

**TRUE R.M.S. WATTMETER (MULTIPLIER) DPM,**  
 • RS232/422 • Peak & Hold • 3-State BCD • Digital Limit  
 • Excitation/Compliance • Analog Output • PC Compatible

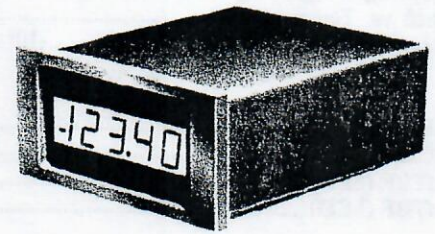
**MODEL  
213**



LED

**FEATURES**

- Unlimited Power Measurement
- Uses External Standard 50, 100mV Shunts
- 120, 240, or 480V Ranges Easily Scaled to Engineering Units
- 30Hz to 20KHz Frequency Response
- 1.0% Accuracy & Linearity
- 1/8 DIN & NEMA Compatible Cut-Out
- 3 1/2 Digit LED or LCD Display with/wo Dummy Digit
- 7 Power Inputs



LCD

**DESCRIPTION: WARNING - NO ISOLATION** The Model 213 contains an Ultra-stable RMS analog multiplier to perform the watts conversion (Ix E) into a 0-2VDC full scale signal that is digitized by the A/D converter on the mainframe.

Flexibility of applications and power measurements are only limited to the external (customer supplied) current shunts, you can order a calibrated unit for specific range or solve by the following equation:  
 $VRMS \times IRMS \times \cos \phi = \text{WATTS}$   
 $\therefore \phi = E - I \text{ Difference PHASE}$

Since the 213 is designed to accept mVRMS at its "current" input (from a shunt) and VRMS at its "voltage" input (but the display will read in watts) select the proper current shunt to have the product of IxE fall within the 2000 or 20,000 counts (2V FS) of the display.

**CONNECTOR(S):** A standard screw type connector for power and signal input is used. The I/O ports (top board) have industry standard flat cable connectors according to the function. All mating connectors are supplied at no charge.

**DISPLAY:** High efficiency  $\pm 3\frac{1}{2}$  LED with or without dummy digit or its LCD high contrast low power equivalent. Dummy digit is programmable as a x10 multiplier or alpha A, C, F, H, E, L, P, etc.

**INPUT RANGES:** Industry's most popular ranges are standard. Contact Otek for special input ranges or scaling.

**EXCITATION (COMPLIANCE) AND ANALOG CONTROL OUTPUTS:** The most popular combinations to match transducers are available, see Specifications & Ordering Information. The 4-20mA outputs are ideal for Proportional Control.

**DIGITAL CONTROL OUTPUT OPTIONS**

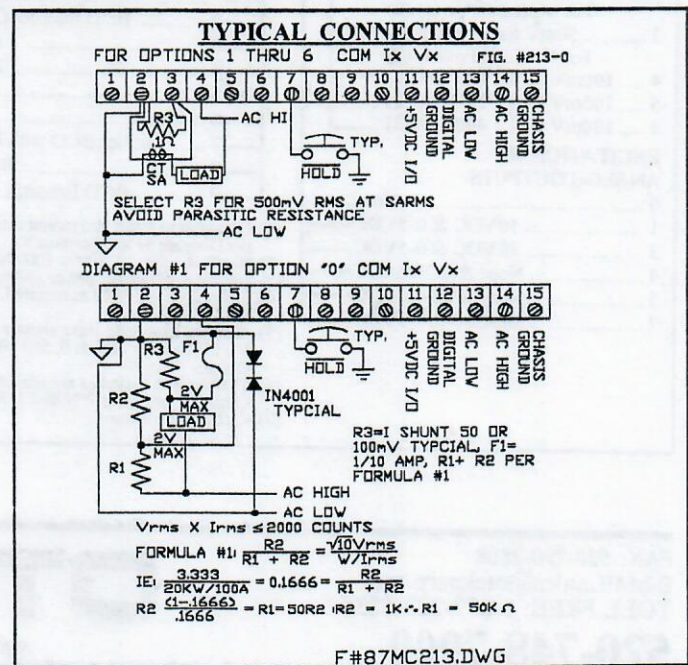
- Option 1: BCD PARALLEL TRISTATE NON-ISOLATED, TTL compatible, bit addressable, with a 34 Pin Flat Ribbon connector.
- Option 2: BCD PARALLEL TRISTATE OPTO-ISOLATED to 1500VDC, TTL compatible bit addressable, with a 34 Pin Flat Ribbon connector.
- Option 3: DIGITAL PEAK & HOLD WITH RECALL holds and recalls the greatest positive and negative peak when enabled, otherwise it displays current data. A 34 Pin Flat Ribbon connector is included.
- Option 4: DIGITAL LIMIT compares internal BCD data to an external BCD word (Multiplex Format) from Thumbwheel Switches or any TTL source. Its two 1 amp SPDT relays (for over and under) control external loads. It is field programmable for hysteresis of 10 or 100 counts. A 34 Pin Flat Ribbon connector is supplied.
- Option 5: RS232C converts the "ULTIMA 200" to a data acquisition system. Up to 32 stations and baud rates from 150-19,200, see Section 7, Model A81-2450.

- Option 6: RS422 This is the high-speed, longer distance version of RS232C with same features, Section 7, Model A81-2450.
- Option 7: PARALLEL BCD WITH PEAK & HOLD: This option combines both options (1 & 3) on the same board.
- Option 8: 8-BIT ENCODED BCD MUX: The output of the A/D (same as display) is presented on an 8 bit BUS containing the BCD (1, 2, 4, 8) plus over-range, under-range, and sign are encoded in 3 lines. A separate strobe BCD word line is included. This system is compatible to any 8 bit BUS system. Address selection is available.
- Option 9: 8-BIT ENCODED BCD OPTO-ISOLATED: Same as option 8 except it is opto-isolated to 1500VRMS. Power requirement is 5VDC at 100mA.

**POWER INPUTS:** Seven options are available: 5VDC non-isolated, 120VAC, 50-60Hz & 240VAC, 50-60Hz isolated to 1200VDC or RMS, 10VAC, 40-400Hz non-isolated, 12VDC non-isolated, 7-32VDC non-isolated and 7-32VDC isolated.

**CASE:** U.L. approved ABS Polycarbonate 94VO rated. Meets 1/8 DIN and NEMA panel cut out requirements.

**FULL SCALE, DECIMAL POINTS, AND OTHER ADJUSTMENTS** are easily accessible by removing the bezel and filter.



TRUE RMS AC

**SPECIFICATIONS AT 25°C**

**MAINFRAME**

Accuracy and Linearity ..... 1% of F.S.  $\pm 1$  Digit  
 Frequency Response ..... 30-20KHz  
 Lead/Lag Compensation ..... None  
 Max. Input Signal  $I_x$  ..... 1VRMS  
 Max. Input Signal  $V_x$  ..... 100% F.S.  
 Drift vs. Temperature ..... 0.001% F.S./°C  
 Operating/Storage Temperature ..... -10° to +60°C/-20 + 70°C

**DISPLAY**

LED  $\pm 3\frac{1}{2}$  ..... 0.6"  
 LCD  $\pm 3\frac{1}{2}$  ..... 0.5"  
 MTBF (LED) ..... 100,000 Hours  
 MTBF (LCD) ..... 80,000 Hours

**EXCITATION (COMPLIANCE)/ANALOG OUTPUTS**  
 (Non-isolated from digital ground)

5VDC Excitation ..... 5VDC  $\pm 0.1\%$  30mA Max.  
 0-5VDC Output .....  $\pm 1\%$  Accuracy, Max. Load: 5mA  
 24VDC Compliance ..... 24VDC  $\pm 10\%$  @ 30mA Max.  
 4-20mA Output .....  $\pm 1\%$  Accuracy, 24VDC Compliance  
 20 4mA Output .....  $\pm 1\%$  Accuracy, 24VDC Compliance  
 1.8mA Excitation .....  $\pm 1\%$  at 24VDC Compliance  
**NOTE: All outputs are short circuit protected.**

**DIGITAL CONTROL OUTPUTS (All Positive True Logic)**  
**Tristate Parallel BCD** ..... 10LPTTL Loads  
**3-State Par, BCD Opto-Isolated** ..... 10LPTTL Loads, 1500VDC  
 isolation, 20mA at 5VDC  
**Digital Limit** ..... Absolute comparison, 1 amp relays at 120VAC  
 resistive, parallel BCD serial digit select type (multiplexed)  
**Thumbwheel Switches** ..... BCD w/Diodes  
**Peak & Hold** ..... + or - peaks, user recall/clear  
 by logic or switch contact  
**BCD Multiplex** ..... Parallel digit BCD, serial digit  
 select MSD to LSD scan  
**Parallel BCD with Peak & Hold** is the combination of options 1 &  
 3 (same specifications).  
**RS232/422** ..... See Model A81-2450

**POWER INPUTS**

5VDC ..... 50mA  
 Display ..... LED: 140mA; LCD Display: 20mA  
 Plus ..... Excitation option of 150mA, plus digital control output  
 of 100mA. Worst case requirements (Fully Loaded): 500mA  
 120VAC ..... 100mA  
 240VAC ..... 50mA  
 7-32VDC ..... 300mA  
 12VDC ..... 300mA

**ORDERING INFORMATION (11/1/00)**

MODEL **2** **1** **3** **□** **□** **□** **□** **0**

**DISPLAY TYPE (7)**

0 ... 3½ LED w/Dummy Zero  
 3 ... 3½ LCD w/Dummy Zero  
 5 ..... 3½ LED  
 6 ..... 3½ LCD

**INPUT RANGE F.S.**

0 ..... Customer Selected (1)  
 1 ..... 50mV for  $I_x$ : 120VAC  
 For  $V_x$  (Line Power) (2)  
 2 ..... 50mV for  $I_x$ : 240VAC  
 For  $V_x$  (Line Power) (2)  
 3 ..... 50mV for  $I_x$ : 480VAC  
 For  $V_x$  (Line Power) (2)  
 4 ..... 100mV for  $I_x$ : 120VAC(3)  
 5 ..... 100mV for  $I_x$ : 240VAC(3)  
 6 ..... 100mV for  $I_x$ : 480VAC(3)

**EXCITATION & ANALOG OUTPUTS**

0 ..... None  
 1 ..... 10VDC & 0-5VDC  
 3 ..... 24VDC & 0-5VDC  
 4 ..... None & 4-20mADC  
 5 ..... None & 20-4mADC  
 7 ..... 1.8mADC & 0-5VDC

**POWER INPUT**

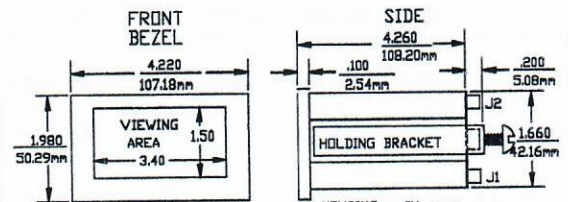
0 ..... 5VDC  
 1 ..... 120VAC  
 2 ..... 240VAC  
 3 ..... 10VAC  
 4 ..... 12VDC  
 5 ..... 7-32VDC  
 6 ..... Isolated 7-32VDC

**DIGITAL CONTROL OUTPUTS (6)**

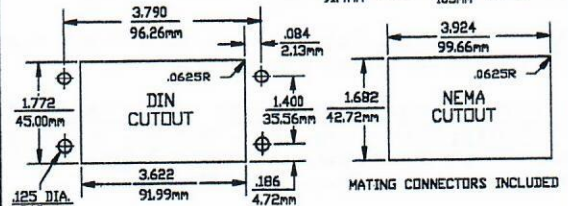
0 ..... None  
 1 ..... BCD Parallel  
 2 ..... BCD Parallel Opto-Isolated  
 3 ..... Peak & Hold  
 4 ..... Digital Limit  
 5 ..... RS232C  
 6 ..... RS422  
 7 ..... Parallel BCD with Peak & Hold  
 8 ..... BCD Encoded  
 9 ..... BCD Encoded Optoisolated

- (1) Customer to select and mount externally  $R_1$ ,  $R_2$  &  $R_3$  per Diagram #1 and Formula #1
- (2) 50mV at either 10, 100 or 1000 Amps full load
- (3) 100mV at either 10, 100 or 1000 Amps full load.
- (4) Select Decimal Point as required, by removing Bezel & Filter
- (5) Absolute maximum input signals:  $I_x$ : 1VRMS;  $V_x$ : 2VRMS for Option 0, 550 VRMS for Options 1 thru 6
- (6) Thumbwheel Switches are available for the Digital Limit Option, Order P/N 89-0213 ( $\pm 3\frac{1}{2}$ ).
- (7) 4 1/2 digit on request.

**MECHANICAL**

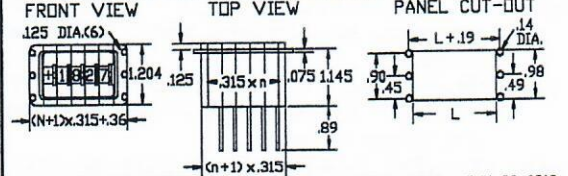


HOUSING IN DIMENSIONS mm HIGH 1.66 42mm WIDE 3.6 91.4mm DEPTH 4.16 105mm



MATING CONNECTORS INCLUDED  
 \* MOUNTING HOLES OPTIONAL ON DIN ONLY (#4-40) INSTEAD OF HOLDING BRACKET USE FLAT HEAD SCREWS.

**SR SERIES THUMBWHEEL SWITCHES (REAR MOUNT) PANEL CUT-OUT**



F#87MC200M.DWG  
 $\pm 3$  1/2 DIGIT/L=1.89" - P/N 89-0213  
 $\pm 4$  1/2 DIGIT/L=2.205" - P/N 89-0215

FAX: 520-790-2808  
 E-MAIL:sales@otekcorp.com  
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