



INSTRUCTION MANUALS

*** Model SWR POWER METER ***

Model is SWR & POWER Meter with Directional Coupler installed and its character is to measure the wide frequency range precisely by the very easy operation. For SWR measurement, it uses Directional Coupler, comparing the power supplied to and reflected from transmitter and the independent SWR indicates the measurement. For power measurement, the power meter indicates the travelling wave power detected by Directional Coupler and its frequency range is determined by the figure of Variable Resistor which is for sensitivity adjustment, Model is a through type power meter in its construction, so RF component is not directly detected from co-ax line. Accordingly, there is very little loss connecting it between transmitter and antenna circuit and QSO is available as it is connected.

SPECIFICATIONS

Measuring Way	Directional Coupler	
Measuring Range	RF Power	0-1 KW
	SWR	1 : 1-1 : 3 V.S.W.R.
Frequency Range	3.5-150 MHz	
Circuit Impedance	50-75 ohm	
Measuring Accuracy	RF Power	±20%
	SWR	± 5 %
Connecter	SO-239	
Meter Sensitivity	SWR Meter	100µA F.S.D.
	POWER Meter	100µA F.S.D.
Dimensions	120(W)×50(H)×65(D)mm.	
Weight	450g.	

OPERATION

*** Connection of Model ***

1. Turn off the output power of transmitter. Disconnect the co-ax cable which leads to antenna from transmitter.
2. Connect the antenna terminal of transmitter and the "TRANSMITTER" connector of Model with the same kind of cable as the cable from the antenna. This co-ax cable is preferably short, and should be less than 1 meter long.
3. Connect the co-ax cable which leads to the antenna to the "ANTENNA" connector of Model When any antenna coupler is set between transmitter and antenna, connect Model between transmitter and antenna coupler. In this case, any type of feeder is acceptable between antenna coupler and antenna, but use 50 ohm or 75 ohm co-ax cable which fits to the transmitter output power impedance between transmitter and Model .

*** SWR Measurement ***

1. Turn transmitter on, under the condition that Model is correctly connected.
2. POWER Meter and SWR Meter swing at the same time. Adjust the center knob so that the left side POWER Meter indicates "100/50". This position is the position of "SET." You can now read SWR figure on the right side SWR Meter directly.
3. The indication of SWR Meter shows the ratio of the travelling wave power from transmitter and the reflected wave power from antenna circuit, so the higher the indication of SWR Meter, the larger the reflected wave power. The reflected wave power is not delivered from antenna and it is more preferable that its power is less. If SWR Meter indicates less than 1.3, the condition is good. The table below shows the ratio of the travelling wave power and the reflected wave power against the SWR figure.

SWR	W(REF)/W(FOR)%	SWR	W(REF)/W(FOR)%
1.1	0.227	1.5	4.00
1.2	0.827	2.0	11.1
1.3	1.71	2.5	18.4
1.4	2.78	3.0	25.0

4. In case Antenna Coupler is set between Model and antenna, adjust Antenna Coupler to make SWR figure as small as possible.

5. The relationship between the minimum input power and frequency range in order to measure SWR by Model is as follows.

Frequency (MHz)	The Minimum Input Power (watts)
3.5	15
7	7.5
14	4
21—28	2
50—150	1

*** RF Power Measurement ***

1. Connect correctly Model , transmitter and antenna.
2. The center dial of Model is the level dial to fix the relationship between the frequency range and the measuring power. According to the used frequency, fix the dial position referring to the below tables. There are two tables, one is for the 50 ohm line impedance and another for the 75 ohm line impedance. So, select either one according to the output impedance of transmitter.

Table 1. 50 ohm line

at SWR 1~1.5

Freq. MHz	POWER METER FULL SCALE VALUE											
	1 W	5 W	10W	25W	50W	100W	150W	200W	250W	300W	500W	1 KW
3.5	—	—	—	—	—	9.4	9.2	9.0	8.9	8.8	8.5	7.8
7	—	—	—	—	9.1	8.7	8.5	8.2	7.9	7.7	7.0	5.7
14	—	—	9.2	8.8	8.1	7.4	6.9	6.3	5.7	5.5	4.0	—
21	—	9.2	9.0	8.4	7.2	5.9	5.1	4.3	3.4	2.6	—	—
27	—	9.0	8.7	8.0	6.5	4.9	3.4	—	—	—	—	—
28	—	9.0	8.7	7.9	6.4	4.8	3.3	—	—	—	—	—
50	9.2	8.3	7.4	6.1	3.5	1.0	—	—	—	—	—	—
144	8.4	5.8	3.9	—	—	—	—	—	—	—	—	—
Scale reading	100W	500W	100W	50W	50W	100W	50W	100W	50W	100W	50W	100W
Multiple X	1/100	1/10	1/10	1/2	1	1	3	2	5	3	10	10

Table 2. 75 ohm line

at SWR 1~1.5

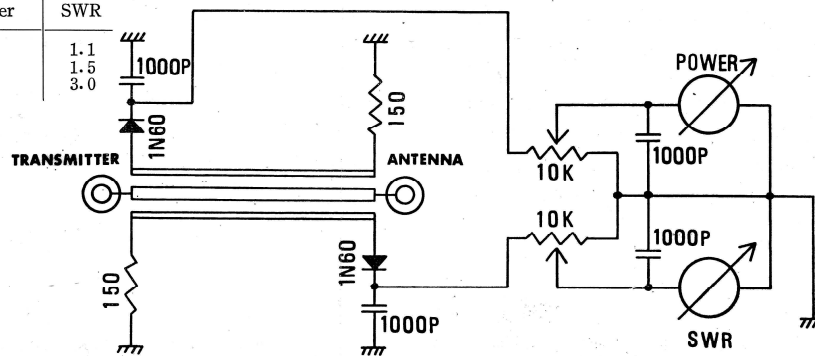
Freq. MHz	POWER METER FULL SCALE VALUE											
	1 W	5 W	10W	25W	50W	100W	150W	200W	250W	300W	500W	1 KW
3.5	—	—	—	—	—	9.8	9.4	9.3	9.2	9.1	9.0	8.6
7	—	—	—	—	9.2	8.9	8.5	8.3	8.0	7.9	7.3	5.9
14	—	—	9.2	8.9	8.1	7.2	6.5	5.8	5.4	4.8	3.0	—
21	—	9.3	8.8	8.0	7.1	5.7	4.4	3.5	2.7	1.5	—	—
27	—	9.1	8.5	7.5	6.4	4.6	2.5	—	—	—	—	—
28	—	9.0	8.4	7.4	6.3	4.5	2.5	—	—	—	—	—
50	9.6	8.7	8.0	6.5	4.8	1.8	—	—	—	—	—	—
144	8.3	5.2	2.1	—	—	—	—	—	—	—	—	—
Scale reading	100W	50W	100W	50W	50W	100W	50W	100W	50W	100W	500W	100W
Multiple X	1/100	1/10	1/10	1/2	1	1	3	2	5	3	10	10

3. Turn the output of transmitter on. POWER Meter swings and its indication shows the power when the frequency and the measuring range are set by the level dial. POWER Meter is scaled for both 50 watts and 100 watts. Use either scale according to the Table 1 or Table 2.
4. POWER Meter indicates the travelling wave power, so the correct output of antenna cannot be measured if SWR is too high. Measure after you confirm the SWR figure is less than 1.5.
5. SWR measurement cannot be done when you measure RF power.

*** CAUTION ***

1. Never disconnect the the connector of Model leading to antenna when transmitter is on. Model may be burned and spoiled.
2. Sometimes abnormal voltage is found at a certain place of the feeder when transmitter and antenna circuit are mismatching. Do not connect Model in such a case. The safety limit of Model from the view point of transmitting power and SWR figure is shown in the below Table. Cut off the output power of transmitter immediately and do not use Model when the shown figure is exceeded.

Transmitting Power	SWR
1kW	1.1
500kW	1.5
300kW	3.0



SCHEMATIC OF MODEL