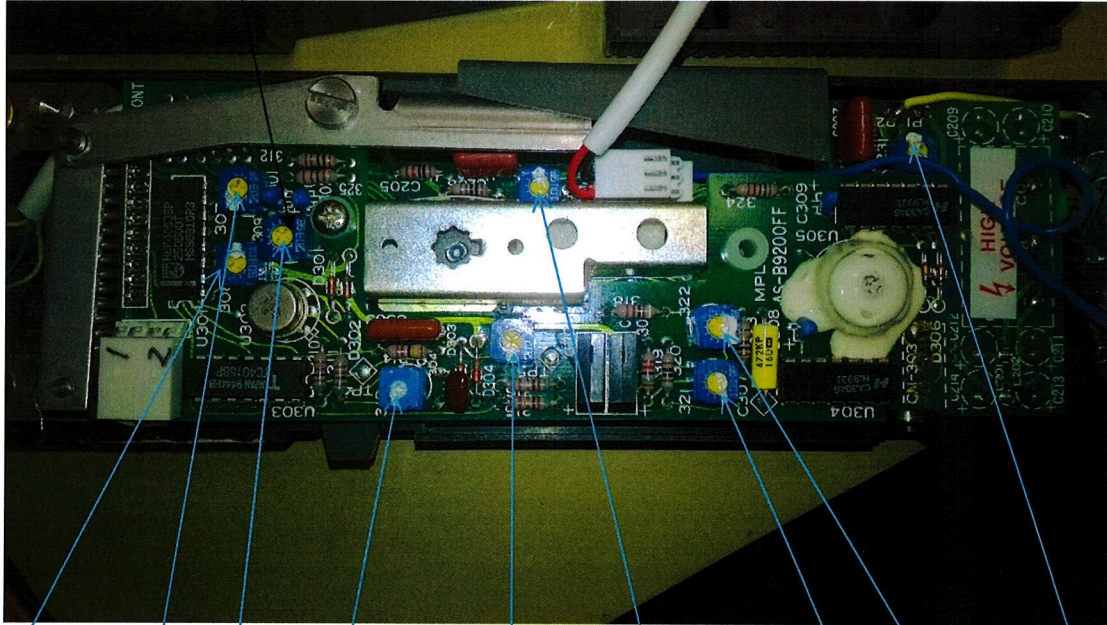


YOKOGAWA 2433

Potentiometer Positionen

P 104 !



P 308

P 307

P 309

P 313

P 317

P 222

P 321

P 322

P231

1) Clock C 307 R 104 10kHz \pm 5 Hz

2) Arms "0" R 313

3) Wrms "0" R 317

4) Analog Out "0" R321

5) Arms Low 1,900 A R308

6) Analog Out 95 R322

7) Wrms factor C 208

8) 190,0 V R231

9) 1900 kW Low R309

10) 190 V 10 A =1900 W P1 – P3 R222

11) 10,00 kW High R307

12) Arms 19,00 High R 212

13) Vrms 600 V 400Hz \pm 4 D.

Item \ Measurement Function		Vrms	Arms	kW (single phase)
Operating Principle		Feedback Time Division Multiplier RMS Value Computation		Feedback Time-division Multiplier
Input Ranges (Automatic Ranging)	2433-01	200/600 V	20/200 A	20/200 kW
	2433-02	200/600 V	2/20 A	2/20 kW
Resolution		0.1 V/digit	-01: 10 mA/digit -02: 1 mA/digit	-01: 10 W/digit -02: 1 W/digit
Frequency Range		40 to 400 Hz		
Crest Factor		Less than 2 at rated Value	Less than 3 at rated value	See Vrms and Arms
Accuracy At ambient temperature: $23 \pm 3^{\circ}\text{C}$ Input waveform: Sinusoidal		$\pm (1\% \text{ of reading} + 0.5\% \text{ of range})$ for 47 to 63 Hz $\pm (2\% \text{ of reading} + 1\% \text{ of range})$ for 40 to 47 Hz or 63 to 400 Hz		At unity power factor, same as for V and A measurements
Power Factor Influence (at $\cos \varphi = 0.5$ 50 or 60 Hz)		—		Less than $\pm 1\%$ of reading
Temperature Characteristic at 5 to 20°C or 26 to 40°C 50 or 60 Hz		Less than $\pm 0.1\%$ or range/ $^{\circ}\text{C}$		
Meter Loss		Input Impedance $1\text{ M}\Omega$	0.6 VA at 200 A (2433-01) 0.01 VA at 20 A (2433-02)	
Maximum Allowable Input (for less than 5s)		1,000 Vpk	1,000 Apk (2433-01) 200 Apk (2433-02)	Corresponds to Vrms and Arms measurements
Continuous Maximum Allowable Input		700 Vrms	300 Arms (2433-01) 30 Arms (2433-02)	

2-6. Inspection and Adjustment.

- (1) **Clock adjustment of the A/D converter.**
Turn the function selector switch from OFF to kW (or Vrms or Arms).
Connect a frequency counter between C307 and COM of the MPL Ass'y and adjust R104 so that the counter indicates 10.01 kHz \pm 5 Hz.
- (2) **Zero adjustment of the RMS circuit.**
Turn the function selector switch to "Arms" and turn the R317 and R321 to its center position. Adjust R313 so that the power meter display is 0 ± 1 digit.
- (3) **Zero adjustment of the W circuit.**
Turn the function selector switch to "kW" and adjust R317 so that the power meter display is 0 ± 1 digit.
- (4) **Zero adjustment of the analog output.**
Adjust R321 so that the power meter analog output voltage is 0 ± 0.3 mV on a digital voltmeter.
- (5) **F.S. adjustment of the A circuit low range.**
Turn the function selector switch to "Arms" and set the AC voltage and current standard setting dials to 1.900 A and adjust R308 so that the power meter display is 1.900 ± 2 digit.
- (6) **F.S. adjustment of the analog output.**
In the above procedure (5), adjust R322 so that the analog output voltage is 95 ± 0.3 mV.
- (7) **Power factor adjustment of the W circuit.**
Turn the function selector switch to "kW" and apply an input voltage of 500 V and input current of 20 A. Confirm that the display of the Model 2433 is as shown in the following list when $\cos \phi = 0$ (at lag side).

2433-01	0.20 to -0.50
2433-02	0.0 to -0.04

- If the display is outside the above range, replace C205 through C208. If the value is excessively positive, reduce the capacity in 20% steps, and if the value is excessively negative, increase the capacity in 20% steps.
- (8) **F.S. adjustment of the W circuit low range.**
Turn the function selector switch to "Vrms". apply an input voltage of 190.0 V and adjust R231 so that the Model 2433 display is 190.0 ± 2 digit.
 - (9) **F.S. adjustment of the V circuit low range.**
Turn the function selector switch to "kW", apply an input voltage of 190 V and input current of 10 A (1900 W setting) and adjust R309 so that the power meter display is 1900 ± 2 digit.
 - (10) **F.S. adjustment of the P3 input W circuit.**
Turn the function selector switch to "kW" and apply an input voltage of 190 V across terminals P1 and P3, and apply input current of 10 A. Adjust R222 so that the power meter display is $(1900 \pm 2 \text{ digit}) \pm 2$ digit.
 - (11) **F.S. adjustment of the W circuit high range.**
Turn the function selector switch to "kW" and apply an input voltage of 500 V and input current of 20 A (10 kW). Adjust R307 so that the Model 2433 display is 10.00 ± 1 digit.
 - (12) **F.S. adjustment of the A circuit high range.**
Turn the function selector switch to "Arms", set the measurement current to 19 A and adjust R212 so that the Model 2433 display is within 19.00 ± 2 digit.
 - (13) **Confirmation of F.S. value on the V circuit high range.**
On the "Vrms" range, set the measurement voltage to 600 V and confirm that the Model 2433 displays 600 ± 4 digit.
Further, set the measurement voltage to 210 V at 400 Hz and confirm that the Model 2433 display is between 202 and 218 V.

4. SCHEMATIC DIAGRAMS AND COMPONENT LOCATION DIAGRAMS.

Par.	Description	Ass'y No.	Figure No.	Page
1	PCB Ass'y Component Location Diagram	B9200FA	4-1a	4-2
2	PCB Ass'y Component Location Diagram	B9200FC, FD	4-2a	4-3
3	PCB Ass'y Component Location Diagram	B9200FF	4-3a	4-6
4	Model 2433 Clip AC Power Meter Schematic Diagram ADC Ass'y	B9200FA	4-1b	4-3
5	Model 2433 Clip AC Power Meter Schematic Diagram PWM Ass'y	B9200FC, FD	4-2b	4-5
6	Model 2433 Clip AC Power Meter Schematic Diagram MPL Ass'y	B9200FF	4-3b	4-7

2-4. Disassembling.

When disassembling the Model 2433, follow the procedure described below referring to Figure 2-2.

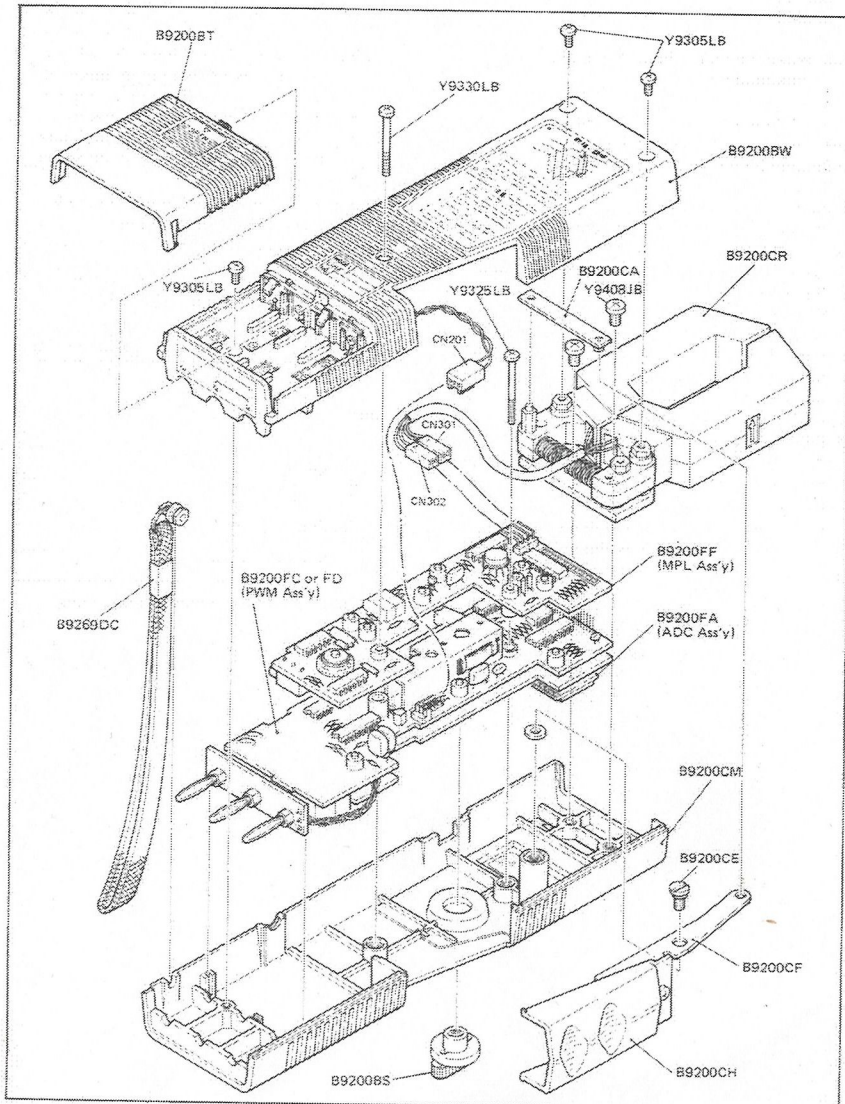


Figure 2-2. Disassembling of the Model 2433

2-5. Inspection and Adjustment Preparations.

- (1) **Rear case ass'y (B9200BW).**
Set the function selector switch to OFF, and unplug the leads for voltage measurement from the mainframe, remove the Battery cover (B9200BT) and remove the four batteries.
The rear case ass'y (B9200BW) may be removed by removing the following four screws.
Y9330LB 1 pc
Y9305LB 3 pcs
Remove the lead wires connected to the case with the connector (CN201) shifted to the CT side.
- (2) **CT ass'y (B9200CR).**
The CT can be removed by removing the plate ass'y (B9200CA) near the CT and the two screws (Y9408JB) fixing the CT.
Shift the connectors (CN301 and 302) to the HOLD-MEAS switch side, and remove the lead wires connecting the CT.
- (3) **Printed Circuit Boards and front case ass'y (B9200CM).**
First, remove the screw (B9200CE), then remove the grip assembly (B9200CH + B9200CF).
Remove the screw (T9325LB) fixing the printed circuit board. Remove the measuring knob (B9200BS) by inserting the screwdriver tip between printed circuit board (B9200FA) and the front case ass'y (B9200CM).
Three printed circuit boards are joined by connectors into one printed circuit board assembly and it can be removed from the front case cover. The three printed circuit boards can be separated from each other by gently pulling them apart with your hands.

- (1) Adjust the analog output voltage with a load resistor $1\text{ M}\Omega \pm 1\%$ connected in parallel to the digital voltmeter inputs.
- (2) Always perform power meter adjustments strictly in the order they are described in this manual and if a part of procedure must be repeated, observe the correct order of adjustments.
- (3) Adjust the clip-on AC power meters according to the indication of an AC voltage/current standard or standard power meter when the 10 turn coil for the Model 2433-01 or one turn coil for the Model 2433-02 is used.
- (4) The automatic ranging method is used for the Model 2433, so, when adjusting Lo (low) range, confirm that the power meter is in low range mode.
- (5) Adjust the power range at $\cos \phi \approx 1$ and use the current for fine power adjustment.
- (6) Adjust the PCB Ass'y after following items are confirmed using an oscillograph (for zero voltage and current inputs).
 - LCDs light without flickering.
 - Approximately 40 kHz (square waveform) at TP1.
 - Approximately 6.8 to 7.2 kHz ($\pm 6\text{ V}$ square waveform) at TP2 on W range Approximately 800 Hz ($\pm 6\text{ V}$ square waveform) at TP2 on V and A ranges.
- (7) Wire the instruments for inspection and adjustment to the Model 2433 as shown in Figure 2-3.

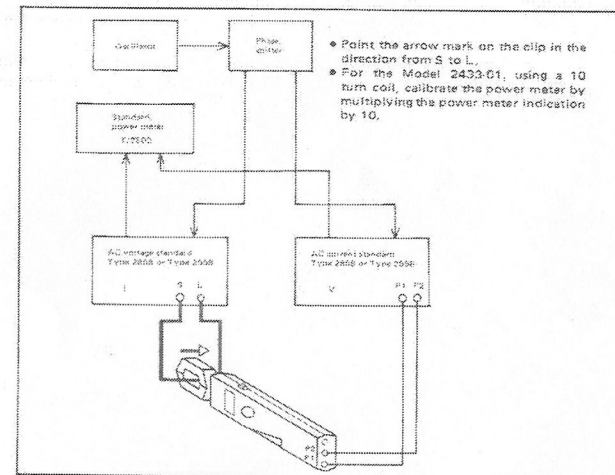


Figure 2-3. Wiring Diagram for Model 2433 Inspection and Adjustment