Selective Level Meters
Level Test Sets
(with tracking generator)

ACTERNA
The Keepers of Communications

Rapid sweep operation from 50 Hz to 8/18/32 MHz

AC or battery powered

SPM-37... 39
SPM-137...139
PSM-37... 39
PSM-137...139

Selective Level Meters and Level Test Sets for measuring the physical parameters of analog and digital communications systems

- **RF voltmeter for selective and broadband measurements**
- **Test sets with tracking generator and sweep functions**
- **Balanced inputs for direct interface or circuit measurements on ISDN, PCM, HDSL, ADSL, VDSL etc.**
- **Spectrum analysis and scalar network analysis**
- **Comprehensive test functions for FDM systems**
- **Memory card for storing setups and results**
- **Remote control via IEEE 488.2 and V.24 interfaces**
- **Hardcopy output with direct V.24 printer connection**
- **Runs for up to 5 hours from batteries**
- **Powerful control software for external desktop or notebook PC**

The SPM/PSM-37...139 family of instruments is designed to measure voltage or power levels extremely accurately.
A number of other functions based on these fundamental measurements allow for a wide range of applications. The built-in generator is coupled to the receiver frequency and has a wide output level range. Application-oriented menus, high measurement speeds, graphic display of the results and practical hardcopy features provide the support you need when making measurements. These instruments are equally suitable for use in the laboratory or production environment as well as for mobile or on-site field operation, thanks to their powerful range of features, very compact design and battery power supply.

Example measurement applications:
- Measurements on FDM and VFT systems
- Qualification of ISDN, PCM, HDSL, ADSL, VDSL circuits
- Measurements on digital interfaces (ETS 300 xxx)
- Use in production test systems
- Receiver for field strength measurements
- Signal analysis (e.g. distortion of electrical signals)
- Radio system baseband measurements.

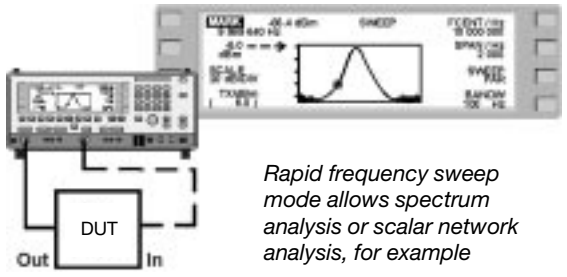
Australia: Tel. +61-3-9690 6700
Brazil: Tel. +55-11-5505 3266
China: Tel. +86-10-6856 1034
Singapore: Tel. +65-356-3246
United Kingdom: Tel. +44-1189-409200
USA: Tel. +1-919-941-5730
Worldwide:
Tel. +49-7121-86 16 16 · Fax +49-7121-86 13 33
e-mail: info@wago.de · http://www.wg.com

Functions and applications:

- Level (voltage and power), selective or broadband
- Gain, loss and frequency response
- Continuous frequency sweep mode (SWEEP)
- Synchronized frequency stepping mode (AUTOSTEP)
- Selective frequency counter (AFC)
- Signal search or interference analysis (hot tone search)
- Bridge measurements (see accessories):
  - Impedance
  - Return loss
  - Common mode suppression
- Simulation of longitudinal voltages in balanced systems
- AM / SSB demodulation
- Voice-channel psophometer measurements (ITU-T O.41)
- Noise distortion measurements (NPR)
- Transmission distortions (TIMS):
  - Phase jitter (ITU-T O.91)
  - Interrupts (ITU-T O.61)
  - Impulse noise (ITU-T O.71)

Signal and frequency response analysis

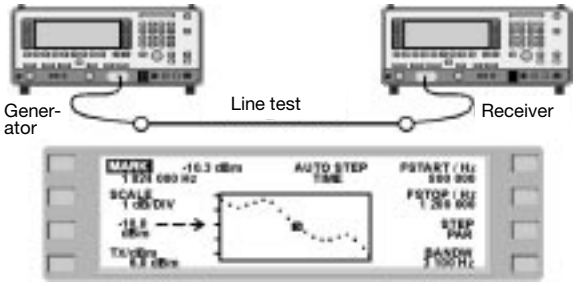
SWEEP mode provides a continuous sweep across the set frequency range. Sweep times between 1 s and 300 s allow spectrum analysis and frequency response curves to be displayed and evaluated graphically. The instruments can be optimized for LOW NOISE or LOW DISTORTION operation to match the measurement task, making them suitable for spectrum and network analysis. Single or continuous sweep, maximum value memory, marker copy function (MKR-›FCENT) and marker evaluations (even during a measurement) are other practical operating features. Measurements of impedance, return loss or common mode suppression versus frequency are particularly quick and easy to make using external bridges.



Rapid frequency sweep mode allows spectrum analysis or scalar network analysis, for example

End-to-end measurements over long distances

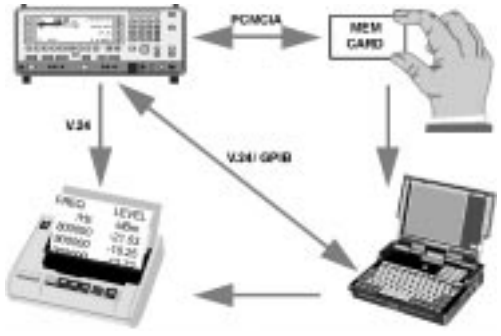
AUTOSTEP mode allows synchronized measurements using 2 instruments even over very long distances. One instrument acts as generator (master), the other as receiver (slave), e. g. when determining line loss or far-end crosstalk. A measurement may comprise up to 100 frequency steps that can be defined as 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.
AUTOSTEP mode can also be used with a single instrument, e.g. to determine near-end crosstalk at one end of the line.



End-to-end measurement in AUTOSTEP mode

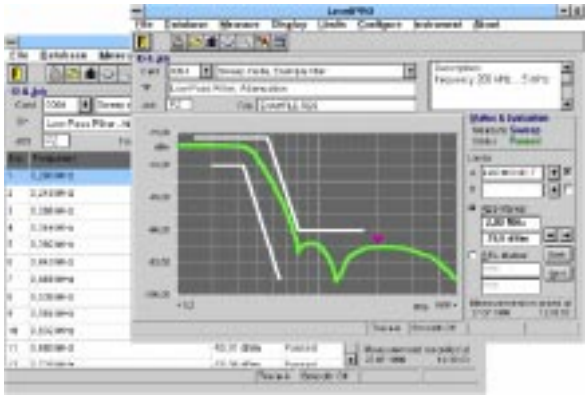
Recording results

The instruments are equipped with a print key. This allows the current result values to be output via the serial interface (V.24) direct to an external printer or to be stored in a file 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 are available for remote control. The command set conforms to the SCPI guidelines. Tailor-made measurement solutions can be easily created with the support of the available LabWindows™ drivers. The LevelPRO software provides an easy-to-use solution to the problem of graphic documentation of results that requires no additional programming.



LevelPRO

This powerful control and evaluation software is specially designed for applications using the SPM/PSM-37 through 139 range of Level Meters and Level Test Sets. It controls up to 2 instruments via the GPIB or RS232 interface and provides useful evaluation features such as trace comparisons, difference traces, 2 markers, tolerance masks with PASS / FAIL indication and many other functions in addition to the practical graphical user interface. The additional menus for measurements using external bridges (impedance, return loss and signal balance) are especially useful, as they allow for direct display of results and frequency-independent normalization. The built-in database provides support for comprehensive measurements and instrument settings. The software runs under Microsoft® Windows™ on any suitable desktop or notebook PC.



Frequency range

Receiver (RX) Receiver (RX)	SPM-37 SPM-137	SPM-38 SPM-138	SPM-39 SPM-139
plus tracking generator (TX + RX)	PSM-37 PSM-137	PSM-38 PSM-138	PSM-39 PSM-139
Coaxial input Balanced input I Balanced input II	50 Hz to 8 MHz 10 kHz to 8 MHz 50 Hz to 620 kHz	50 Hz to 18 MHz 10 kHz to 14 MHz 50 Hz to 620 kHz	50 Hz to 32 MHz 10 kHz to 14 MHz 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)

Frequency control modes

Automatic tone search with preset level threshold (TONE SEARCH)
Automatic frequency control (AFC)
Automatic frequency stepping (AUTOSTEP)
Linear sweep up to 1 MHz/s, 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 . . . . . bargraph
Bargraph scale ranges . . . . . 2 dB, 20 dB, 100 dB
Bargraph 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_{k_2} and a_{k_3} . . . . . ≥ 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 (PSM versions only)

Send level range

Output	Impedance	Level range
Coaxial Balanced I Balanced II	$R_{out} = R_L = Z_0$ = 50, 75 Ω $R_{out} = R_L = Z_0$ = 124, 150 Ω $R_{out} = R_L = Z_0$ = 150 Ω $R_{out} = R_L = Z_0$ = 600 Ω $R_{out} \approx$ 5 Ω, R_L = 600 Ω	–60 to +9 dBm –60 to +6 dBm –60 to +9 dBm –70 to +3 dBm –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_{k_2} and a_{k_3} . . . . . ≥ 40 dB

Connectors

Receiver input and tracking generator output

Coaxial Z_0 = 50 and 75 Ω. . . . . Versacon 9*
Balanced Z_0 = 124, 135, 150, 600 Ω. . . . . 3-pole CF socket[2)]
2) North American version: WECO 310; Japanese version: I 213

Auxiliary inputs/outputs (connector Sub-D 9-pole):
Y-output, voltage proportional to bargraph . . . . . 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
(SPM/PSM-137/138/139 only) . . . . . SRAM/FlashROM
to PCMCIA 2.0/JEIDA V.4.1 . . . . . up to 2 MB

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 (PSM versions) . . . . . 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 . . . . . approx 5 hours

Permissible ambient temperature

	SPM/PSM-37... 39	SPM/PSM-137... 139
Nominal range of use	0 to +40 °C	0 to +50 °C
Storage and transport	−20 to +60 °C	−40 to +75 °C

Dimensions (w × h × d) in mm . . . . . 312 × 159 × 375

Weight . . . . . 7.5 kg (10 kg with Battery Pack)

Ordering information

	Frequency range	LC	EL display	Memory Card	Tracking Generator	IEEE 488.2/ V.24	Order number
Selective Level Meters							
SPM-37	8 MHz	•				optional	**BN 2203/02**
SPM-137	8 MHz		•	•		•	**BN 2203/05**
SPM-38	18 MHz	•				optional	**BN 2203/03**
SPM-138	18 MHz		•	•		•	**BN 2203/06**
SPM-39	32 MHz	•				optional	**BN 2203/04**
SPM-139	32 MHz		•	•		•	**BN 2203/07**
Selective Level Test Sets							
PSM-37	8 MHz	•			•	optional	**BN 2203/12**
PSM-137	8 MHz		•	•	•	•	**BN 2203/15**
PSM-38	18 MHz	•			•	optional	**BN 2203/13**
PSM-138	18 MHz		•	•	•	•	**BN 2203/16**
PSM-39	32 MHz	•			•	optional	**BN 2203/14**
PSM-139	32 MHz		•	•	•	•	**BN 2203/17**

Options:

BAZ-2203 Battery Pack (charged via mainframe instrument)	BN 2203/00.04
IEEE 488.2/V.24 interface for SPM/PSM-37 to 39	BN 2203/00.05
Reference oscillator, accuracy 5×10^{-7} (factory fitted only)	BN 2203/00.06
Additional 400 Hz bandwidth (only 1 additional bandwidth possible)	BN 2203/00.23
Additional 200 Hz bandwidth (only 1 additional bandwidth possible)	BN 2203/00.24
Additional 6 Hz bandwidth (only 1 additional bandwidth possible)	BN 2203/00.26
19″ rack mount kit	BN 2203/00.07
"North American" input section (for all SPM versions)	BN 2203/00.10
"North American" input and output sections (for all PSM versions)	BN 2203/00.10 plus BN 2203/00.11
"Japanese" input section (for all SPM versions)	BN 2203/00.12
"Japanese" input and output sections (for all PSM versions)	BN 2203/00.12 plus BN 2203/00.13
LabWindows/CVI/DOS driver (for SPM/PSM-37...139)	BN 2203/95.99
LevelPRO control and evaluation software (for SPM/PSM-37...139) and external Windows PC)	**BN 2203/93.01**

Accessories

Return loss bridges	
RFZ-1 (50 Ω coax., 50 kHz to 190 MHz)	BN 2045/30
RFZ-1 (75 Ω coax., 75 kHz to 190 MHz)	BN 2045/10
RFZ-12 (75 Ω to 600 Ω, 200 kHz to 4.5 MHz)	BN 0810/01
RFZ-30 (120 Ω bal., 30 kHz to 32 MHz)	BN 2234/10
Impedance bridges	
BMB-30 (wire a to b, 10 kHz to 32 MHz)	BN 2234/30
IMB-30 (wires a/b to ground, 50 Hz to 3 MHz)	BN 2234/20
ITG-30 (wires a/b to ground, ITU-T I.431)	BN 2234/15
Signal balance bridges	
SDZ-12 (124 Ω to 600 Ω, 200 Hz to 4.5 MHz)	BN 0811/01
SDZ-30 (120 Ω, 10 kHz to 32 MHz)	BN 2234/01
SDZ-31 (150 Ω, 10 kHz to 32 MHz)	BN 2234/02
PSV-39 Amplifier, 20 dB, coaxial (for output levels up to +24 dBm, 50 Hz to 32 MHz	BN 2249/01
TBN-30 T Network for common mode simulation (Z = 120 Ω, 9 kHz to 32 MHz)	BN 2234/25
MSD-2 Coaxial Choke (for measuring high losses on coaxial systems)	BN 2227/01
KMK-100 Compensated Test Cable, coaxial	BN 0862/00.01
TK-11 Active Probe, 75Ω output (for low-capacitance, high impedance measurements)	BN 0573/03
Near-field probe set	BN 0926/24
SD-930 Dust Covers (1 set)	BN 0960/00.01
TPK-960/3 Transport Case (for SPM/PSM-xxx)	BN 0960/00.05

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