

GLOBAL POWER PRODUCTS

MACS SYSTEM SPECIFICATIONS

Energy Meter - EM

Accuracy	<u>Unity PF</u>	<u>50% PF Lag</u>
Test Amps/10	0.2%	1.5%
Test Amps	0.1%	0.4%
Services		
Types:	2 wire or 3 wire singlephase Network, 4 wire Wye	
Voltages:	120V, 240V 120/208V, 277/480V 120V, 240V, 480V, 120/240V, 240/480V	
Frequency:	60Hz	

Operating Ranges

Voltage: -20% of rated to +12% of rated
Current: See Current Transformers
Frequency: 57 Hz to 63 Hz
Temperature: -40 degrees C to +85 degree C
Humidity: 0 to 95% non-condensing

Burdens

Current Circuit: Phase A, B, C 1VA maximum
Voltage Circuit: Phase A 15 VA maximum
-power circuit
Phase B,C 0.5 VA maximum

Insulation, Surge Protection and Performance

Conforms to ANSI C12.1, ANSI C12.16, and ANSI/IEEE
C62.41-1980 (formerly IEEE 587-1980 category B)
Type: Metal Oxide Varistors
line to neutral
neutral to ground
Ratings: 150 VAC rms continuous
4400 V peak fast transient
4000 A peak transient

Communications

Type: RS232 port on meter (Hardwired)
PLC (Power Line Carrier) via Spread Spectrum
modulation with high level error detection and
correction codes.
PLC
Bandwidth: Variable, 50K, to 150K Hz
Relaying: Multiple EMs in communications path
User programmable (minutes to monthly)
Daily updates (normally)

Current Transformers

Construction: Solid Core (high nickel composition)
 Plastic Encapsulated
 Leads: 72 inches long
 Number 18 gauge (AWG)
 600V insulation
 Accuracy: 0.03% accuracy rating
 Frequency: 60 Hz
 Burden: 4.86 ohms
 Thermal
 Rating Factor: 1.5

Size and Dimensions (Inches):

100:0.1 amp	ID	0.75 min.
	OD	2.34 max.
	Hgt	0.78 max.
200:0.1 amp	ID	1.05 min.
	OD	2.70 max.
	Hgt	1.10 max.
400:0.1 amp	ID	1.90 min.
	OD	3.56 max.
	Hgt	1.25 max.

Greater than 400 amps use Cascaded CT arrangement (see MACS personnel for more information).

Enclosures

Material: Painted Steel
 Weight: 8.5 lbs. to 9.25 lbs.

TYPES AND DIMENSIONS (INCHES)	
Surface mount:	10.0 x 7.0 x 2.9
Flush mount case:	10.0 x 7.0 x 2.9
Flush mount cover:	12.0 x 10.0 x 0.5

Grounded for safety

Other Configurations

MACS Prewired Load Center

Size	Breakers	Dimensions(inches)
125A	12-24	24 x 14 x 4
150A	20-30	30 x 14 x 4
200A	12-24	28 x 14 x 4
200A	20-40	32 x 14 x 4

Options

Liquid Crystal Display (LCD):
 kWh, Peak Demand (Current and Last), Cumulative Demand,

Number of Demand Resets, CT multipliers and Error Codes
Metering pulse annunciator
Pulse Input Combinations:
(1) Form C or (2) 2 wire inputs, or (1) 2 wire input and Keylock
Reset
Keylock Demand Reset: For MACS Standalone units
Current Loop Communication Board:
For direct communication connection:
MACS PLMs (Power Line Modems) and
Hardwired meters

General Notes

Metering data stored in nonvolatile memory at meter.
For use as part of PLC system or Standalone.
Wiring diagram inside cover.
Ability to test and calibrate on-site.

Electronic Submetering System Specification

A. The electronic submetering system for each building shall consist of the following components:

1. Utility Grade Energy Meters (i.e. "submeters")
2. Central data collection equipment with 2400 baud modem
3. Current Transformers
4. On-site billing equipment and software (if applicable)
5. Alternate communication path capabilities
6. Hardwiring communications capabilities (if applicable)

B. The submeters shall each consist of a microprocessor based electronic meter, a carrier current communications section for two-way distribution of data over the low voltage (120 - 480 volts) power lines, and a power supply. The submeters shall each function in conjunction with current transformers and voltage potential taps.

1. Meters and current transformers shall be provided as indicated and as follows:
 - a. Meters shall be received from the manufacturer as a completed unit with the current transformers packed in the container with the meter.
 - b. Meters should be mountable in either a surface or a flush configuration at the meter installation location.
2. The meter shall monitor current and voltage so as to compute kilowatt-hours (kWh) and kW consumption. This kWh information shall be displayed on command at one of two acceptable locations as follows:
 - a. At the Energy Meter itself
 - b. At the Building Control Unit (BCU) or interrogating central computer.

3. The Energy Meter shall have non-volatile memory so that kWh and kW information will be retained without the use of batteries in the event of voltage disturbances or power outages.
4. The Energy Meter shall be capable of measuring the following services:
 - a. 120V 2 wire singlephase, 120/240V 3 wire singlephase or 120/208V Network Spec # 959321100-000
 - b. 120/240V 3P 4W wye Spec # 959341100-000
 - c. 277/480V 3P 4W wye Spec # 959351100-000
 - d. 240V Delta Spec # 959361100-000
 - e. 480V Delta Spec # 959371100-000
5. The Energy Meter shall meter the above services within the following accuracy and operation limits:
 - a. Unity PF light load 0.5
full load 0.3
 - b. Temperature: -40 to +85
 - c. Voltage: +/- 10% of rated voltage
 - d. Frequency: 57Hz to 63Hz
 - e. Temperature: -40 to +85

The Energy Meter's construction shall be such that it shall be comprised of industrial/military specification electronics. The electronics shall meet or exceed ANSI C12.1 (meter testing specification), and ANSI/IEEE c62.41-1980 (insulation and surge protection). The electronics shall be protected from over or reverse voltage and voltage limited by metal oxide varistors (MOVs) or equivalent. This protection shall be line(s) to neutral and neutral to ground. This protection shall meet or exceed the following ratings.

- a. 150 VAC rms continuous
 - b. +/-4400 V peak fast transient (line-line, line-neutral and neutral-ground)
6. The Energy Meter shall transmit data to the central equipment to enable the storage of kWh consumption and integrated kW demand on a time frame divided into two to four intervals per day in accordance with local utility practice. It shall be possible to randomly combine the data from multiple submeters so as to read totalized kWh consumption and coincident integrated demand kW.
 7. Data transmission shall be over the building's power distribution wires. Dedicated wiring shall not be required between Energy Meters and the central equipment unless specifically requested. The system shall function properly even with the presence of both hardwired and power line carrier Energy Meters. Data transmission shall be highly reliable against power line noise. There should also be a system of

error detection and correction to account for any errors that do occur.

C. The system shall be able to boost the PLC data transmission either with additional hardware or via relayed data messages with the existing hardware. All additional required hardware shall be supplied.

D. The central equipment shall include all items necessary to receive data from the outlying submeters, to analyze and store the data as it is received, to query each outlying submeter to verify proper operation, to detect tamper, loss of communication and loss of power, to transmit data on demand for readout of consumption (kWh) and demand for any submeter and to transmit data to a Lobby Display Unit (where applicable). The central equipment shall also include all items as necessary to transmit data via modem, utilizing telephone lines, to an off-site facility for billing and/or diagnostic purposes. It shall also be able to perform on-site billing if required; with the addition of billing software and an output device such as a printer.

E. Provide all required system wiring, including, but not limited to, microcomputer (complete with all required software), printer and peripheral equipment as required to permit the Owner to prepare monthly bills for each submeter.

F. Provide all required system wiring, including connections to power line wiring, in-line fuses, 120 VAC connections for the supply of energy consuming equipment (for example computers), and interwiring between central equipment components. All wiring shall be run in a code approved manner, including raceways, outlets and junction boxes as required.

G. The system and all its components must receive the approval of all agencies having jurisdiction, **prior to installation of any equipment or wiring.**

H. The system supplier must guarantee his ability to provide off-site diagnostic analysis of the system via telephone lines, as well as his ability to provide off-site preparation of bills in the required format, if required by the Owner. The supplier must provide on-site diagnostics analysis of the system (if needed). Installation assistance in the form of telephone assistance or on-site visits. Including one year's free diagnostic service (including on-site, or off-site repairs and adjustments) and preparation of bills.

I. Submit a separate price for service, repairs and off-site billing after the first year.

J. The system shall be the Metering and Communication System manufactured by North American Power Products, Inc.