

i-meter™ MF12

– Installation & Operation Manual –



i-meter™ MF12

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Part One

1. Measurement Canada Requirements

Notice to all Electrical Contractors and Owners **(Applies to milli-Amp type CTs only)**

This is to inform the electrical contractors who are installing any static type metering system that Current Transformers (CT's) are typically assigned to a specific meter and are required to stay with that meter.

On the side of the CTs, the CT number, the meter number and the potential line is indicated as a guide for the contractor.

FOLLOW THE INSTALLATION DRAWINGS!

Using the installation drawing as a guide, match the CT's with the meter, and install them on the correct line to the correct phase.

If there are any differences with the drawings compared to your distribution panel,

CALL US IMMEDIATELY to discuss an alternate installation plan!

CAUTION

Phasing and CT installation are very important. If the metering system is not installed according to the installation drawings, the system will not work and any cost in correcting the installation by Intellimeter will be charged back to the installer / developer.



Part Two

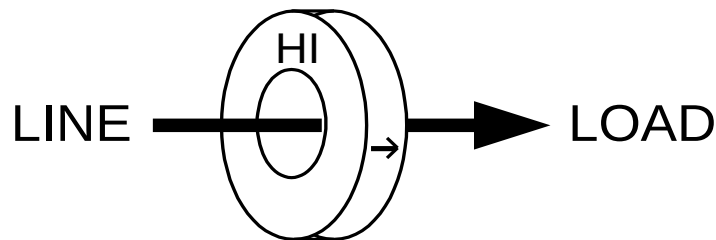
2. Metering Rules

- #1. Current Transformers (CTs) are directional.
- #2. Voltage references must be in phase with the load being metered and from the same source.
- #3. CTs (milli-Amp) are certified to an assigned meter and to the meters assigned phase.

Rule #1:

If the CTs are mounted in the opposite direction, the polarity of the CT will be opposite.

The arrow on the CT indicates the direction from LINE to LOAD.



Similarly, the "H1" is on the LINE SIDE.

All Intellimeter milli-Amp current transformers 200:0.1A, 400:0.1A and 600:0.1A have self-shorting protection built into the device. They can safely be open circuited while under load.

Rule #2:

Check to verify that the voltage potential used, as a reference voltage, is the same phasing as the loads being metered. ABC is ABC not CBA. The reference voltage must come from the same source. Voltage reference from another transformer is incorrect and causes inaccurate readings.

Connect the voltage reference to the meters disconnect or terminals making sure it is the same phase sequence.

Usually:

Line 1 = Red or 'A' phase
Line 2 = Black or 'B' phase
Line 3 = Blue or 'C' phase
Neutral = White

Note: Colour sequence may vary depending on the country and region.

Rule #3: (Intellimeter milli-Amp current transformers range from 200:0.1A to 600:0.1A only)

When the metering system was tested at the factory, the CT's were assigned to a meter and to a specific element of that meter. The CTs are recommended to be installed and used only with the meter and element that it was tested with.

We have identified each CT so it can be easily installed following the installation drawing that was designed for that particular distribution.

Follow the Installation Drawing! If there is a discrepancy with the drawing in comparison to your distribution panel, call us for assistance.

PLEASE CALL IF ANYTHING IS NOT CLEAR. IT IS DIFFICULT TO CORRECT ERRORS ONCE INSTALLATION HAS BEEN COMPLETED!

Technical Assistance: 905-839-9199

Part Three

3. Installation Instructions

These installation instructions are generic for multi-customer sub-metering systems. Again, call before you install if you require additional information on this process. If any of these steps are incorrect, call for assistance.

1. Confirm the drawings that were sent with the metering system are accurate. Verify the type of panel and that the distribution is the same. It is important that all assigned breaker phasing is correct.
2. Assign the proper panel to the identified distribution.
3. Verify the number of loads is the same as the number of meters.
4. Verify the type of system is the same as the meters supplied, (Ex. 120/208V, 100A or 200A, 3 phase 4 wire, single phase 3 wire network system, etc).
5. Mount the panel as indicated by the drawing. Call to inquire if a different mounting configuration would work better.
6. Refer to the drawings to sort out the CTs to be installed on the load feeders.
7. One feeder at a time, install the CTs so the arrow is pointing towards the load. Confirm on the drawing, the installed CT corresponds to the correct phase of the suite. Continue until all CT's are installed.
8. Supply a voltage reference from the distribution panel. Depending on the configuration, minimum is a 15A breaker and the number of phases should match what is required on the drawing.



9. If the system is automated, a CAT 5e (min), 4 pair #24 (Network cable) is required to be pulled from one metering panel to the next until it reaches the communication cabinet that is usually mounted in the communication room or main electrical room. Refer to single line drawing.
10. Attached is a checklist that is to be completed, verified and faxed back to Intellimeter before commissioning is scheduled.

NOTE: The electrical contractor will provide an electrician for the duration of the commissioning for inspection and for any modification re-work required. Intellimeter is not liable to work on the electrical distribution and will only be terminating the communication lines. All deficiencies will be recorded and sent to the electrical contractor for correction before returning to site.

Part Four

4. Service Types

- Single Phase 2Wire (120)

Line 1 = CT1

- Single Phase 3 Wire (120/240)

Line 1 = CT1

Line 2 = CT2

- Network Two Phase Three Wire (120/208) - (3 sets) Typical Colour Code

Meter1 Line 1 = CT1 = A phase = Red
 Line 2 = CT2 = B phase = Black
 &

Meter 2 Line 1 = CT3 = C phase = Blue
 Line 2 = CT4 = A phase = Red
 &

Meter 3 Line 1 = CT5 = B phase = Black
 Line 2 = CT6 = C phase = Blue

...

If the load is on B & C phase, Line 1 (CTX) is on B phase and Line 2 (CTY) is on C phase.

This staggering of phasing is to match the typical three-phase four-wire distribution panel for 2 phase loads.

Three Phase Meter Typical (120/208, 277/480, 347/600) Colour Code
 (Continued on next page)

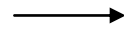


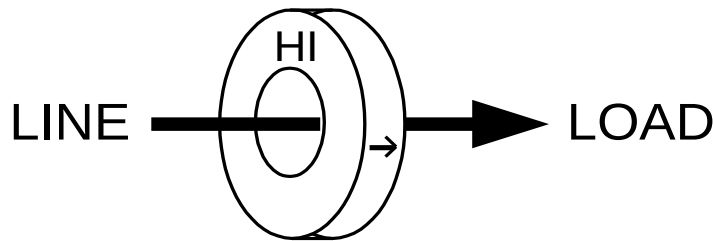
Line 1 = CT1 = A phase = Red / Orange
Line 2 = CT2 = B phase = Black / Brown
Line 3 = CT3 = C phase = Blue / Yellow

Note: Colour code and sequence may vary depending on the country and region.

Part Five

5. CT Wiring and Lengths

Current Transformers (CTs) are directional (). An arrow points to the load or “H1” indicates Line Side.



Typical: Install CT1 on Line 1 (Red), CT2 on Line2 (Black), and CT3 on Line3 (Blue).

Refer to “Service Types” above for your system.

External Current Transformers (CTs) Twisted Pair #18-14 stranded colour code

#1	Intellimeter CTs 200A (ICI30CT21)	White (+) Black (-)
#2	Intellimeter CTs 400A (ICI30CT41)	White (+) Black (-)
#3	Intellimeter CTs 600A (ICI30CT61)	White (+) Black (-)

The maximum length the CT leads can be extended is 400 feet for #1 & #2 and #3.
1 twisted pair wire only for each CT.

Intellimeter CT's: CT's lead wire gage <50 ft. = Min. #18
 50 ft. < CT's lead wire gage < 150 ft. = Min. #16
 150 ft. < CT's lead wire gage < 250 ft. = Min. #14
 250 ft. < CT's lead wire gage < 400 ft. = Min. #12

Identify the polarity and the phase the CT is installed on for proper termination. Always identify all wires.

Refer to installation drawings and terminal labels for polarity and connection.



Part Six

6. Pre Site Visit Check List

	Description of Work	Yes / No	Tech:
1	All loads have been identified and confirmed at the distribution panels. "Suite to Breaker Verification"		
2	The installation drawings are accurate.		
3	All metering equipment installed.		
4	The voltage reference to metering board disconnect is pulled, connected, and energised.		
5	The voltage reference is in phase with the loads being metered. 'A' is 'A', 'B' is 'B', & 'C' is 'C' etc.		
6	All CT installation has been completed and confirmed that they are installed in the correct direction and installed accordingly to the installation drawing 100%!		
7	All suites or loads have been documented on the installation drawings.		
8	All communication cables (if applicable) are pulled accordingly to the single line drawing. (CAT5 cable)		
9	In each metering cabinet, the communication cable is identified and has enough length for proper termination.		
10	The communication cabinet is mounted in designated area and a 120VAC, 15A circuit is assigned to it.		
11	A communication cable (CAT5) from the communication cabinet to an internet connection is supplied for remote communication.		
12	The metering panels are all energised and working.		
13	There should be no BLUE light illuminated. This would indicate a reverse load and would need to be investigated. (Page 10).		

Job Name:		Job #:	Date:
Company:		Office Number:	
Forman:		Site Number:	
Signature:			
Date Requesting for Site Visit:			

Intellimeter Canada Service Department: Phone: 905-839-9199, Fax: 905-839-9198

INSTALLATION INSTRUCTIONS FOR i-meter™ MF12

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Part Seven

7. Meter Specialization, Installation and Operation

1.0 MF12 meter Specification

1.1 *Summary Description*

The **MF-12** electricity meter is a solid-state multi-customer metering system. The meters use microprocessor controlled circuitry for optimum performance and accuracy.

1.2 *Specifications*

1.2.1 Measurements taken for monitoring:

- 1.2.1.1 Voltage per phase
- 1.2.1.2 Current per phase
- 1.2.1.3 Instantaneous kilo-Watt per phase
- 1.2.1.4 Instantaneous kilo-VA per phase
- 1.2.1.5 Frequency

1.2.2 **MF-12** measurement accuracy:

- 1.2.2.1 Total kWh accurate within 1%
- 1.2.2.2 Total kVAh accurate within 1%

1.2.3 Pulse input and output specifications:

- 1.2.3.1 No pulse inputs
- 1.2.3.2 12 pulse outputs for kWh – can be programmed to 6 pulse outputs for kWh and 6 for kVAh

1.2.4 **MF-12** has an LCD which can cycle through screens in 10 patterns showing different information. See Appendix A.

1.2.5 **MF-12** can monitor consumption based on time-of-use costing

1.2.6 **MF-12** can be configured for different number of meters and a variety of phases. See Appendix B

1.2.7 Measurements taken by the **MF-12** can be viewed on a PC Display.

1.3 *Programming*

The **MF-12** has the capability to be programmed to set some parameters and to change the behaviour of the meter.



These settings can be changed ONLY prior to shipping the meter and ONLY by the manufacturer:

- a) Serial Number
- b) Customer Number
- c) CT Ratio
- d) Service Configuration

These settings can be changed on site by the customer:

- a) Date/Time
- b) LCD Display arrangement
- c) Rates and Prices

1.4 Theory of Operation

The **MF-12** is a channel interval, multi-customer kilowatt- hour metering system. It can be programmed for single phase or polyphase applications with up to 12 meters. Refer to Configuration table in Appendix B.

1.5 Communication

- 1) Modbus/RTU
- 2) BacNet-MSTP
- 3) Radio/Wireless

2.0 Mf-12 installation and operation

2.1 Physical Description (See Fig.1)

The **MF-12** is comprised of the following major components:

- 1) Metering Board
- 2) Power supply Board
- 3) LCD Display
- 4) External current sensors



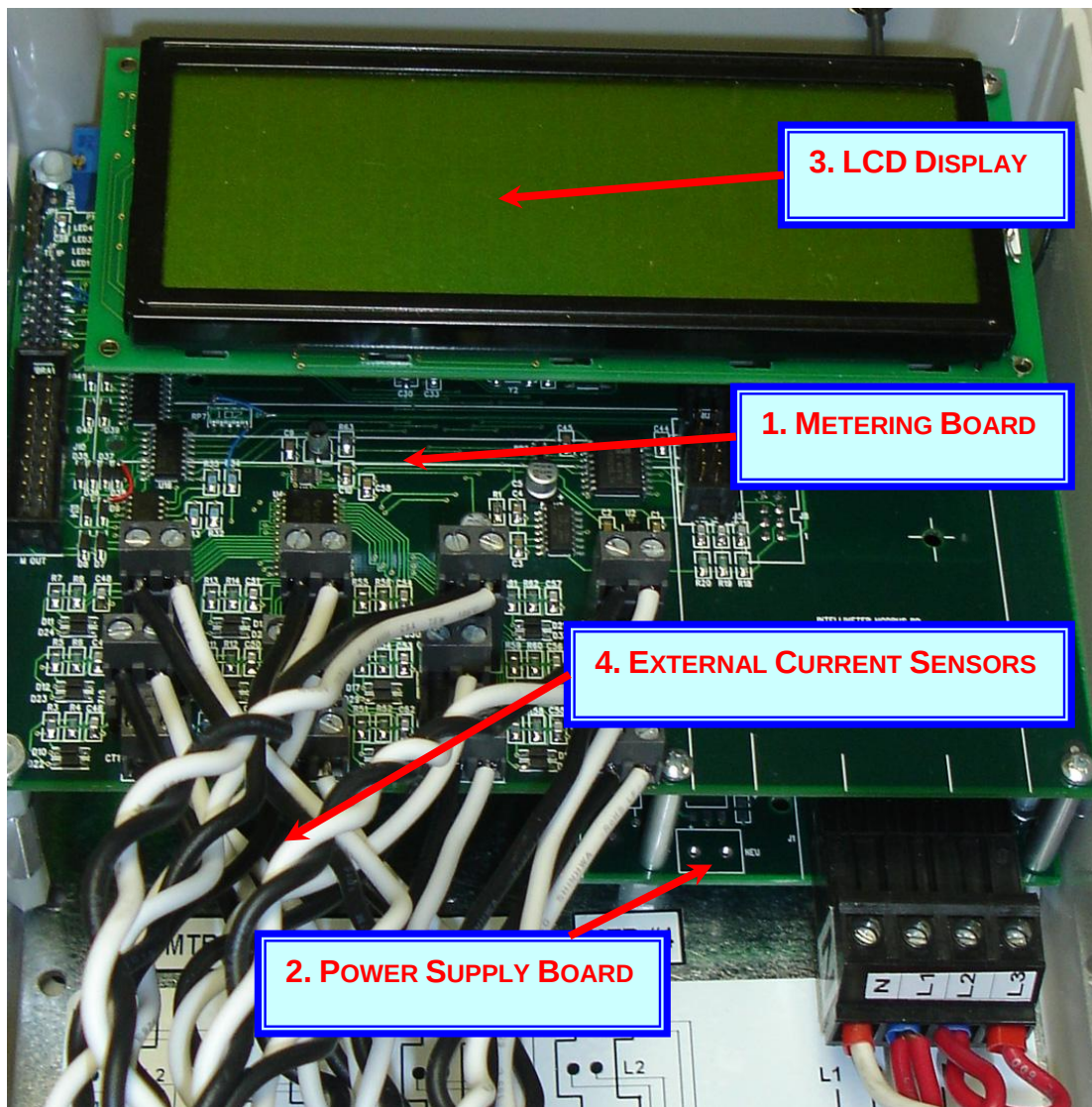


FIG 1: PHYSICAL DESCRIPTION

2.2 LED Indicators

2.2.1 LEDs ON METERING BOARD

LED3 – The power indicator

LED1, LED2, LED4, LED5 – Reverse energy flow indicators for each group of three CTs (Current Transformers). They will flash blue if reversed energy is detected.

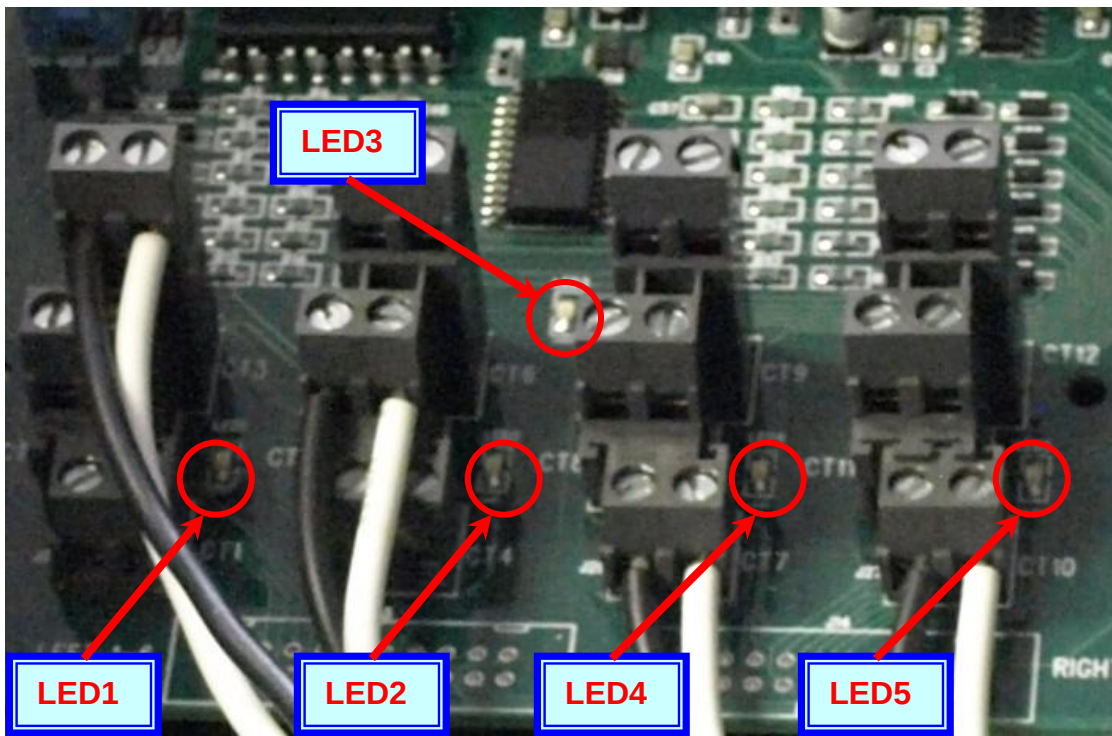


FIG 2: LED LOCATIONS ON METERING BOARD

2.2.2 LEDs ON EXTERNAL CURRENT SENSOR BOARD

See section 2.2.1

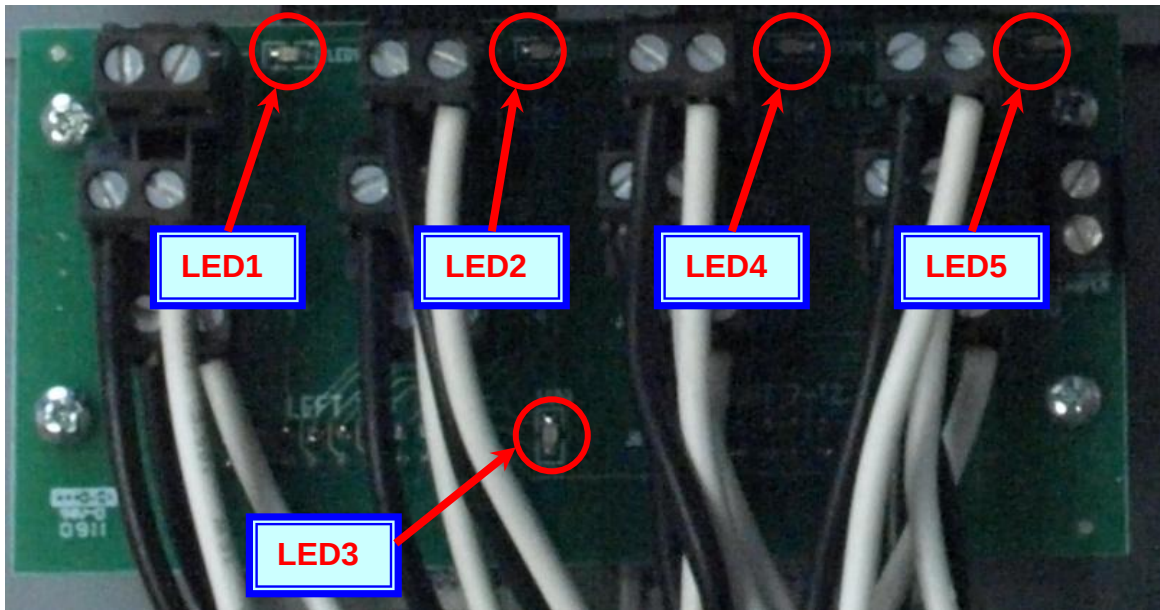


FIG 3: LED LOCATIONS ON EXTERNAL CURRENT SENSOR BOARD

2.3 LCD Display

The **MF-12** LCD is 4×20 character type LCD display. You can select the LCD screen configuration on the MF-12 through Modbus or Radio module. Refer to **Appendix A** for a description (MF-12 LCD Display Table).

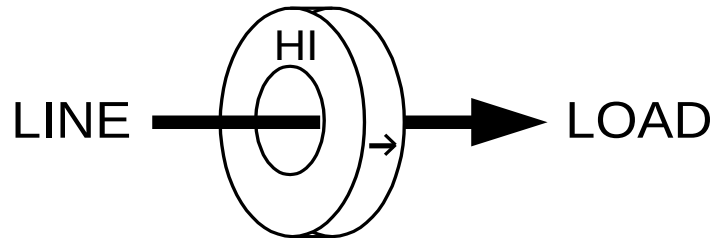


FIG 4: CT PRIMARY POLARITY

Secondary: Refer to the drawings. Confirm the polarity is correct.

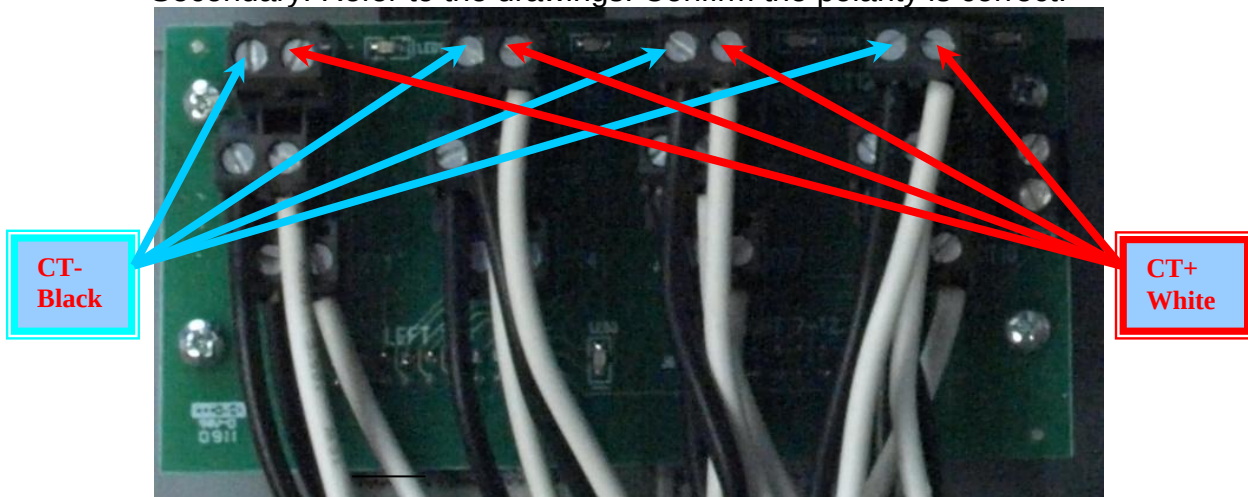


FIG 5: CT SECONDARY POLARITY

Typical: Install CT1 on Line 1 (Red), CT2 on Line2 (Black), and CT3 on Line3 (Blue). Refer to “Service Types” above for your system.

Part Eight

8.1 APPENDIX A

MF-12 LCD Display Table

Measurements Display Options	Voltage	Current	Instantaneous kilo-watts	Instantaneous kilo-VA	Power Factor	Frequency	Rates	Total kVAh	Total kWh
Default							Yes	Yes	Yes
Option #1	Yes						Yes	Yes	Yes
Option #2		Yes					Yes	Yes	Yes
Option #3			Yes				Yes	Yes	Yes
Option #4				Yes			Yes	Yes	Yes
Option #5					Yes		Yes	Yes	Yes
Option #6	Yes	Yes	Yes				Yes	Yes	Yes
Option #7	Yes	Yes		Yes			Yes	Yes	Yes
Option #8	Yes	Yes			Yes		Yes	Yes	Yes
Option #9	Yes	Yes				Yes	Yes	Yes	Yes

All screen cycles include the meter screen and the customer screen.

Meter screen: displays meter number, serial number, customer number, service type, and date/time.

Customer screen: displays customer number, total kWh, total kVAh, and the current rate and price.

Configuration is done at the manufacture only - No on-site re-configuration.



8.2 APPENDIX B

MF-12 configurations

Meter #	1	2	3	4	5	6	7	8	9	10	11	12	Service Type	Pulse Outputs	
Configuration#														kWh	kVAh
0	A	B	C	A	B	C	A	B	C	A	B	C	1Φ2W	12	N/A
1	ABC	ABC	ABC	ABC	////	/////	/////	/////	/////	////	/////	/////	3Φ4W,Y	4	4
2	AB	CA	BC	AB	CA	BC	/////	/////	/////	////	/////	/////	2Φ3W, N	6	6
3	BC	AB	CA	BC	AB	CA	/////	/////	/////	////	/////	/////	2Φ3W, N	6	6
4	CA	BC	AB	CA	BC	AB	/////	/////	/////	////	/////	/////	2Φ3W, N	6	6
5	A	A	A	A	A	A	A	A	A	A	A	A	1Φ2W	12	N/A
6	AC	AC	AC	AC	AC	AC	/////	/////	/////	////	/////	/////	3Φ3W, Δ	6	6
7	ABC	ABC	A	B	C	A	B	C	/////	////	/////	/////	1&3 Φ	8	N/A
8	A	B	C	A	B	C	ABC	ABC	/////	////	/////	/////	1&3 Φ	8	N/A

Configuration is done at the manufacture only - No on-site re-configuration.



Typical i-Meter MF12 Wiring Diagram

