**Westinghouse Electric Corporation**
Measurements and Control Division
Raleigh, North Carolina, U.S.A. 27611



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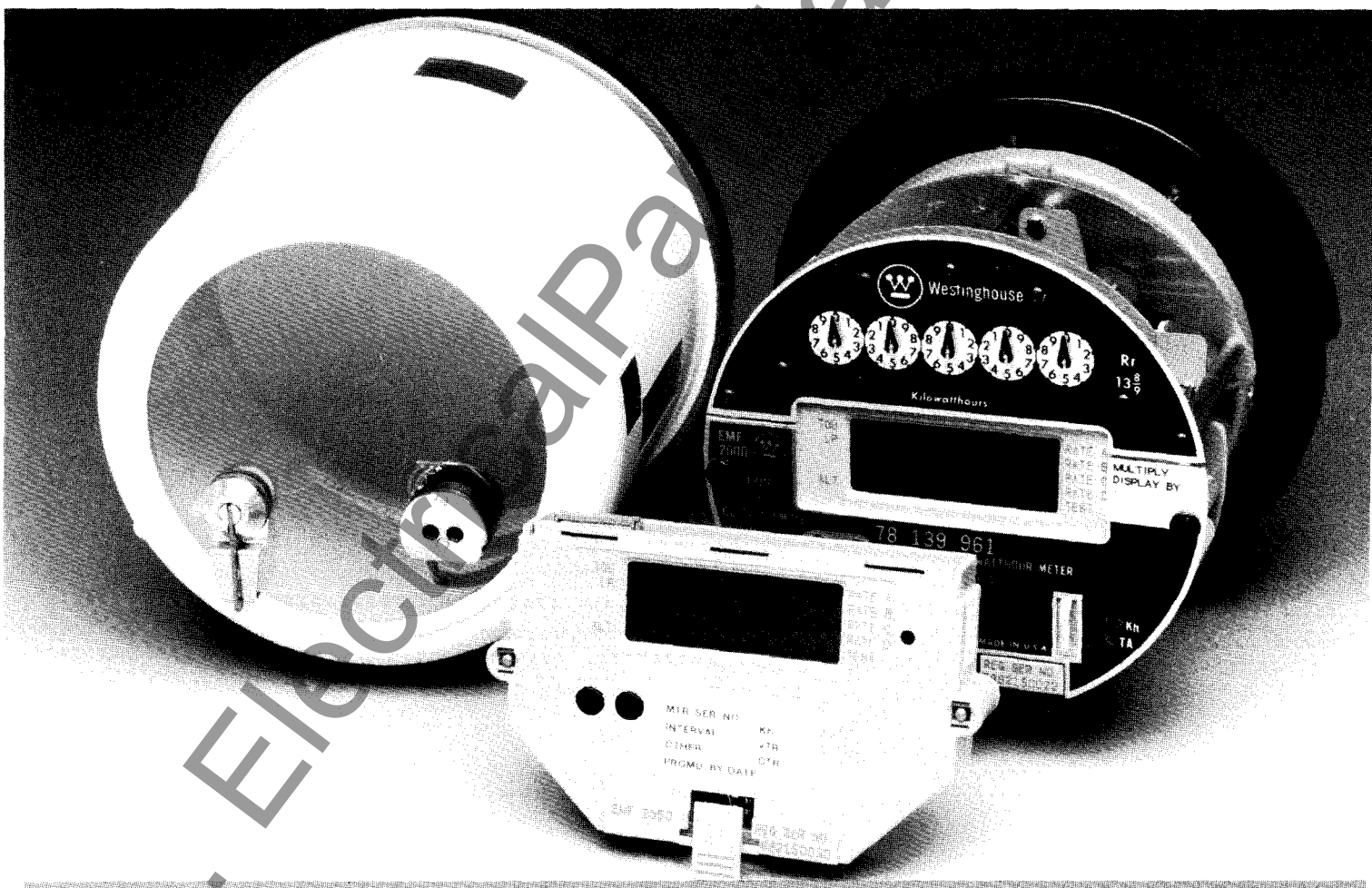
New Information
Mailed to: E, D, C/42-100A

# EMF-2500 Time-of-Use/Load Profile Modules



## Description

The EMF-2500 time-of-use/load profile modules are part of the EMF-2000 electronic register family. These modules may be inserted into a common EMF-2000 chassis for any combination of demand, energy, time-of-use or load profile metering.

The modules are designed to be quickly disassembled and reassembled for register reconfiguration or board replacement. They consist of three parts:

- A printed circuit board and holder
- A front cover – which holds the display, and
- A back cover – which contains a plug-in connector for the power supply and pulse initiator communications lines.

## Features

EMF-2500 modules feature:

- Liquid crystal display
- UNICOM™ Optical port
- Programmable display of up to 70 selectable quantities
- Independently programmable display identifiers and display sequence
- Standard power supply — available for 50 or 60 Hertz on 120, 208, 240, 277 and 480 Vac applications
- Normal mode, alternate and test mode – independently programmable as to display quantities
- Programmable decimal point and software selectable 5 or 6 digit display.
- Test mode that will retain billing data during tests with no loss of any data or change of interval time
- Retrofittable to D4 and D5 series single-phase and polyphase meters, except switchboard types
- Programmable threshold level
- Previous billing period and previous season quantities
- Programmable demand forgiveness
- Alternate scroll
- Programmable leading zeros
- Electronic detent
- Programmable security code
- Outage and battery logs
- Up to 4 rate periods per day
- Rolling demand
- Time and date for each maximum demand
- Super capacitor back-up for clock/calendar
- Non-volatile (EEPROM) storage of critical information
- Extended calendar (over 20 years for most rates)

### Optional Features

The optional features of the EMF-2500 modules include:

- Remote operation
- Mechanical detents
- Conventional mechanical kWh register
- Key lock demand reset
- Output relays
  - — end-of-interval signal
  - — load control or customer demand threshold alerts
  - — pulse initiator
- Automatic self reading at fixed interval or by day of the month
- Automatic self loading of new rate schedule at programmed date
- Long life lithium cell

### Output Relay Options

Output relay options are available on the display PC board. The board supports one KYZ Output relay and either a Load Control (LC) relay or an End-of-Interval (EOI) relay. It will also support up to three customer alert relays. A separate PC board is available for high voltage applications for KYZ, LC and EOI applications.

Output relays on the optional board terminate into a 12-pin connector. High voltage applications require the 12-pin connector for use with hard contact relays such as mercury-wetted switches. Low voltage applications require the 7-pin connector for use with solid state switches. A mating connector for the 7- or 12-pin connector is provided for the signal cable. The following are the available optional functions:

1. Load control
2. KYZ pulse initiator (output contact closures are proportional to meter disk speed)
3. End of interval (EOI)
4. Customer alert

Wires from the outputs are routed through a hole in the meter base for customer connections. A Westinghouse contact protection circuit is applied to the output connections to suppress contact arcing for loads up to 0.1 AMP. If additional contact protection is required, you may apply parallel protection circuits.

Either the high or low voltage KYZ output relay when supplied on the options PC board, can be provided with divide-by capability of 1 to 255.

Maximum loads that can be connected to output contacts are as follows:

1. For Relay Outputs (High voltage):
   a. KYZ Output – Mercury-wetted (100VA)
   b. EOI Output – Mercury-wetted (100VA)
   c. LC Output – reed switch (1800VA)

2. For Solid State Outputs (Low voltage)
   a. 3-wire KYZ (2VA)
   b. 2-wire EOI (10VA)
   c. 2-wire LC (10VA)

### Liquid Crystal Display

The liquid crystal display (LCD) features easy-to-read numbers and identifiers. It is designed for operation at extended temperature ranges.

Annunciator bullets give visual confirmation of mode (test and alternate), rate period, TOU collection and load profile collection.

### Data Collection and Storage

EMF-2500 modules are available with 4 current period, previous billing period, and previous season displays for energy and demand. These include:

- **Indicating Demand**

When measuring indicating demand the EMF-2500 modules maintain a record of the maximum power (kW) required by a customer during the present billing period. Prior billing period kW may be obtained if required. During each interval, demand is compared to the maximum recorded demand. If the new kW usage exceeds that recorded in a prior demand interval, the old reading will be replaced with the new higher reading.

At the end of the billing period, the indicating demand is reset through the cover with the reset button and the kW demand digits return to zero.

- **Cumulative Demand**

Cumulative demand is similar to indicating demand except that present kW demand value is added to previous kW demand value each time the reset button is pushed. When the demand reset button is pushed, the new cumulative total is displayed.

- **Continuous Cumulative Demand**

Continuous cumulative demand is similar to cumulative demand except maximum kW demand values are added to cumulative total each time previous indicating maximum is exceeded. Thus, kW demand values are added at each new peak instead of at reset time.

- **Present Demand**

Present block interval's demand value.

- **kWh**

Total kWh and individual kWh (rates A, B, C, D) are displayed.

In addition to metered quantity displays, other parameters and general information are also displayable. These include:

- **Ke**

The EMF-2500 modules maintain a record of the value of watt-hours per input pulse to the register.

- **Kh**

The EMF-2500 modules maintain a record of the value of watthours per disk revolution.

- **Pulses per disk revolution (P/R)**

The number of pulses per disk revolution programmed into the register.

- **Cumulative pulse count**
A cumulative pulse count since the last demand reset. The pulse count may be scaled to avoid overflow in the load profile memory, thus the cumulative pulse count may be displayed with two displays: cumulative scaled pulses and cumulative unscaled pulses.

- **kW Overload**
When the kW overload indication exceeds a programmable value, the right-most digit of the kW reading is replaced with an F.

- **kW Threshold**
The programmable value that, when exceeded, closes the load control relay for direct control or consumer alert.

- **Interval**
Two types of intervals are available: block intervals of 5, 15, 30, or 60 minutes; or rolled intervals of 1 into 5, 3 into 15, 5 into 15, 5 into 20, 15 into 30, 10 into 60 or 12 into 60 minutes. Rolled intervals are displayed with the subinterval followed by the block interval.

- **Demand Resets**
A cumulative count of the number of demand resets for the register is maintained.

- **Calendar/Clock**
Present time, date, and day of the week are displayable. Other date/time displays include program date (initialization), reprogram date, future rate date, outage log, battery log, present season, kW demand, date and time for each rate period, last reset date, last automatic read date.

**Demand Intervals**
All common demand intervals are available including: 5, 15, 30 and 60 minutes. In addition, the software includes a rolling demand option. Rolling demand allows programmable subintervals from 1-255 minutes. There is a maximum of 15 subintervals per block.

While cumulative demand and continuous cumulative demand only display the sum of indicating demands, rolling demand can compute and display demand on a sliding scale. For rolling demand, the demand interval is divided into subintervals. Demand is calculated for the interval at the end of each subinterval. For example, for a 15 minute interval and 5 minute subintervals, demand is recalculated every 5 minutes over the previous 15 minute period. Based on this principle, indicating demand would be the maximum demand in any of the consecutive subintervals totaling 15 minutes. That is, 3 consecutive 5 minute periods would add to 15 minutes, which is the maximum for the billing period. The same principle applies for other billed intervals.

## Programming

The EMF-2500 modules can be programmed with an IBM PC (or compatible) and the Westinghouse designed, user-friendly software. Battery powered laptops also may be used for field programming or diagnostics. The UNICOM™ optical probe – which plugs into a standard serial communications port – mates with the UNICOM optical port on the meter cover.

The software allows on-screen selection of programming values with pop-up windows. Once the desired program is chosen – or selected from available program files – a push of a button transfers the program to the register. Another program checks the register to assure that it is properly programmed.

If you need different features and functions, the flexible EMF-2000 register may be quickly reconfigured with other modules to accommodate these applications.

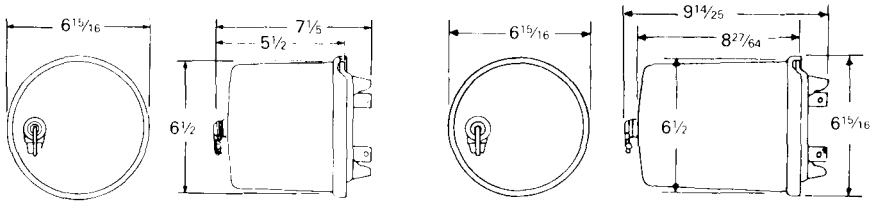
**For ordering information about the EMF-2500 registers, see Product Bulletin 42-250A.**

## Specifications

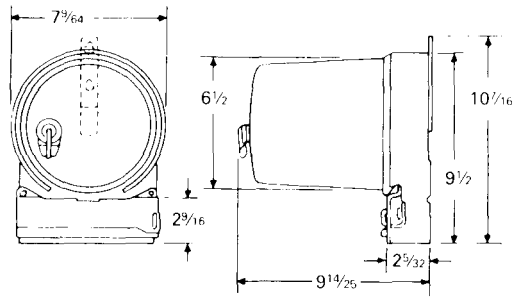
Temperature (Outdoor) −40° to 50°C (−40° to 122°F)
Relative Humidity 0 to 100% non-condensing

**EMF-2500 Time-of-Use/Load Profile Meters**
Dimensions are for reference only and are based on 1 PC board module and glass cover.

**D5S-E** (With EMF-2500 Register) **Single-Phase** **D5S-xE** (With EMF-2500) **Socket Type Polyphase**




**D5A-xE** (With EMF-2500) **Bottom-Connected Polyphase**




Outline Dimensions in Inches

**Shipping Weights and Carton Dimensions (Approximate – based on 1 PC board module and glass cover)**

| Type | No. in Carton | Weight Lbs. | | | | | Shipping Carton Dimensions, Inches |
|---|---|---|---|---|---|---|---|
| | | Domestic | | Export | | | |
| | | Net | Shipping | Net | Legal | Gross | |
| **Single Phase** | | | | | | | |
| D5S-E | 1 | 6 | 7 | 6 | 7 | 8 | 9½ x 9½ x 11½ |
| D5S-E | 4 | 24 | 26 | 24 | 26 | 28 | 16 x 16 x 11½ |
| **Polyphase** | | | | | | | |
| D5S-2E | 1 | 6½ | 7 | 6½ | 7 | 8 | 9½ x 9½ x 11½ |
| D5S-2E | 4 | 26 | 29 | 26 | 29 | 31 | 16½ x 16½ x 15 |
| D5A-2E | 1 | 8½ | 9½ | 8½ | 9½ | 10½ | 11 x 11 x 12 |
| D5S-3E | 1 | 10 | 12 | 10 | 11 | 12 | 12 x 10½ x 12¼ |
| D5S-3E | 4 | 40 | 43¼ | 40 | 42½ | 43½ | 16⅛ x 16⅛ x 10⅝ |
| D5A-3E | 1 | 12 | 14 | 12 | 13 | 14 | 12 x 10½ x 12¼ |
| D5S-5E | 1 | 9 | 10 | 9 | 10 | 11 | 9½ x 9½ x 11½ |
| D5S-5E | 4 | 36 | 39 | 36 | 39 | 41 | 16½ x 16½ x 15 |
| D5S-7E | 1 | 9 | 11 | 9 | 10 | 11 | 12 x 10½ x 12¼ |
| D5S-7E | 4 | 36 | 39½ | 36 | 38½ | 39½ | 16⅛ x 16⅛ x 10⅝ |
| D5A-7E | 1 | 10¼ | 12¼ | 10¼ | 11¼ | 12¼ | 12 x 10½ x 12¼ |
| D5S-8E | 1 | 9 | 10 | 9 | 10 | 11 | 9½ x 9½ x 11½ |
| D5S-8E | 4 | 36 | 39 | 36 | 39 | 41 | 16½ x 16½ x 15 |
| D5A-8E | 1 | 11 | 12 | 11 | 12 | 13 | 11 x 11 x 12 |

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