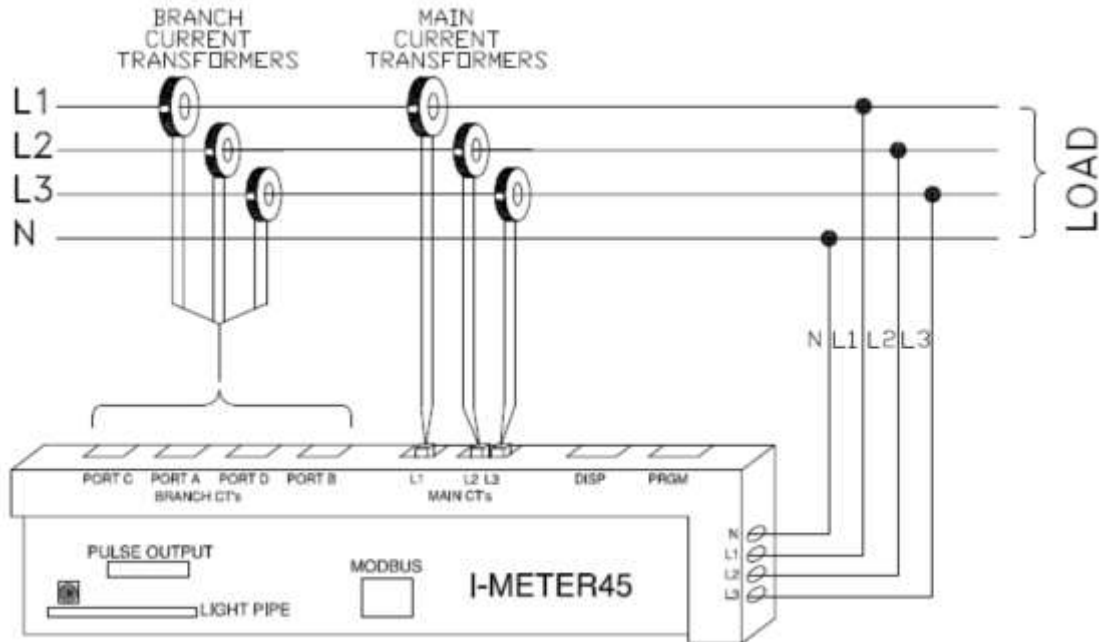
### **WARNING:**

- Verify the number of breakers is the same as the number of meters assigned for that panel board. Follow the installation drawings. Group the assigned modules to the identified panel board.
- Referring to the diagram below, CTs can be embedded in the distribution panel. If the customer has supplied a special compartment for the meter with their electrical panel, Intellimeter will install the meter and have the SPE-1000 field evaluation completed. Otherwise, the meter will be installed in an external enclosure to be mounted near the electrical panel for ease of servicing.
- Install the modules into their appropriate position.
- Install the voltage connectors to the meter modules and dress the wires so they are protected from damage during feeder and branch circuit installation.
- Terminate the voltage reference chain to the designated, 15Amp breaker and ensure the proper phasing retained as per drawings.
- Install the communication connectors to the meter modules and dress the wires they are protected from damage during feeder and branch circuit installation.
- Communication cable is to be terminated to a junction box outside of the panel board by the electrical contractor.

### 2.1. i-meter®45 Wiring Guide

In the i-meter®45 wiring diagram figure below, the branch CTs connect to Port A, B, C, D using a ribbon cable.

- Port A: CT1 – CT12
- Port C: CT13 – CT21
- Port B: CT22 – CT33
- Port D: CT34 – CT42
- CT43, CT44, CT45 are connected directly to the meter module with 2 pin connectors.
- Voltage Input: L1, L2, L3 and N
- Display- MC required- optional only if non-sealed: i-meter®45 MDU = meter display unit- comes with a 6 ft. cable for connecting directly to the meter.

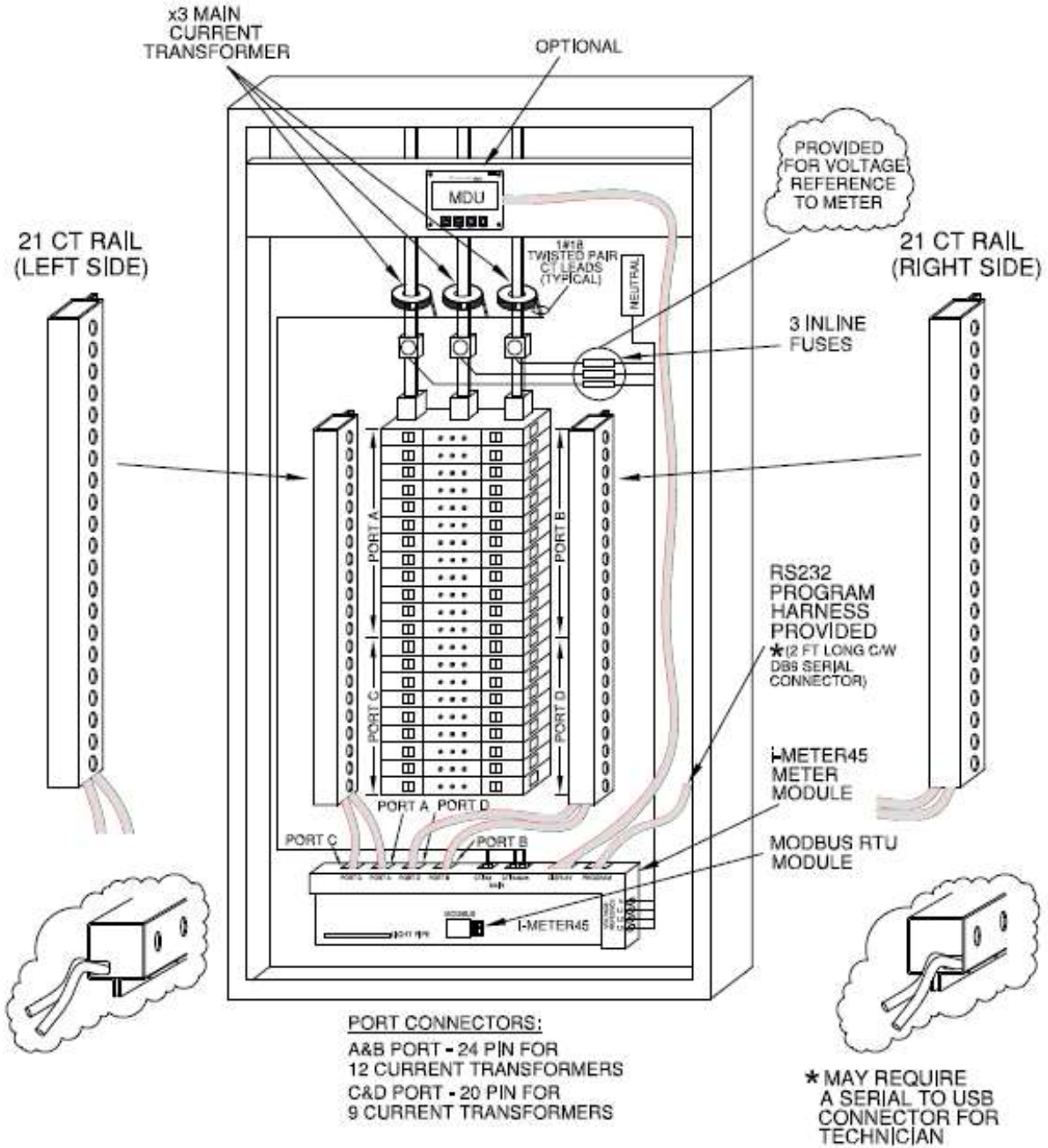


**i-meter®45 wiring diagram**

## 2.2. i-meter®45 Current transformers (CT) Rail

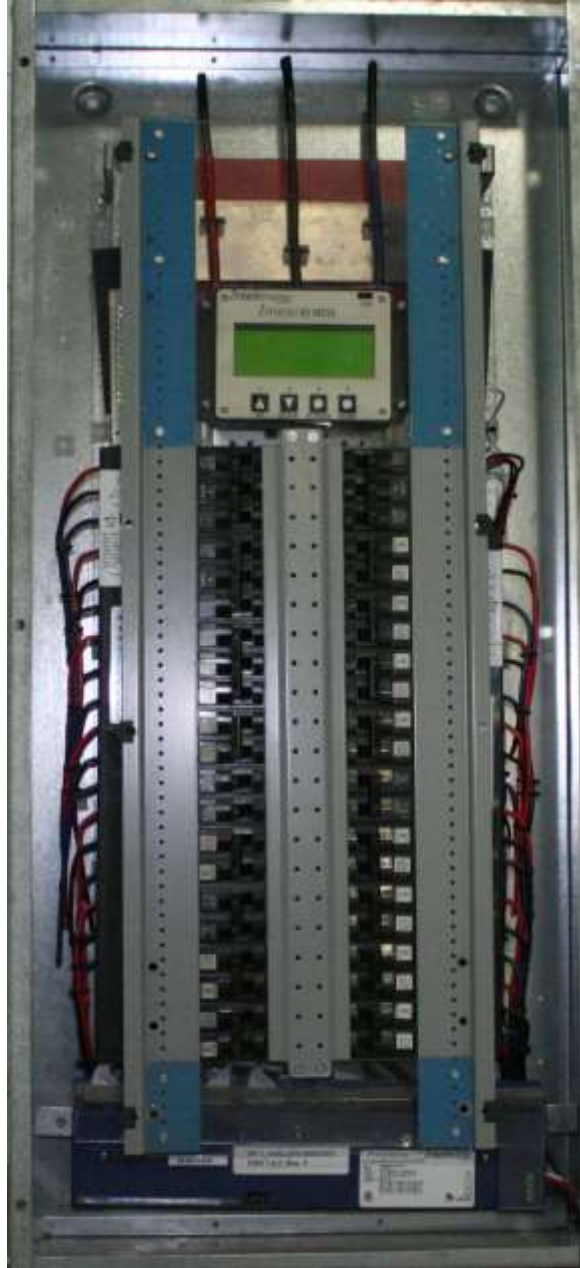
- Review general information and wiring diagram.
- Carefully read all the WARNING signs and notes.
- Check meter serial number and other information on the meter.
- All meter modules are assigned within the panel board and are identified with respect to position, or section of breakers.
- Follow the installation drawings that are supplied with the units.
- Do not leave the secondary CT open when current is flowing through the primary circuit. This refers to instrument CTs as ICI milliamp CTs are self-protected.
- Contact ICI if there has been a change made to the layout or if the assigned drawings do not match the actual distribution panel layout.

# DISTRIBUTION PANEL i-Meter45 TYPICAL INSTALLATION





**Typical Application Using CT rail**

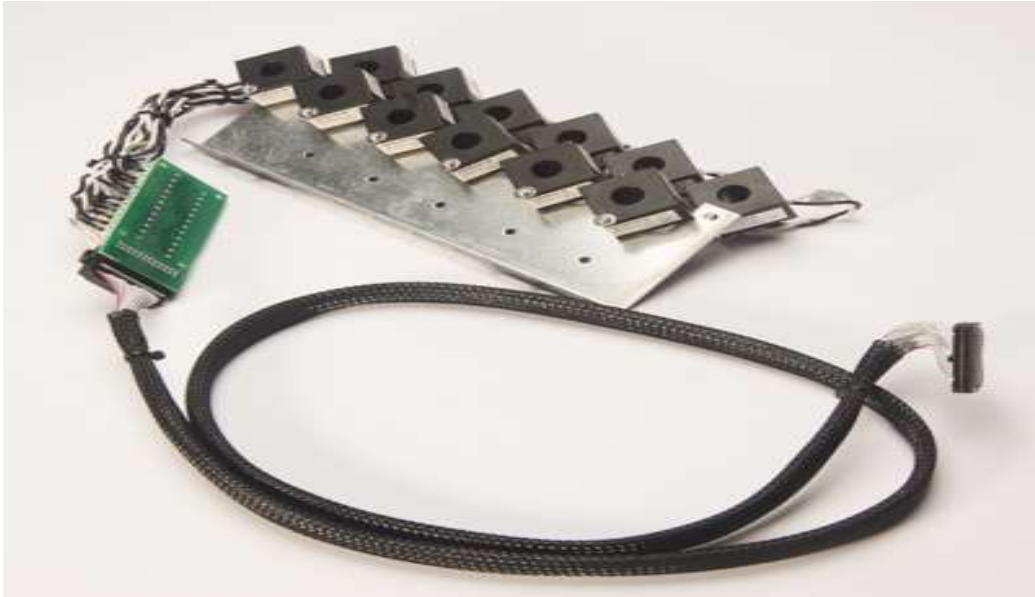


**Typical Application Using CT rail**

### 2.3. i-meter®45 Current Transformers (CT) Interface Board

- Referring to the installation drawings, mount the module, complete with mounting brackets, to the back frame rail.
- The CT rails are to be permanently fastened to the interior panel rails in their designated position; this serves for spacing and support for the CTs.
- Dress in the CT wire back to the metering modules to protect it from damage during feeder and branch circuit installations.
- Any CT that is not connected to the proper metering module will give incorrect readings.
- All CT wire connectors and terminal position on the meter module are identified. Polarity of CT is VERY important- white is positive, black is negative- note arrow for load/line direction. Typically, the CT leads do not need to be removed from the meter module. If required, connect the CT wire connector to the identified terminal on the correct meter module. There may be several modules within a panel board, confirm the meter number on the CT connector label.
- Install the voltage connectors to the meter modules and dress the wires so they are protected from damage during feeder and branch circuit installation.
- Terminate the voltage reference chain to the designated 15Amp breaker and ensure the proper phasing retained as per drawings.
- Install the communication cables to the meter modules and dress the wires so they are protected from damage during feeder and branch circuit installation.
- Communication cable is designed to be terminated to a junction box outside of the panel board by the electrical contractor.

The 12 CT rail can replace the requirement for the CT interface box in certain situations. The CTs must be mounted on a rail and the loads should be 100A or 200A. If there are any 400A or 600A loads, the CT interface box must still be used.



**12 CT rail for 100A CTs**

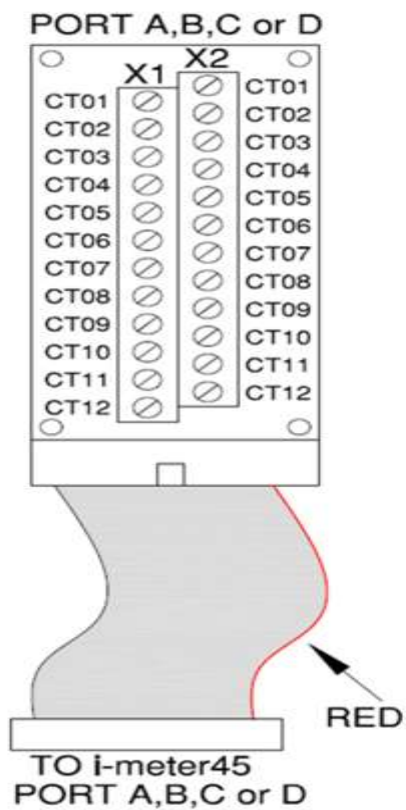


**12 CT rail for 200A CTs**

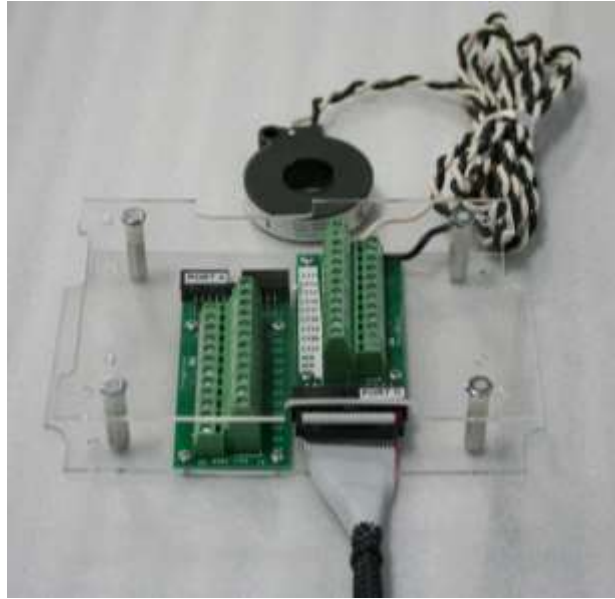
The i-meter<sup>®</sup>45 CT terminal board



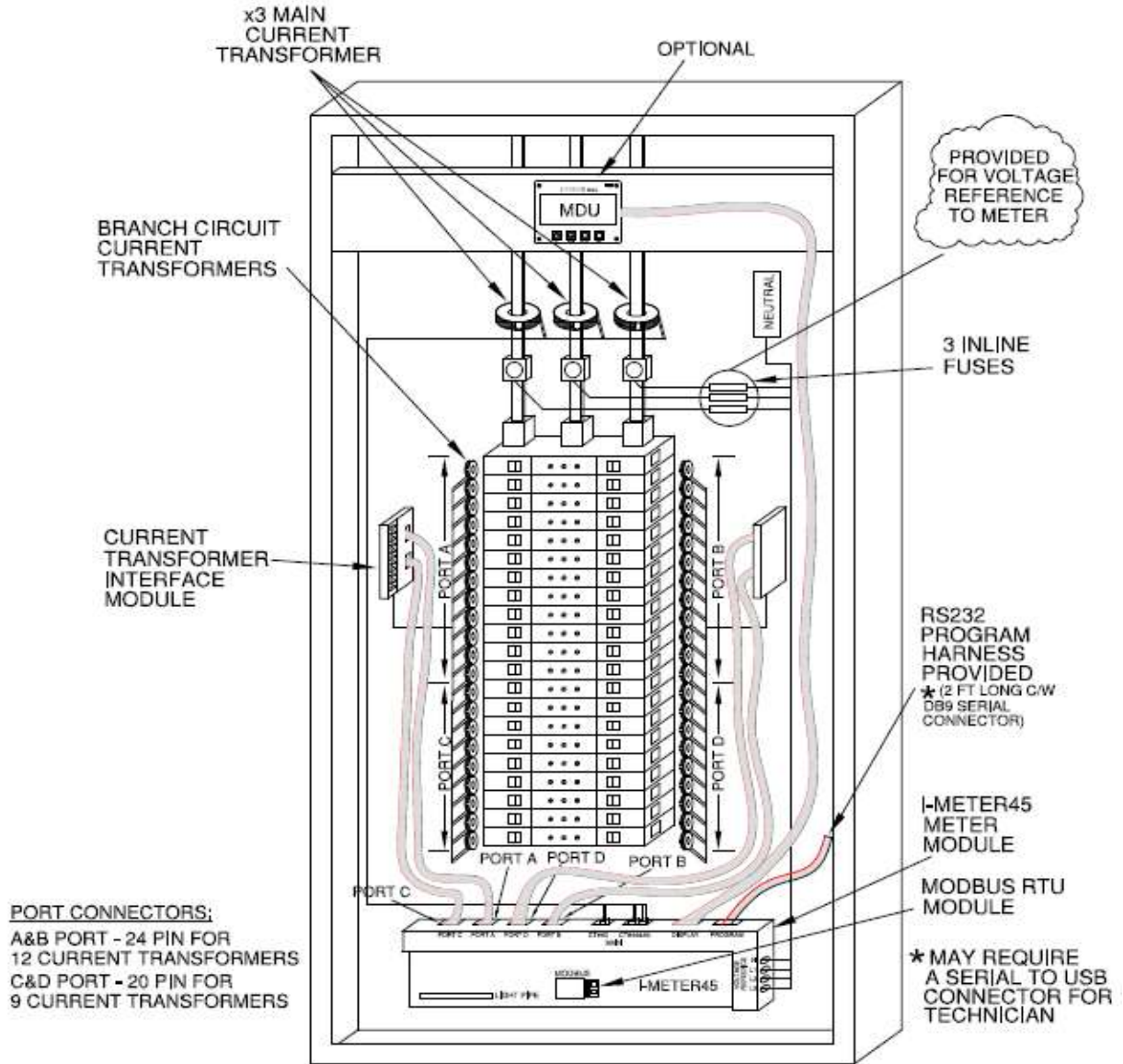
**TYPICAL CT INTERFACE BOARD  
FOR PORTS A,B,C & D**



Current Transformer Interface Module:



# DISTRIBUTION PANEL i-Meter45 TYPICAL INSTALLATION



**Typical Application Using CT Terminal Board**

### 3. i-meter®45 METER DISPLAY MODULE (MDU DISPLAY)

The Meter Display Module (i-meter®45 MDU) displays customer information, real time measurements, total energy consumption, and power quality of each customer by using the key pad “UP”, “DOWN” and “SELECT”.



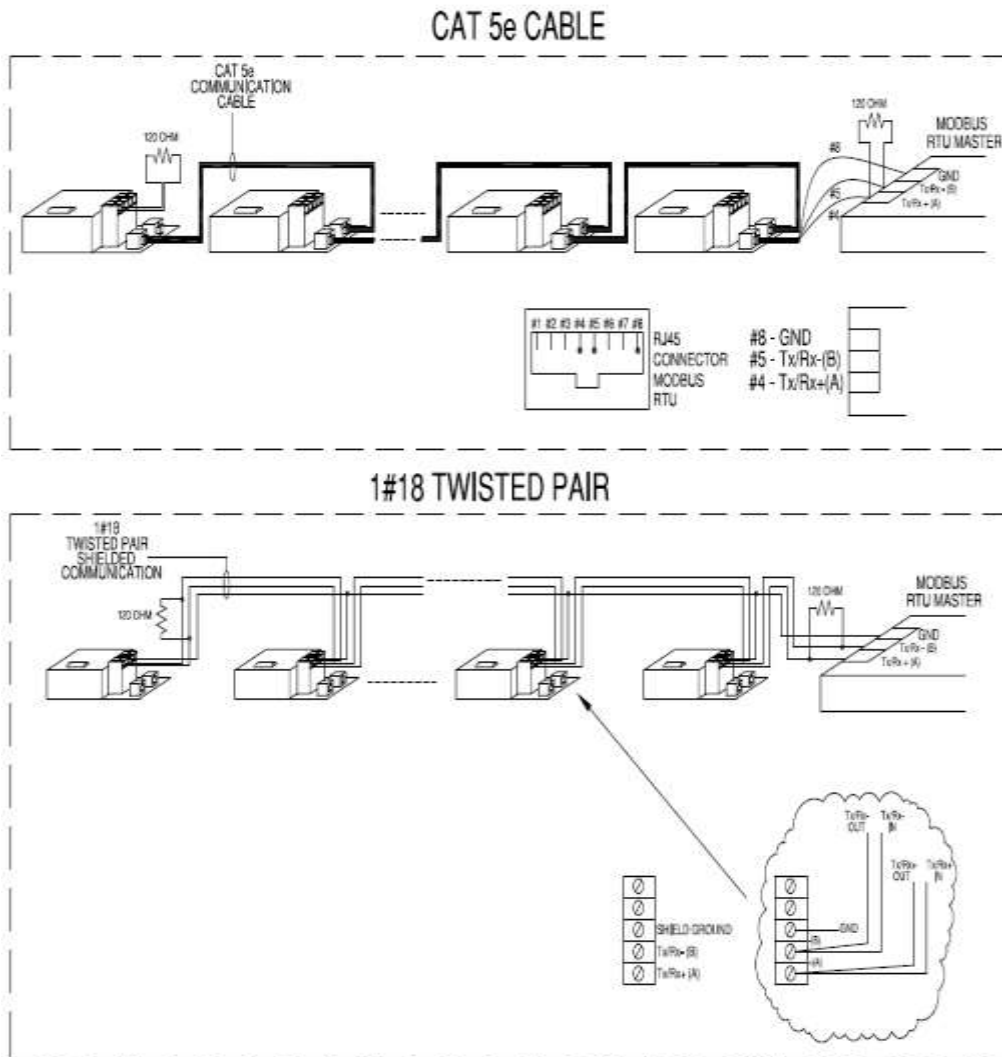
**i-meter®45 MDU Display**

### 4. i-meter®45 MODBUS MODULE

The i-meter®45 ModBus module enables the meter to communicate on a ModBus system. It presents real time measurements, such as voltage, current, THD etc. The normal mode of the module supports RTU ModBus communication over an RS-485 network. Within 30 seconds of power up, the module will enter the normal mode of operation that supports ModBus communication. By default, the module communicates at 9600 bps, 8 data bits, no parity and 1 stop bit (8N1). The communication parameters and ModBus ID may be changed through the ModBus registers or through the Recovery Mode.

**4.1 Electrical connection**

## i-METER 45 MODBUS CONNECTION DIAGRAM FOR TWISTED PAIR AND CAT 5e CABLE





## 4.2 Register Mapping

Table 4-1 Configuration Parameters

Modbus Address	Name	Format	Access	Default
40003	Firmware Version	UINT16		
41002	Address	UINT16	R/W	1
41003	Baud Rate	Enumated	R/W	3 = 9600 bps
Note	<ol style="list-style-type: none"> <li><b>Address - 41002:</b> Changes to the ModBus address takes effect immediately. The next command must use the changed address, otherwise the module will not respond.</li> <li><b>Baud Rate - 41003:</b> 3 = 9600 bps; 4 = 19200 bps; 5 = 38400 bps; 6 = 57600 bps; 7 = 115200 bps. The Baud Rate takes effect after power cycling.</li> </ol>			

Table 5-2 Meter 0 Information

Modbus Address	Name	Format	Unit	Default
41100	Active Phases	Bit map	x1	
41101	Voltage A	UINT32	0.001V	
41103	Voltage B	UINT32	0.001V	
41105	Voltage C	UINT32	0.001V	
41107	Current A	UINT32	0.001A	
41109	Current B	UINT32	0.001A	
41111	Current C	UINT32	0.001A	
41113	Watts A	INT32	W	
41115	Watts B	INT32	W	
41117	Watts C	INT32	0.001W	
41119	Volt-Amp A	INT32	VA	
41121	Volt-Amp B	INT32	VA	
41123	Volt-Amp C	INT32	0.001VA	
41131	Power Factor A	INT32	0.001 Units	
41133	Power Factor B	INT32	0.001 Units	
41135	Power Factor C	INT32	0.001 Units	
41143	kWh	UINT32	0.001kWh	

41145	kVAh	UINT32	001kVAh	
41149	Frequency	UINT32	0.01 Hz	
41155	Voltage Average	UINT32	0.001V	
41157	Meter Total Current	UINT32	0.001A	
41161	Meter Total Watts	UINT32	0.001kWh	
41163	Meter Total VA	UINT32	0.001kVA	
Note	<ol style="list-style-type: none"> <li><b>Active Phases - 41100:</b> 0x0001 - Meter uses phase A; 0x0002 - Meter uses phase B; 0x0004 - Meter uses phase C.</li> <li><b>Voltage Average - 41155:</b> Average of the voltage from each phase.</li> <li><b>Meter Total Current - 41157:</b> Average of the current from each phase.</li> <li>Meter 0 is assigned to the main meter if you program the configuration with main meter.</li> </ol>			

Table 5-3 Meter x Information

Modbus Address	Name	Format	Unit	Default
4xx00	Active Phases	Bit map	x1	
4xx01	Voltage A	UINT32	0.001V	
4xx03	Voltage B	UINT32	0.001V	
4xx05	Voltage C	UINT32	0.001V	
4xx07	Current A	UINT32	0.001A	
4xx09	Current B	UINT32	0.001A	
4xx11	Current C	UINT32	0.001A	
4xx13	Watts A	INT32	W	
4xx15	Watts B	INT32	W	
4xx17	Watts C	INT32	W0.001kW	
4xx19	Volt-Amp A	INT32	VA	
4xx21	Volt-Amp B	INT32	VA	
4xx23	Volt-Amp C	INT32	0.001kVA	
4xx31	Power Factor A	INT32	0.001 Units	
4xx33	Power Factor B	INT32	0.001 Units	
4xx35	Power Factor C	INT32	0.001 Units	
4xx43	kWh	UINT32	0.001kWh	

4xx45	kVAh	UINT32	0.001kVAh	
4xx49	Frequency	UINT32	0.01 Hz	
4xx55	Voltage Average	UINT32	0.001V	
4xx57	Meter Total Current	UINT32	0.001A	

4xx61	Meter Total Watts	UINT32	0.001kW	
4xx63	Meter Total VA	UINT32	0.001kVA	
Note	<ol style="list-style-type: none"> <li>1. The "xx" = 12+ n, where n = 0, 1 ... 44. For an example, meter 24 (n = 23), xx = (12+23) = 35, so the start address of meter 24 shall be 43500;</li> <li>2. <b>Active Phases - 4xx00:</b> 0x0001 - Meter uses phase A; 0x0002 - Meter uses phase B; 0x0004 - Meter uses phase C.</li> <li>3. <b>Voltage Average - 4xx55:</b> Average of the voltage from each phase.</li> <li>4. <b>Meter Total Current - 4xx57:</b> Average of the current from each phase.</li> </ol>			

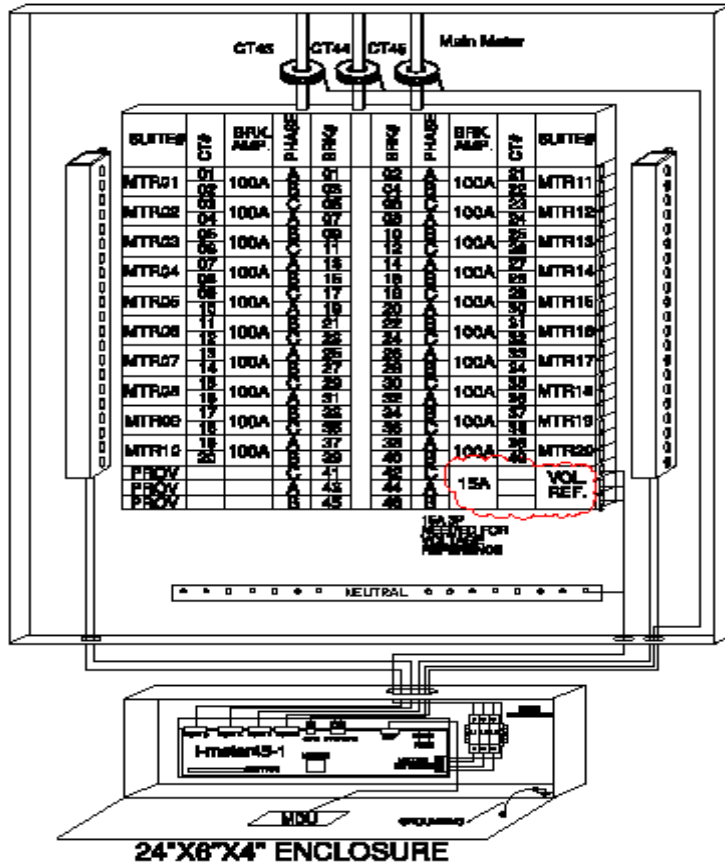
Table 5-5 Harmonic Register Map

Modbus Address	Name	Format	Unit	Description/Format
47xxx	Meter	Enum		The meter that this element is associated with
47xxx+1	THD	UINT16	0.01%	Total harmonic distortion for this waveform
47xxx+2	Fundamental	UINT16	0.01%	Fundamental component for this waveform
47xxx+3	2nd Harmonic	UINT16	0.01%	2nd harmonic component for this waveform
47xxx+4	3rd Harmonic	UINT16	0.01%	3rd harmonic component for this waveform
47xxx+5	4th Harmonic	UINT16	0.01%	4th harmonic component for this waveform
47xxx+6	5th Harmonic	UINT16	0.01%	5th harmonic component for this waveform
47xxx+7	6th Harmonic	UINT16	0.01%	6th harmonic component for this waveform
47xxx+8	7th Harmonic	UINT16	0.01%	7th harmonic component for this waveform
47xxx+9	8th Harmonic	UINT16	0.01%	8th harmonic component for this waveform
47xxx+10	9th Harmonic	UINT16	0.01%	9th harmonic component for this waveform
47xxx+11	10th Harmonic	UINT16	0.01%	10th harmonic component for this waveform
47xxx+12	11th Harmonic	UINT16	0.01%	11th harmonic component for this waveform
47xxx+13	12th Harmonic	UINT16	0.01%	12th harmonic component for this waveform

47yyy	Meter	Enum		The meter that this element is associated with
47yyy+1	THD	UINT16	0.01%	Total harmonic distortion for this waveform
47yyy+2	Fundamental	UINT16	0.01%	Fundamental component for this waveform
47yyy+3	2nd Harmonic	UINT16	0.01%	2nd harmonic component for this waveform
47yyy+4	3rd Harmonic	UINT16	0.01%	3rd harmonic component for this waveform
47yyy+5	4th Harmonic	UINT16	0.01%	4th harmonic component for this waveform
47yyy+6	5th Harmonic	UINT16	0.01%	5th harmonic component for this waveform
47yyy+7	6th Harmonic	UINT16	0.01%	6th harmonic component for this waveform
47yyy+8	7th Harmonic	UINT16	0.01%	7th harmonic component for this waveform
47yyy+9	8th Harmonic	UINT16	0.01%	8th harmonic component for this waveform
47yyy+10	9th Harmonic	UINT16	0.01%	9th harmonic component for this waveform
47yyy+11	10th Harmonic	UINT16	0.01%	10th harmonic component for this waveform
47yyy+12	11th Harmonic	UINT16	0.01%	11th harmonic component for this waveform
47yyy+13	12th Harmonic	UINT16	0.01%	12th harmonic component for this waveform
Note	1. The "xxx" = 000, 010, ..., (000 + 10n), where (n+1) is the number of CTs or Current inputs, n = 0, 1, ..., 44. 2. The "yyy" = 460 (Voltage A), 480 (Voltage B), 500 (Voltage C),			

i-meter®45 External Enclosure Model:

## TYPICAL EXTERNAL I-METER45



WARNING: METERING PANEL HAS BEEN PHASED ACCORDINGLY.  
 DO NOT CHANGE ASSIGNED DISTRIBUTION.

**24"x8"x4" ENCLOSURE**

**i-meter45-1**

SUITE NO.	ID#	METER NO.	SUITE NO.	ID#	METER NO.
		METER01			METER11
		METER02			METER12
		METER03			METER13
		METER04			METER14
		METER05			METER15
		METER06			METER16
		METER07			METER17
		METER08			METER18
		METER09			METER19
		METER10			METER20
		MAIN Meter			

 Innovative Metering Solutions	TDS Alpha Beach Plant Pickering, Ontario L1W 3T9 Phone: (905) 839-9199 Fax: (905) 839-9198 intellimeter.com	Project Name:	Distributor:	Engineer:	P.O.#:	Date:	Rev. Project:	Drawing:	Drawn:	Checked:	Design:
										N.P.	N.P.

Thank you for giving us the opportunity to serve you. We appreciate your business and the confidence you have placed in us.

Please visit us @ <https://intellimeter.ca>  
or call us @ 905-839-9199 if you need any further assistance.