

POWER MONITORING

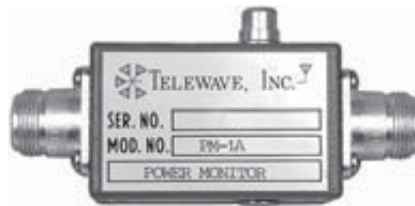
Broadband Wattmeters

Telewave Broadband Wattmeters are known worldwide for quality, durability, and convenience. A single meter covers 2-200 MHz or 20-1000 MHz and 1-500 watts with no plug-in elements or band switching.



Power Monitors

RF power monitors produce a calibrated DC voltage proportional to an RF signal between 30 and 960 MHz. They are available as single and dual-direction devices with very low insertion loss.



Alarm Panels

Power monitoring and alarm panels continuously monitor the output of up to 12 transmitters and 2 antennas. Multiple measurements are switch selectable including VSWR and FWD/REV power. Relay contact closures indicate out of range conditions.



MODEL 44L1, L1P BROADBAND RF WATTMETER

FEATURES

- REQUIRES NO ELEMENTS OR "SLUGS"
- NO BAND SWITCHING
- MEASURES 1 TO 500 WATTS
- 5 POWER RANGES
- 5 WATT FULL SCALE RANGE
- COVERS 2 - 200 MHz
- MEASURES FORWARD AND REFLECTED POWER
- -40 dB RF SAMPLING PORT
- SHOCK-MOUNTED METER
- LOW TEMPERATURE OPERATION
- QUICK-CHANGE CONNECTORS
- LIGHT WEIGHT: 3 LBS

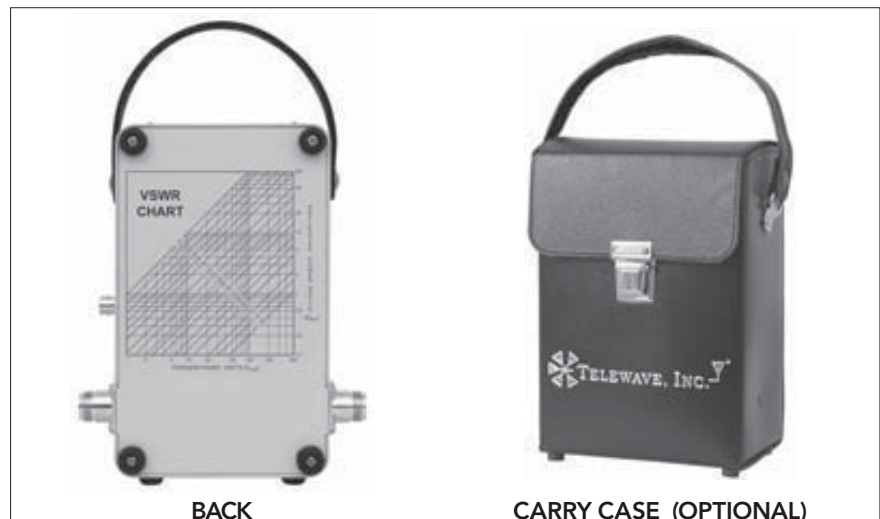
The Telewave Model 44L1/L1P RF Wattmeter is a compact, versatile instrument used for direct measurement of forward and reflected RF power in a coaxial transmission line under any load conditions. Wide band capability and dynamic range allows operation without elements, inserts, or bandswitching.

The 20 microamp taut-band meter movement is shock mounted in a rugged, diecast housing, making this instrument ideal for mobile radio installation in aircraft or vehicles, as well as base stations.

Model 44L1P includes an RF sampling port, with an output 40 dB below the total transmission line level, for frequency measurement, signal injection, or spectral analysis.



MODEL 44L1P



BACK

CARRY CASE (OPTIONAL)

MODEL 44L1, L1P

This wideband instrument covers 2 to 200 MHz with a power range of 1 to 500 watts. The meter movement can be turned off for protection when not in use. A leather carrying strap is provided for easy portability. The use of a taut-band meter movement allows operation in cold temperatures.

The RF sample port on Model 44L1P samples a low level of RF power as it passes through the instrument. This bi-directional port is accessed via a BNC connector located on the side of the meter. It allows injection of a signal into the device under test, or can be used for spectrum analysis and frequency measurements without affecting operation of the meter.

The Model 44L1/L1P utilizes a set of precision directional detectors which sample forward and reverse CW power flow in a specially engineered section of transmission line. The sampled current is scaled

to drive the 20 μ A taut band meter. Forward and reflected power can be directly measured by rotating the FWD-REV switch. VSWR (Voltage Standing Wave Ratio) is easily determined by comparing these measurements and using the convenient chart on the back of the instrument.

Five power scales are provided. The 500 watt scale will test most high powered transmitters, while the 5 watt scale makes it simple to tune low powered portables. The excellent stability of this unit and the ability to switch it from one power range to another to check the calibration eliminates the need for a secondary standard to verify calibration.

SPECIFICATIONS	
Frequency range	2-200 MHz
Full scale power ranges	5, 15, 50, 150 and 500 watts
Impedance, primary line	50 ohms nominal
VSWR (max)	1.1:1
Accuracy (at 80% of full scale)	+/- 7% with N connectors only
RF sampling port (44L1P)	-40 dB +/- 2 dB below total power (forward + reverse)
Connectors (input/output) (Quick-Change standard)	N Female standard UHF, DIN, TNC, BNC optional
Sample port	BNC Female
Dimensions (HWD)	in. 6.625 x 4 x 3.25 mm 168.3 x 101.6 x 82.6
Weight lbs (kg)	3 (1.36)

MODEL 44A, AP BROADBAND RF WATTMETER

FEATURES

- REQUIRES NO ELEMENTS OR "SLUGS"
- NO BAND SWITCHING
- MEASURES 1 TO 500 WATTS
- 5 POWER RANGES
- 5 WATT FULL SCALE RANGE
- COVERS 20 - 1000 MHz
- MEASURES FORWARD AND REFLECTED POWER
- -40 dB RF SAMPLING PORT
- SHOCK-MOUNTED METER
- LOW TEMPERATURE OPERATION
- QUICK-CHANGE CONNECTORS
- LIGHT WEIGHT: 3 LBS

The Telewave Model 44A/AP RF Wattmeter is a compact, versatile instrument used for direct measurement of forward and reflected RF power in a coaxial transmission line under any load conditions. Wide band capability and dynamic range allows operation without elements, inserts, or bandswitching.

The 20 microamp taut-band meter movement is shock mounted in a rugged, diecast housing, making this instrument ideal for mobile radio installation in aircraft or vehicles, as well as base stations.

Model 44AP includes an RF sampling port, with an output 40 dB below the total transmission line level, for frequency measurement, signal injection, or spectral analysis.



MODEL 44AP



BACK



CARRY CASE (OPTIONAL)

MODEL 44A, AP

This wideband instrument covers 20 to 1000 MHz with a power range of 1 to 500 watts. The meter movement can be turned off for protection when not in use. A leather carrying strap is provided for easy portability. The use of a taut-band meter movement allows operation in cold temperatures.

The RF sample port on Model 44AP samples a low level of RF power as it passes through the instrument. This bi-directional port is accessed via a BNC connector located on the side of the meter. It allows injection of a signal into the device under test, or can be used for spectrum analysis and frequency measurements without affecting operation of the meter.

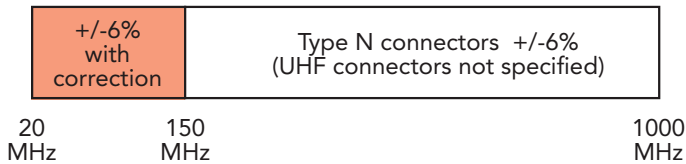
The Model 44A/AP utilizes a set of precision directional detectors which sample forward and reverse

CW power flow in a specially engineered section of transmission line. The sampled current is scaled to drive the 20 μ A taut band meter. Forward and reflected power can be directly measured by rotating the FWD-REV switch. VSWR (Voltage Standing Wave Ratio) is easily determined by comparing these measurements and using the convenient chart on the back of the instrument.

Five power scales are provided. The 500 watt scale will test most high powered transmitters, while the 5 watt scale makes it simple to tune low powered portables. The excellent stability of this unit and the ability to switch it from one power range to another to check the calibration eliminates the need for a secondary standard to verify calibration.

SPECIFICATIONS	
Frequency range	20-1000 MHz
Full scale power ranges	5, 15, 50, 150 and 500 watts
Impedance, primary line	50 ohms nominal
VSWR (max)	1.1:1
RF sampling port (44AP)	-40 dB +/-2 dB below total power (forward + reverse)
Connectors (input/output) (Quick-Change standard)	N Female standard UHF, DIN, TNC, BNC optional
Sample port	BNC-female
Dimensions (HWD)	in. 6.625 x 4 x 3.25 mm 168.3 x 101.6 x 82.6
Weight lbs (kg)	3 (1.36)

METER ACCURACY



RF POWER MONITORS

PM-1A, PM-2A SERIES

Telewave RF Power Monitors are single or dual-direction devices which produce a DC voltage proportional to an RF signal between 30 and 960 MHz, depending on model. These devices exhibit extremely low insertion loss, and are designed to be placed in the transmission line permanently, allowing continuous monitoring of forward and reflected power.

Each power monitor is used for one transmitter within a specified bandwidth. Voltage trimmers allow each unit to be quickly recalibrated for a new frequency within the same

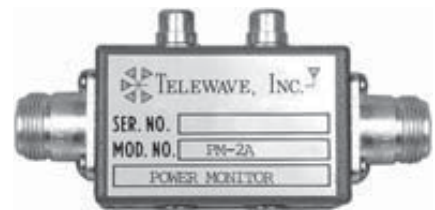
band. One or two RCA connectors provide access to the proportional DC output, which is coupled to the meter panel with a simple shielded audio-type cable.

Standard RF connectors are N Female. Any combination of N, SMA, or UHF, Male or Female are available on request.

Note: Center frequency or desired band coverage must be specified with order.



PM-1A



PM-2A

MODEL	TYPE	FREQUENCY	BANDWIDTH*
PM-1A-50	Single Direction	30-88 MHz	20 MHz
PM-1A-90	Single Direction	87.5-108 MHz	20 MHz
PM-1A-150	Single Direction	118-230 MHz	50 MHz
PM-1A-300	Single Direction	200-400 MHz	50 MHz
PM-1A-450	Single Direction	380-512 MHz	50 MHz
PM-1A-760	Single Direction	700-869 MHz	50 MHz
PM-1A-900	Single Direction	806-960 MHz	50 MHz
PM-2A-50	Dual Direction	30-88 MHz	20 MHz
PM-2A-90	Dual Direction	87.5-108 MHz	20 MHz
PM-2A-150	Dual Direction	118-230 MHz	50 MHz
PM-2A-300	Dual Direction	200-400 MHz	50 MHz
PM-2A-450	Dual Direction	380-512 MHz	50 MHz
PM-2A-760	Dual Direction	700-869 MHz	50 MHz
PM-2A-900	Dual Direction	806-960 MHz	50 MHz
SPECIFICATIONS			
Input power range	5-1000 watts		
Impedance (typ.)	50 ohms		
VSWR (max)	1.1:1		
Insertion loss (typ)	0.1 dB		
Dimensions (HWD) in. (cm)	1.375 x 2.25 x 1.25 (3.5 x 5.7 x 3.2)		
Weight lb. (kg)	0.5 (0.2)		
RF connectors	Any combination of N, SMA, or UHF Male/Female (specify types)		
DC connectors	RCA-F standard, BNC-F or SMA (optional)		

*Bandwidth is the approximate maximum range over which a useful range of voltages are available without retuning.

PM1C1S RF POWER MONITOR / ALARM PANEL

The Telewave PM1C1S is a single-channel, single antenna automatic alarm panel for low transmit power and high VSWR, featuring "true VSWR" circuitry and a built-in power monitor. The 2RU panel (3.5" x 19") mounts in any standard rack or inside most base station cabinets, and can be powered directly from 120 VAC or 12 VDC.



Whenever a low transmitter power condition is sensed by the PM1C1S, a latched relay closure occurs and a red light on the front panel turns on. Both normally-open and normally-closed relay contacts are provided.

A high VSWR condition is indicated by a second latched relay and light. These contacts can be used to remotely activate light, speakers, or other alarm systems. The relays and lights are reset by means of a front panel RESET button.

The panel also operates as an inline power monitor, measuring both forward and reverse RF power, with readings displayed on a 3.5-inch meter. A PM-2A power monitor for the appropriate frequency band is included, attached to the rear panel.

The PM1C1S has 2 meter scale options: 0-250 watts, or 0-400 watts. The meter scale and frequency band must be specified with the order.

FREQUENCY RANGE	BANDWIDTH
30-88 MHz	20 MHz
87.5-108 MHz	20 MHz
118-512 MHz	50 MHz
760-960 MHz	40 MHz

The frequency range is determined by the integrated power monitor. Bandwidth is the approximate maximum range over which a useful range of voltages are available without retuning.

SPECIFICATIONS		
Power scales	FWD	0-250 watts or 0-400 watts
	REV	0-25 watts or 0-120 watts
VSWR alarm range		2.0:1 +25% / -10%
Low power alarm range		5 watts to full scale
Delay timing range		0.1 to 1 second
Relay contacts, closure		N/O and N/C
Relay contacts, ratings		3A - AC or DC
Temperature range		-20°C to +60°C
Power requirements		120 VAC / 4 W or +12 VDC / 2 W
Dimensions (HWD) in. (cm)		3.5 x 19 x 4 (8.9 x 48.3 x 10.2)
Weight lbs (kg)		3.5 (1.6)

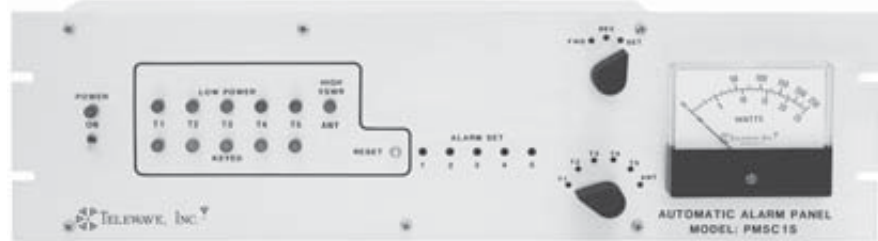
PM5C1S RF POWER MONITOR / ALARM PANEL

The Telewave PM5C1S is an automatic alarm panel featuring "true VSWR" circuitry. With optional PM-1A or PM-2A power monitors, this panel monitors the power output of up to 5 transmitters for low power, and provides a high VSWR alarm for one antenna. The 3RU (5.25" x 19") panel mounts in any standard rack or inside most base station cabinets, and can be powered directly from 120VAC or 12VDC.

Whenever a low transmitter power condition is sensed by the PM5C1S on one of the five channels, a latched relay closure occurs for the appropriate channel and a red light turns on at the front of the panel. Normally open and normally-closed relay contacts are provided for each individual channel.

A high antenna VSWR condition is accurately sensed at all power levels and indicated by a sixth latched relay and light. These contacts can be used to remotely activate lights, speakers, or other alarm systems. The relays and lights are reset by means of a front panel RESET button or by momentarily grounding the RESET input connection located on the rear of the unit.

The panel also operates as an inline power monitor, measuring both forward and reverse RF power of up to five transmitters plus a sixth channel for single antenna VSWR, with all readings displayed on a 3.5-inch meter. Up to 6 power monitors (not included) for the appropriate frequency band are required.



The PM5C1S has 2 meter scale options: 0-250 watts, or 0-400 watts. The meter scale must be specified with the order.

FREQUENCY RANGE	BANDWIDTH
30-88 MHz	20 MHz
87.5-108 MHz	20 MHz
118-512 MHz	50 MHz
760-960 MHz	40 MHz

The frequency range is determined by the associated power monitors. Bandwidth is the approximate maximum range over which a useful range of voltages are available without retuning.

SPECIFICATIONS		
Power scales	FWD	0-250 watts or 0-400 watts
	REV	0-25 watts or 0-120 watts
VSWR alarm range		2.0:1 +25% / -10%
Low power alarm range		5 watts to full scale
Delay timing range		0.1 to 1 second
Relay contacts, closure		N/O and N/C
Relay contacts, ratings		3A - AC or DC
Temperature range		-20°C to +60°C
Power requirements		120 VAC / 8 W or +12 VDC / 3.5 W
Dimensions (HWD) in. (cm)		5.25 x 19 x 3.25 (13.3 x 48.3 x 8.3)
Weight lbs (kg)		4 (1.8)

PM10C2S1C

RF POWER MONITOR PANEL

The Telewave PM10C2S1C is a 1RU, compact RF power monitor panel, capable of monitoring up to ten transmitters and two antennas with optional PM-1A or PM-2A power monitors. This unit fits in 1.75" x 19", preserving valuable rack space for other equipment.



The PM10C2S1C greatly simplifies procedures for monitoring the output of transmitters, and the condition of transmission lines and antennas. Ten remote transmitter keying switches are provided, and a simple two wire hook-up (RF shielded or twisted pair) from the keying circuit of each transmitter to the screw terminals located on the rear of the wattmeter panel completes the connections. A floating ground required by certain transmitters is provided for each keyer.

VSWR calculations can be made when appropriate dual-direction power monitors are installed. The FWD / REV switch on the front panel quickly displays forward and reflected power for the transmitter or antenna circuits. Up to 10 power monitors (not included) for the appropriate frequency band(s) are required.

The power monitor panel is not frequency dependent, and power monitors for multiple bands can be used with a single panel. No power supply is required for the meter panel.

FREQUENCY RANGE	BANDWIDTH
30-88 MHz	20 MHz
87.5-108 MHz	20 MHz
118-512 MHz	50 MHz
760-960 MHz	40 MHz

The frequency range is determined by the associated power monitors. Bandwidth is the approximate maximum range over which a useful range of voltages are available without retuning.

SPECIFICATIONS		
Power scales	FWD	0-400 watts
	REV	0-120 watts
Monitor inputs		12 FWD, 12 REV
Input connectors		RCA-Female
Temperature range		-20°C to +60°C
Dimensions (HWD) in. (cm)		1.75 x 19 x 5 (4.5 x 48.3 x 12.7)
Weight lbs (kg)		2 (0.9)