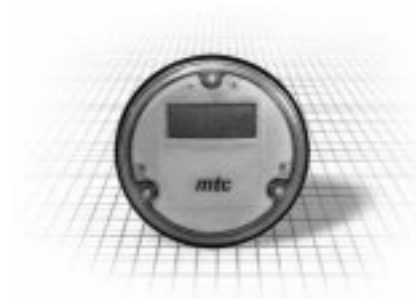# mtc
## METERING TECHNOLOGY CORPORATION

# Residential Electric Meter

## Residential ANSI Meter with Remote Disconnect and Wireless Modem

### Models AD20-H13S/NT2/L
### AD20-H13S/NT2

## Installation and User's Guide

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## Credits

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# Contents

CHAPTER 1

# INSTALLATION

This chapter provides installation requirements and instructions. It also describes the safety warnings and precautions to use when installing or servicing the Residential Electric ANSI Meters.

> *Warning: Make sure you read the following safety warnings and precautions before you proceed with configuring, installing, and operating the meters.*

## Safety Warnings

Before you install and operate your meters, it is important to be familiar with all the safety precautions. Observe these precautions during all phases of operation, service, and repair. Failure to comply with these precautions or with specific warnings elsewhere in this guide violates safety standards of design manufacture and the intended use of the meter. Metering Technology Corporation (MTC) assumes no liability for your failure to comply with these requirements.

The information presented in this guide is intended to be an aid to qualified metering personnel. It does not replace the extensive training necessary to handle metering equipment in a safe manner.

> *Warning: Any work on or near energized meters or other metering equipment presents the danger of electrical shock. Only qualified electricians and metering specialists are authorized to work on the meters in accordance with local utility safety practices, utility requirements, and other safety precautions as dictated by local code, regulations, or statutes.*

### Precautions

The meter is connected directly to line voltage. Observe all safety warnings as indicated on the meter. Be sure to follow these precautions:

- Never service the meter alone.
- Be extremely cautious when working around exposed meter socket terminals.

# Installing the Meter

This section describes the installation requirements and procedure to install the meter. Before you proceed with the installation, make sure you have read the safety warnings and precautions on page 5.

## Preparing the Meters for Installation

Unpack the meters and perform the following steps.

**To prepare the meters for installation:**

1. Carefully inspect the meter case and terminals to make sure they were not damaged during shipping.

> ⚠ **Warning:** *Return damaged meters and components to MTC; do not attempt to repair the damage. The meter has no user-serviceable parts. Any attempt to remove or repair internal parts voids the meter warranty.*

2. Do one of the following:
   - To configure the meters in-house before you install them in the field, refer to the manufacturer's host programming documentation.
   - If you're planning to install the meters in the field and then configure them remotely, follow the instructions in this chapter to install the meters, then refer to the manufacturer's host programming documentation for remote configuration.

## Installing the Meter

The Residential Electric ANSI Meter must be installed by qualified persons. Check with local regulations before installation. If you are unsure about installation issues regarding licensing or local regulations, contact your local electrical utility.

> ⚠ **Warning:** *Dangerous voltages exist in and at the meter socket terminals. Read all warning and application information provided with the meters and sockets.*

**To install the meter:**

1. Plug the meter into an ANSI approved socket with the label in the upright, or readable orientation.
2. Install a sealing ring and seal.

> **Note:** The internal wiring configuration of the Residential Electric ANSI Meter complies with the Form 2S regulation standard.

CHAPTER 2

# LCD DISPLAY

This chapter describes the liquid crystal display (LCD) on the meter.

## Using the Liquid Crystal Display (LCD)

The Residential Electric ANSI Meters are pre-programmed to display a default sequence of registers, unless you special-ordered a customized default sequence. The items shown on the display and their formats are described in the following table.  Items are displayed on the LCD in the order shown:

| Item Displayed | Display Format | Notes |
|---|---|---|
| Total net active energy | xxxxxx | In kWh, delivered minus received |
| Total net reactive energy | xxxxxx | In kVARh |
| Current voltage | xxx.x | In V |
| Current frequency | xx.xx | In Hz |
| Current active power | xxxxx.x | In kW |
| Current reactive power | xxxxx.x | In kVAr |
| * Active Demand | xxxxx.x | In kW |
| * Reactive Pwr at Active Demand | xxxxx.x | In kVAr |
| * Active energy in current tariff | xxxxxx | In kWh, delivered minus received |
| * Reactive energy in current tariff | xxxxxx | In kVARh |
| Minimum voltage since last reset | xxx.x | In V |
| Maximum voltage since last reset | xxx.x | In V |
| Minimum frequency since last reset | xx.xx | In Hz |
| Maximum frequency since last reset | xx.xx | In Hz |
| Last power failure time | hh.mm.ss | 24-hr time, 'PF' segment also displayed |
| Last power failure date | mm.dd.yy | 'PF' segment also displayed |
| Last power restoration time | hh.mm.ss | 24-hr time, 'PF' segment also displayed |
| Last power restoration date | mm.dd.yy | 'PF' segment also displayed |
| Mfg. Serial number | xxxxxxx | Last 7 digits of the 10-digit SN |
| Electric meter serial number | xxxxxxx | Last 7 digits of the 10-digit SN |
| * Time of Demand value | hh.mm.ss | 24-hr time |
| * Date of Demand value | mm.dd.yy | |
| * Prepay dollar balance | ddddd.cc | In dollars |
| * Current prepay conversion rate | ddddd.cc | In $/Wh |
| Current time | hh.mm.ss | 24-hr time |
| Current date | mm.dd.yy | |

- Each item in the list is displayed for 5 seconds.  The display refresh rate is 1 Hz.

- The power usage indicator is the 'RUN' segment located in the upper left corner of the LCD.  With every 7.2 Wh consumed, the segment alternates its state from on to off.

- The threshold for the 'NO LOAD' segment is 0.075 A. The threshold for the energy accumulation is 0.005 Wh which corresponds to 0.075 A at the nominal 240 V.

- The last 7 digits of the 10-digit serial number should consist of ASCII digits, since ASCII letters are not properly displayed on the LCD.  The first 3 digits of the serial number can be letters since these are not displayed on the LCD.

- * The display is configurable as to which items are displayed.  If no items are selected, the entire list will be scrolled.  This helps to indicate that the meter is running.

CHAPTER 3

# OPERATION NOTES

This chapter provides miscellaneous notes regarding the operation of the Residential Electric ANSI Meter. Refer to manufacturer's documentation for additional information.

## Registered Quantities

To provide for the registration of both delivered and received kWh, there are 6 active energy accumulators (including the 4 tariff accumulators). The Host must be able to request up to 6 active accumulators, the order upon return is:

- KWh delivered
- KWh received
- Tariff 1 net kWh
- Tariff 2 net kWh
- Tariff 3 net kWh
- Tariff 4 net kWh

The registered value for reactive energy (kVARh) is the sum of all four reactive quadrants. This meter cannot distinguish lead/lag. There are 5 reactive accumulators:

- Net kVAR
- Tariff 1 net kVAR
- Tariff 2 net kVAR
- Tariff 3 net kVAR
- Tariff 4 net kVAR

## Load Profile

There are 9 items that can be selected for logging in the load profile log. These are:

- Net active power
- Active energy delivered
- Active energy received
- Instantaneous voltage
- Instantaneous frequency
- Active demand

- Net reactive power
- Net reactive energy
- Power factor

The default setting is for 15-minute intervals, with the following 3 items logged:

- Active energy delivered
- Reactive energy delivered
- Voltage

## Payment Meter Mode

When optionally configured for such use, the meter functions as a prepay meter. In this mode, the meter continuously deducts the appropriate amount for energy usage from a dollar balance stored in the meter. When exhausted beyond a configurable grace-period amount, the meter is configurable to disconnect the load. For prepay operation, the meter must have the optional disconnect relay installed.

When the meter is used in the Payment Meter Mode:

- The dollar balance is updated in the meter once per second based on energy consumption.
- There are 5 conversion rates configured, one for each of 4 tariff periods, and one when no tariff period is in effect.
- The first (non-tariff) conversion factor serves as the prepay enable/disable switch. If this parameter is 0, prepay functionality and alarms are disabled in the meter.
- The meter allows for the deduction of a fixed "facilities charge" once per day at midnight.
- There is an option to automatically disconnect the load on the 2nd prepay alarm. If the meter has disconnected the load, the user must first increment the dollar balance above the 2nd alarm level to enable actuator control. After incrementing above the 2nd alarm level the user may switch the load back on via the Set Actuator command. If prepay is not enabled, the actuators may be switched on and off at any time.

## Non-Volatile Memory

The following information is retained in the meter upon a power failure:

- Most recent power loss/restoration time and date. (The host can read this information to determine when power was lost.)
- Serial numbers
- Radio settings
- Actuator setting
- Alarm options and mask
- Alarm status

- Relay IMU list and information
- Relay retry counter and interval
- Relay statistics
- Active energy accumulators
- Reactive energy accumulators
- Meter statistics: minimum and maximum voltage, frequency, active power, and reactive power
- Prepay conversion rates and alarm settings
- Prepay dollar balance
- Meter calibration data
- Demand statistics
- Time-Of-Use schedules
- Display configuration
- Load Profile configuration and log data

The time and date are not retained in the meter upon power failure. This has two consequences:

- The host must update the meter time and date upon power restoration.
- The power restoration time and date will always be the default date and time: 1/1/2000 and 00:00:01.

## Alarm Messages

When appropriate, the meter shall transmit an alarm message through the network to the utility. The following table lists possible alarm messages.

| Message | Notes |
|---|---|
| AC power failure | Notification of power failure is sent approximately five minutes after power is restored. |
| Non-volatile memory errors | Triggered by checksum, CRC, or memory-test errors. |
| Tamper | A tilt or motion sensor triggers the tamper alarm. If a power failure coincides with a tamper event, the tamper message preempts the final power-failure transmission. |
| Prepay amount reached | See "Payment Meter Mode" on page 10. |
| Virtual shut-off | Reports a load when a premises is presumed vacated. |

The alarm interval is set to 5 minutes. This number is not configurable. A new alarm will be transmitted to the host via radio every 5 minutes until it is either acknowledged or cleared.