Acterna PSM-137/-139 Level Measuring Sets

Precise and accurate testing of physical network elements

Companies need to be confident of the physical characteristics of their transmission line, equipment, systems and services before they can identify service performance issues or deploy new applications. For new high capacity and broadband services, such as xDSL, this confidence is essential. Every cable, modem or network element that is not correctly set up can be a drain on revenue. Network operators, services providers, labs and service centers need a solution that can respond to the increased demands placed upon these key network elements in today's market place that is driven by bandwidth.

The Acterna PSM-137/-139 measure voltages and power levels accurately, quickly and unambiguously across the spectrum. The instruments have a wide variety of applications including copper wire testing, modem verification, lab calibration, field-testing, and service center maintenance.

It is the only solution that can pinpoint problems precisely and quickly. The PSM-137/-139 are proven systems with a demonstrable industry pedigree. They produce high accuracy results, which are traceable to international standards.

The instruments are highly advanced, based on over 40 years' experience in this field. With the help of cutting-edge Acterna LevelPro PC control software, these instruments meet all the users' requirements for physical element testing. When combined with the software, these instruments deliver an unparalleled level of voltage, frequency and power measurement accuracy and speed. This means that even novice users can quickly verify the physical characteristics of a line, device or system present on the network. The PSM-137/-139 deliver the widest breadth and depth of testing capability available on the market today.

Highlights

- **Conducts high performance transmission line, equipment, systems and services testing**
- **Supports ISDN, PCM, POTS, E1/T1, FDM, FM-VFT and xDSL networks**
- **Offers selective and broadband measurements with spectrum analysis in one unit**
- **Provides signal and frequency response analysis**
- **Enables end-to-end testing and comprehensive reporting even over long distances**
- **Delivers a high degree of portability, including five hour battery operation**

ACTERNA™
The Keepers of Communications

High performance transmission line, equipment, systems or services testing

The PSM-137/-139 are capable of qualifying ISDN, PCM and xDSL circuits. They can perform rapid and effective measurements on both FDM and VFT systems. The instruments provide voltage, power, selective or broadband testing, which places them in an elite category of high performance test equipment. They measure gain, loss and frequency response. A continuous Frequency Sweep mode and Synchronized Frequency Stepping mode ensure that no physical abnormalities within a network element are missed.

In addition to these features, the instruments also provide selective frequency counter (AFC), signal search or interference analysis (known as hot tone search). Through the large range of accessories, the PSM-137/-139 also support bridge measurements, such as impedance, return loss and common-mode suppression.

They can simulate longitudinal voltages in balanced systems, offer AM/SSB demodulation and perform voice-channel psophometer measurements in accordance with ITU-T O.41. The PSM-137/-139 can also conduct noise distortion measurements (NPR) and transmission distortions (TIMS), including phase jitter (to ITU-T 0.9) interrupts (to ITU-T 0.61) and impulse noise (to ITU-T 0.71).

With their built-in graphical user interface and powerful software, the instruments offer more than just numerical measurement and capture. Instead, they provide a series of post-measurement analysis features, including results tabulation and automation features.

Signal and frequency response analysis

The instruments' Sweep mode provides continuous diagnosis across a set frequency range. Sweep times between one second and 300 seconds enable spectrum analysis and frequency response curves to be displayed and evaluated graphically. The instruments can be optimized for LOW NOISE or LOW DISTORTION operation to match the measurement task, making them suitable for spectrum and network analysis. They also provide other practical operating features, including single or continuous sweep, maximum value memory, marker copy function (MKR-FCENT), and marker evaluations (even while performing measurements). Measurements of impedance, return loss or common-mode suppression versus frequency are particularly quick and easy to make using external bridges available as optional accessories.

End-to-end measurements over long distances

The PSM-137/-139's Autostep mode delivers synchronized measurements using two instruments even over long distances. One instrument acts as generator (or "master"), the other as receiver ("slave"). This can be used, for example, when determining line loss or far-end cross-talk. A measurement may consist of up to 100 frequency steps that can be defined as required. Synchronization does not require any additional control circuits. Results are shown as a graph on the display and can be easily evaluated using the markers.

The Autostep mode can also be used with a single instrument, for example to determine near-end crosstalk at one end of the line.

Powerful remote control capabilities

The instruments are equipped with an easy-to-access print function. This enables current result values to be output via the serial interface (V.24) direct to an external output device or to be stored on the memory card. The memory card stores instrument setups and results and can be read or processed using any PC equipped with a PCMCIA interface. Both V.24 and GPIB interfaces can be remotely controlled. The command
set conforms to the SCPI guidelines. Tailor-made measurement solutions can be easily created with the support of the available LabWindows™ drivers. LevelPro software provides an easy-to-use solution to the problem of graphically documenting results that requires no additional programming.

Acterna LevelPro

This powerful control and evaluation software has been specially designed for use with the PSM-137/-139.
It controls up to two instruments via the GPIB or RS232 interface and provides useful evaluation features, such as trace comparisons, difference traces, two markers, tolerance masks with PASS/FAIL indicators and many other functions in addition to the practical graphical user interface. The additional menus for measurements using external bridges, which include impedance, return loss and signal balance are especially useful because they enable the direct display of results and frequency-independent normalization. The built-in database provides support for comprehensive measurements and instrument settings. This software runs under Microsoft® Windows® on a desktop or notebook PC.

Specifications of the Level Measuring Sets

Frequency range

plus tracking generator (TX + RX)	PSM-137	PSM-139
Coaxial input	50 Hz to 8 MHz	50 Hz to 32 MHz
Balanced input I	10 kHz to 8 MHz	10 kHz to 14 MHz
Balanced input II	50 Hz to 620 kHz	50 Hz to 620 kHz
Frequency display resolution	1 Hz (0.1 Hz with AFC)	
Frequency accuracy	2×10^{-6} (5×10^{-7} with option BN 4203/00.06)	

Frequency control modes

Automatic tone search with pre-set level threshold (TONE SEARCH)
Automatic frequency control (AFC)
Automatic frequency stepping (AUTOSTEP)
Linear sweep up to 1 MHz per second, graphical presentation of measured results

Level measuring range

Input*	Selective	Voice (50 Hz to 10 kHz)	Wideband
Z_0 = 50, 75 Ω	±130 to +30 dBm	±110 to +30 dBm	±50 to +30 dBm
Z_0 = 124, 150 Ω	±120 to +25 dBm	±100 to +25 dBm	±40 to +25 dBm
Z_0 = 600 Ω	±130 to +20 dBm	±110 to +20 dBm	±50 to +20 dBm

* North American versions: Z_0 = 135 Ω instead of 150 Ω

Level, voltage, power

Display of absolute level in	dB, dBm, dBmp, dBrnC
Display of relative level in	dB0, dBm0, dBm0p, dBrnC0
Voltage display in	µV, mV
Add. display in	dBµV, pW0p
Digital display, resolution	0.01 dB (0.1 dB wideband)
Analog display	bar graph
Bar graph scale ranges	2 dB, 20 dB,100 dB
Bar graph resolution	0.01 dB, 0.1 dB, 0.5 dB

Level display error limits

In selective mode, bandwidth 25 Hz to 3.1 kHz
Input level 0 dBm, digital display, $R_{in} = R_L = Z_0$,
at (23 ±3)°C, for – f ≥ 2 kHz and Z_0 = 50 or 75 Ω
Level error ±0.1 dB

Operating error limits

for $R_{in} = R_L = Z_0$, – f ≥ 2 kHz[1)]

Input	Frequency range	Level range	Error limits
Z_0 = 50, 75 Ω	200 Hz to 32 MHz	± 90 to +30 dBm	+0.20 dB
Z_0 = 124, 150 Ω	60 kHz to 8 (14) MHz	± 85 to +25 dBm	+0.30 dB
Z_0 = 150, 600 Ω	200 Hz to 620 kHz	± 85 to +20 dBm	+0.35 dB

[1)] The operating error limits (IEC 359) are valid within the specified operating ranges of the influence quantities and measured values of specifications. They include the specified influence effects and intrinsic deviations.

Filters

Bandwidths	25 Hz, 100 Hz, 1.74 kHz, 1.95 kHz, 3.1 kHz, 48 kHz and 240 kHz
Bandwidths optional	6 Hz, 200 Hz, 400 Hz

Psophometer filter to ITU-T O.41, C-message filter, Bandstop (notch) filter to ITU-T O.132
Attenuation in stop band,
804 to 850 Hz and 1004 to 1020 Hz ≥50 dB

Dynamics

Intrinsic harmonic distortion a_{k2} and a_{k3}	≥ 80 dB
Noise power ratio NPR for nominal system loading level	≥ 60 dB
With nominal load of 12 MHz baseband	typ. 65 dB

Demodulation

AM/LSB and USB	switchable
Loudspeaker (built in)	volume adjustable
Phone jack	6.3 mm (113BCP)

Transmission impairment measurements TIMS

In a voice channel (direct or after internal demodulation from FDM allocation):
Interruption measurements to ITU-T O.61
Time: 1 min to 100 h, thresholds ±3, ±6, ±10, ±20 dB,
Level range ±50 to +10 dBm, capacity: 9999 events
Impulsive noise measurements to ITU-T O.71
Time: 1 min to 100 h, thresholds: switchable in 0.1 dB steps,
Level range: –60 to 0 dBm, capacity: 9999 events
Phase jitter measurements to ITU-T O.91
(internal demod. test tone frequency 1020 Hz +50 Hz)
Measuring range (for any input frequency) 0.2 to $30°_{pp}$

Tracking generator

Send level range

Output	Impedance	Level range
Coaxial	$R_{out} = R_L = Z_0$ = 50, 75 Ω	± 60 to +9 dBm
Balanced I	$R_{out} = R_L = Z_0$ = 124, 150 Ω	± 60 to +6 dBm
Balanced II	$R_{out} = R_L = Z_0$ = 150 Ω	± 60 to +9 dBm
	$R_{out} = R_L = Z_0$ = 600 Ω	± 70 to +3 dBm
	R_{out} = 5 Ω, R_L = 600 Ω	± 64 to +9 dBm

Output level operating range limits for $R_{out} = R_L = Z_0$

Output	Frequency range	Error limits
Z_0 = 50, 75 Ω	200 Hz to 32 MHz	+0.25 dB
Z_0 = 124, 150 Ω	10 kHz to 14 MHz	+0.35 dB
Z_0 = 150, 600 Ω	200 Hz to 620 kHz	+0.40 dB

North American version: Z_0 = 135 Ω instead of 150 Ω
Harmonic distortion a_{k2} and a_{k3} ≥40 dB

Connectors

Receiver input and tracking generator output
Coaxial Z_0 = 50 and 75 Ω Versacon 9
(normally fitted with BNC female connector)
Balanced Z_0 = 124, 135, 150, 600 Ω 3-pole CF socket[1)]
[1)] North American version: WECO 310; Japanese version: I 213
Auxiliary inputs /outputs (connector Sub-D 9-pole):
Y-output, voltage proportional to bar graph 0 to 5 V
Alarm output, min.-max. limit violations relay contacts
Output for interruptions to ITU-T O.61 TTL signal
External level control input (±1 dB) for tracking generator ±500 mV DC
Reference frequency output 10 MHz/2 V, BNC
Reference frequency input 1, 2, 5, 10 MHz, BNC

Interfaces

Remote control interfaces:
Parallel interface to <IEC 625>/IEEE 488.2
(control commands to SCPI recommendations)
Serial interface to RS232 (V.24)
Memory-Card SRAM/FlashROM

General specifications

Power supply (AC and battery operation)	
AC line voltage, nominal range of use	90 to 264 V
AC line frequency, nominal range of use	47.5 to 63 Hz
Power consumption	approx. 80 VA
Safety class to IEC 1010	Class I
Battery operation with BAZ-2203 battery pack (plug-in module)	
	14 NiCd IEC KR35/62 cells, welded
Charger unit built-in to mainframe instrument	
Operating time	approximately 5 hours

Permissible ambient temperature

Nominal range of use	0 to +40°C
Storage and transport	±20 to +60°C, 0 to +50°C, ± 40 to +75°C
Dimensions (w x h x d)	312 x 159 x 375 mm
Weight	7.5 kg (10 kg with Battery Pack)

Ordering information

	Frequency range	EL display	Memory Card	Tracking Generator	IEEE 488.2/ V.24	Order number
PSM-137	8 MHz	•	•	•	•	4203/15
PSM-139	32 MHz	•	•	•	•	4203/17

Options

Battery Pack (charged via mainframe instrument)	BN 4203/00.04
Tuning Frequency stability 5 x 10^{-7} (factory fitted only)	BN 4203/00.06
Additional 400 Hz bandwidth (only 1 additional bandwidth possible)	BN 4203/00.23
Additional 200 Hz bandwidth (only 1 additional bandwidth possible)	BN 4203/00.24
Additional 6 Hz bandwidth (only 1 additional bandwidth possible)	BN 4203/00.26
Additional 80 Hz bandwidth	BN 4203/00.27
Additional 300 Hz bandwidth	BN 4203/00.29
Additional 800 Hz bandwidth	BN 4203/00.30
Additional 1200 Hz bandwidth	BN 4203/00.31
19-in Rack Mounting Kit	BN 4203/00.07
"North American" input and output sections	BN 4203/00.10
plus	BN 4203/00.11
"Japanese" input and output sections	BN 4203/00.12
plus	BN 4203/00.13
LabWindows/CVI/DOS driver	BN 4203/95.99
LevelProcontrol and evaluation software	BN 4203/93.01

Accessories

Return loss bridges	
RFZ-1 (50 Ω coax., 50 kHz to 190 MHz)	BN 4045/30
RFZ-1 (75 Ω coax., 75 kHz to 190 MHz)	BN 4045/10
RFZ-12 (75 Ω to 600 Ω, 200 kHz to 4.5 MHz)	BN 4810/01
RFZ-30 (120 Ω bal., 30 kHz to 32 MHz)	BN 4234/10
Impedance bridges	
BMB-30 (wire a to b, 10 kHz to 32 MHz)	BN 4234/30
IMB-30 (wires a/b to ground, 50 Hz to 3 MHz)	BN 4234/20
ITG-30 (wires a/b to ground, ITU-T I.431)	BN 4234/15
Signal balance bridges	
SDZ-12 (124 Ω to 600 Ω, 200 Hz to 4.5 MHz)	BN 4811/01
SDZ-30 (120 Ω, 10 kHz to 32 MHz)	BN 4234/01
PSV-39 Amplifier, 20 dB, coaxial (for output levels up to +24 dBm, 50 Hz to 32 MHz)	BN 4249/01
TBN-30 T Network for common mode simulation (Z = 120 Ω, 9 kHz to 32 MHz)	BN 4234/25
MSD-2 Coaxial Choke (for measuring high losses on coaxial systems)	BN 4227/01
KMK-100 Compensated Test Cable, coaxial	BN 4862/00.01
TK-11 Active Probe, 75 Ω output (for low-capacitance, high impedance measurements)	BN 4573/03
SD-930 Dust Covers (1 set)	BN 4203/00.01
TPK-960/3 Transport Case	BN 4203/00.32

Acterna is the world's largest provider of test and management solutions for optical transport, access and cable networks, and the second largest communications test company overall. Focused entirely on providing equipment, software, systems and services, Acterna helps customers develop, install, manufacture and maintain optical transport, access, cable, data/IP and wireless networks.

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Note: Specifications, terms and conditions are subject to change without notice.

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