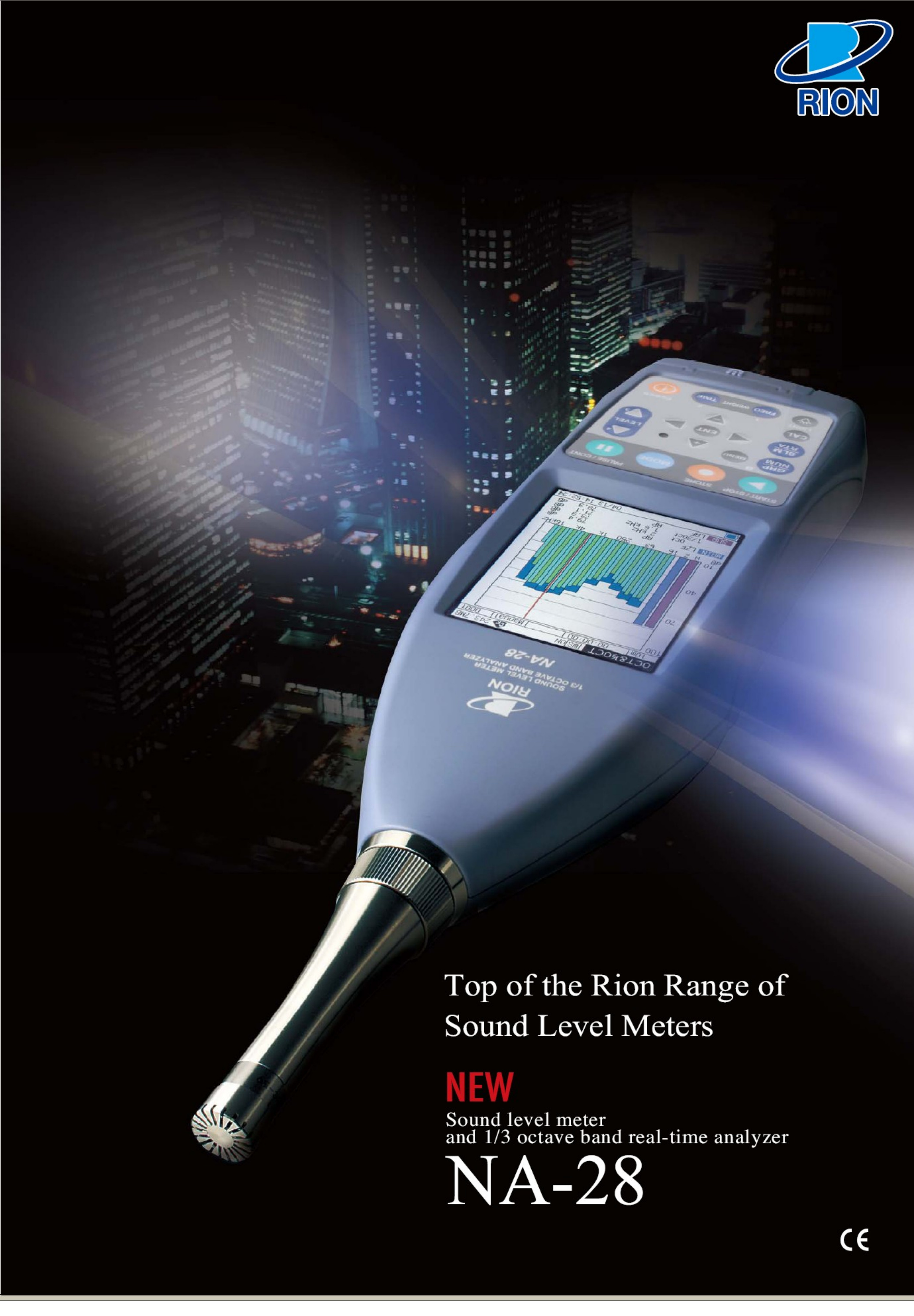


Top of the Rion Range of Sound Level Meters

NEW

Sound level meter
and 1/3 octave band real-time analyzer

NA-28

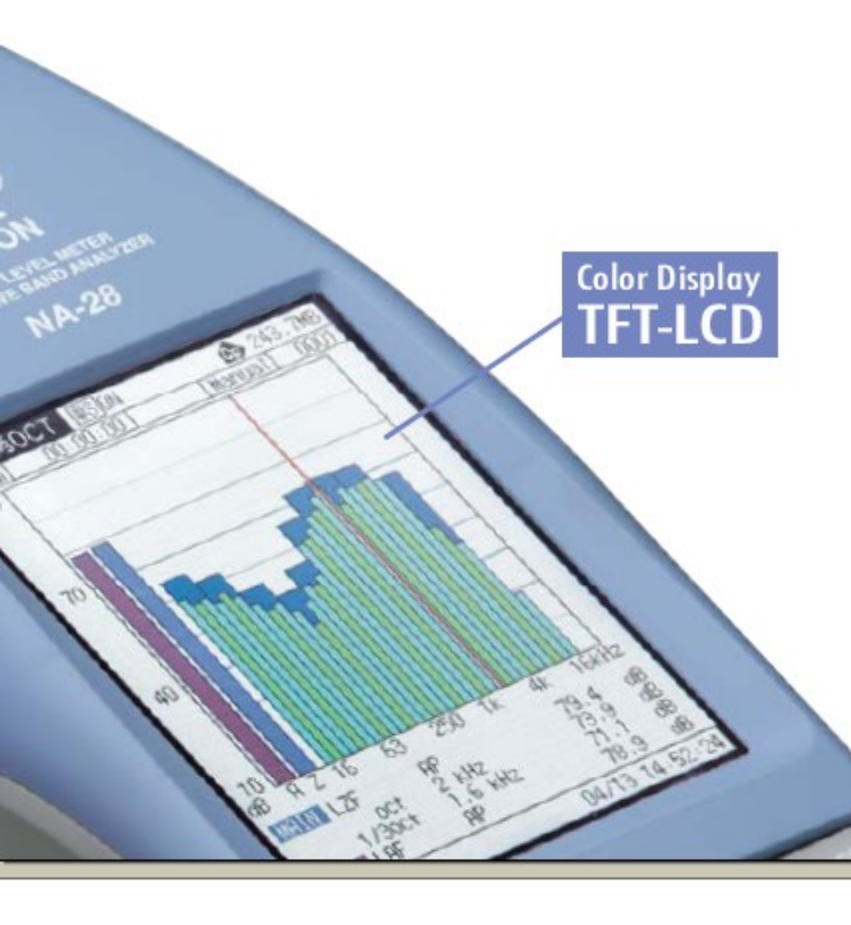
CE

Easy to use compact design with comprehensive features

Rion's priorities for on-site measurements are speed, ease of use, quality and reliability.
The New NA-28 is the top of the Rion range of sound level meters and analyzers. It combines cutting edge technology with excellent quality and unrivalled ease of use.

Key Features Include:

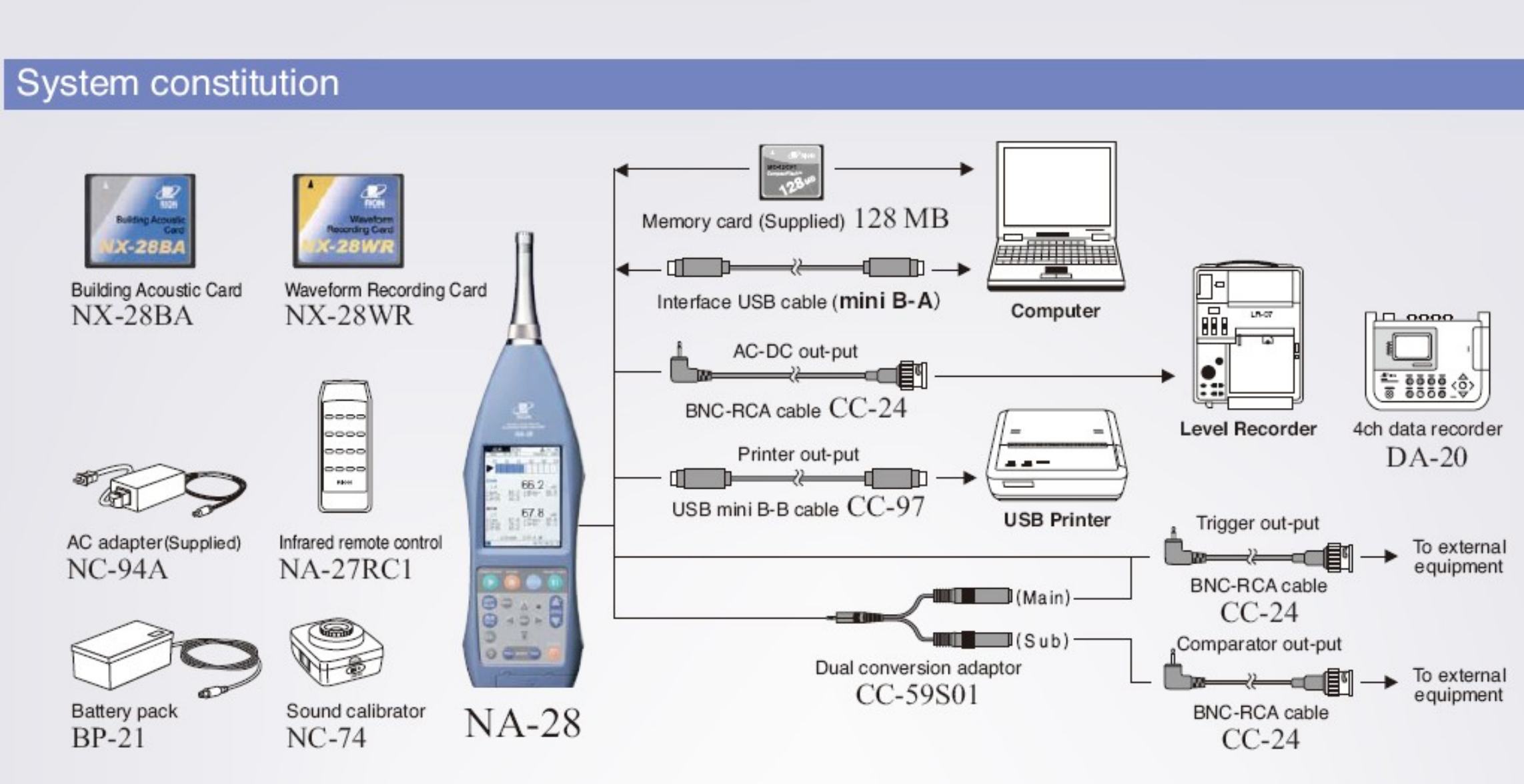
- Ease of use - main functions on dedicated, backlit keys
- Superb high-contrast backlit TFT-LCD colour display
- Simultaneous measurement and display of 1/1 and 1/3 octaves
- One keystroke to switch between sound level meter and analyzer display
- Massive storage capacity using text files stored to CompactFlash memory cards (CF card)
- Flexible and simple PC connectivity (CF card and USB Virtual Disk)
- Exceptional battery life using standard alkaline batteries, approx. 16 hours



NEW
Sound level meter
and 1/3 octave band real-time analyzer

NA-28

System constitution



Key Capabilities

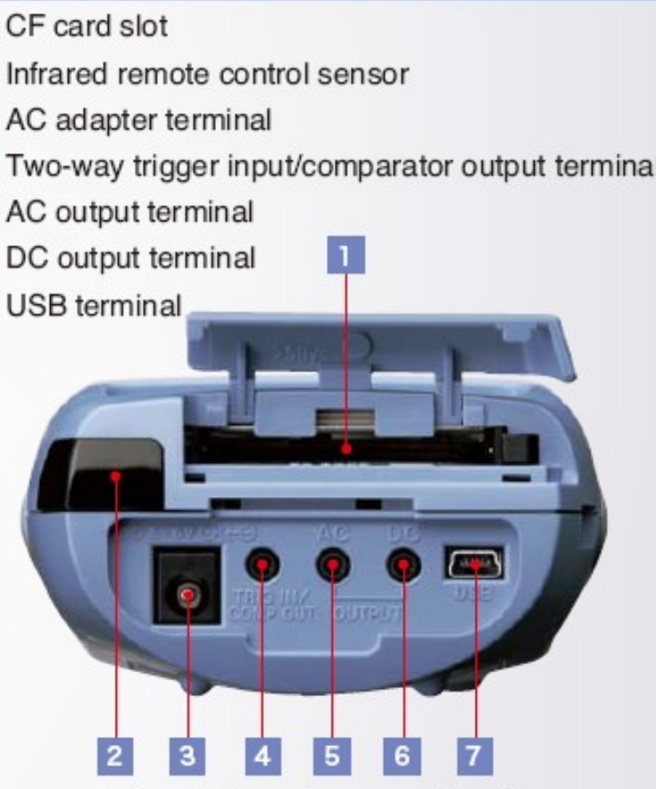
- Real Time Octaves (16 Hz to 16 kHz) or 1/3 octaves (12.5 Hz to 20 kHz)
- Real Time Simultaneous Octaves (16 Hz to 8 kHz) and 1/3 Octaves (12.5 Hz to 12.5 kHz)
- Data stored as text files direct to CF card
- Measures and logs L_{eq}, L_{max}, L_{min} and 5 percentile values (L_N) in octaves and/or 1/3 octaves
- Auto Stores 300 000 data sets or 1 000 hours of 1 second 1/3 octaves onto 1 GB CF card
- Auto Stores 1 000 data sets or 10 000 of 1 second 1/3 octaves to internal memory
- Manual Storage for 1 000 data sets internally or 100 000 data sets to 1 GB CF card
- Linearity 110 dB in Sound Level Meter Mode and 95 dB in Analyzer Mode
- 16 hours battery life with 4 Alkaline 'C' Cells
- Main and Sub-Channel for simultaneous selection of 2 time or frequency weightings F (Fast), S (Slow), 10 ms Time Weightings plus Peak & Impulse on Sub-Channel
- Data transfer using CF card or USB (meter/CF card appearing as virtual disk)
- Measurement can be started by internal or external trigger
- Comparator output to trigger external devices
- AC and DC outputs of main and/or sub-channel
- Expandable functionality using programme cards

Key Options

- Building Acoustics Programme Card
- Uncompressed WAV file recording Programme Card

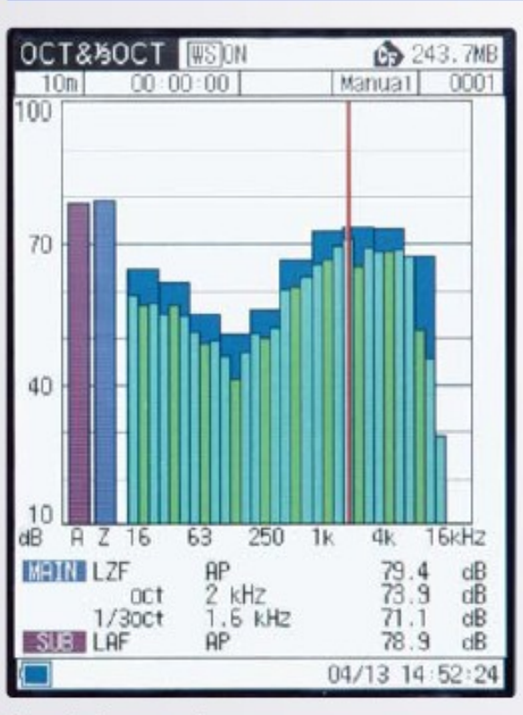
Flexible user interface

1. CF card slot
2. Infrared remote control sensor
3. AC adapter terminal
4. Two-way trigger input/comparator output terminal
5. AC output terminal
6. DC output terminal
7. USB terminal

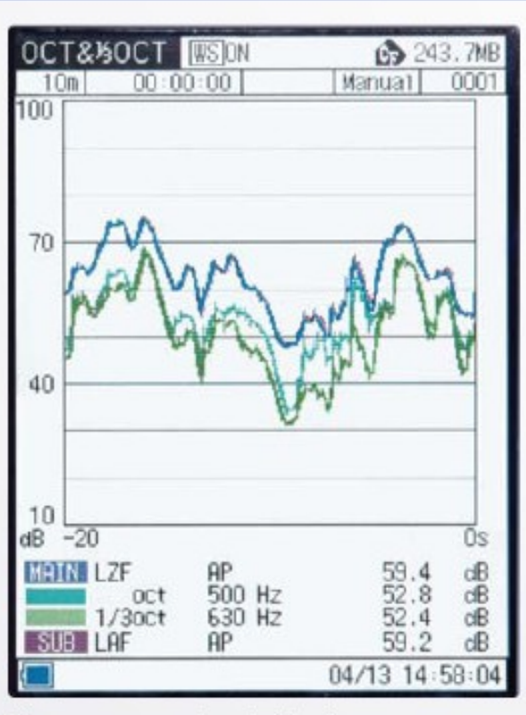


【Terminals on lower surface】

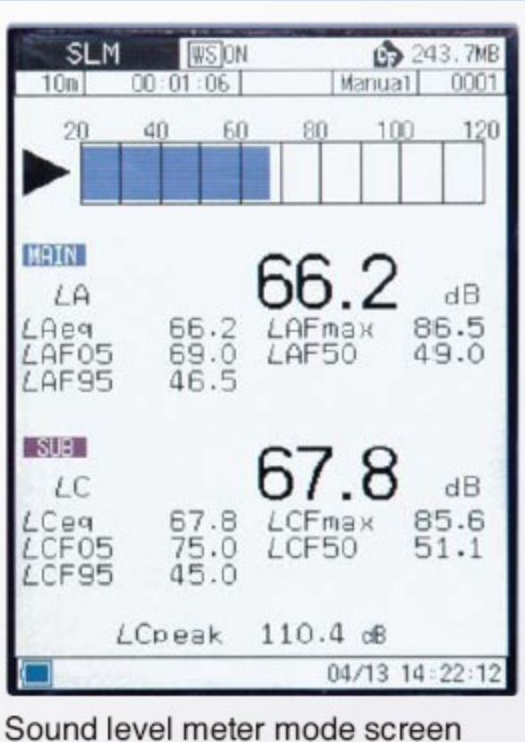
Screen display-Example



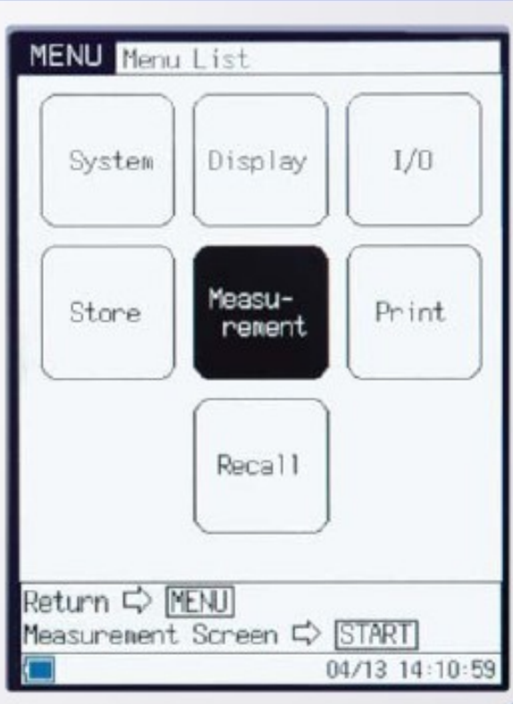
Analysis mode screen
(Simultaneous 1/1 & 1/3 octave band display)



Time versus level display
with 1/1,1/3 octave analysis



Sound level meter mode screen
(Sound level display)



Menu list screen

USB Printer
BL-112UI OPTION

Infrared Remote Control
NA-27RC1 OPTION

Memory Card 128 MB
MC-12CF1 SUPPLIED

Waveform Recording Card

NX-28WR

NX-28WR is a program card that provides the NA-28 with recording functions. Using the NA-28 and NX-28WR in combination makes it possible to measure sound pressure levels together with sound pressure waveforms during frequency analyses. Since the data are recorded in uncompressed WAVE files, they can be handled with software*1 compatible with the WAVE and analyzed.

*1 Software may not be compatible depending on sampling frequencies. If the software is not compatible, use a sampling converter to change sampling frequencies.

Sampling Frequencies & CF Card Recording Time

	128 MB	256 MB	1 GB	2 GB
48 kHz	15 m	30 m	2 h 10 m	4 h 40 m
24 kHz	30 m	1 h	4 h 20 m	9 h 20 m
12 kHz	1 h	2 h 10 m	8 h 50 m	18 h 50 m
64 kHz	10 m	20 m	1 h 40 m	3 h 30 m
32 kHz	20 m	50 m	3 h 20 m	7 h
16 kHz	50 m	1 h 40 m	6 h 40 m	14 h 10 m

Recording time would be somewhat changed by the number of files including recording data.

Feature 1 Replay of recorded sound – It is possible to immediately identify unnecessary or unknown sounds by listening to the recorded data*2

*2 Using Windows Media Player

- I conducted sound analysis but there are irregularities in the analysis results and I don't know what causes them.
- I detected the sound of a police car siren during measurement of traffic noise and I would like to exclude it.
- I measured sound levels and would like to listen to specific events.

Feature 2 Reanalysis of recorded sound – It is possible to reanalyze data based on the recorded waveforms using waveform analysis software

- I conducted 1/1 octave band analysis but I need to be able to conduct 1/3 octave band analysis.
- I conducted 1/3 octave band analysis but I need to be able to conduct analyses in more detail by FFT.

Specifications

Sampling frequency		
	Octave, 1/3 octave simultaneous analysis	48 kHz, 24 kHz, 12 kHz
	Sound meter, octave analysis, 1/3 octave analysis	64 kHz, 32 kHz, 16 kHz
Quantization bit length		16 bit
Data format		WAVE
Frequency weighting		Z weighting (flat response) (fixed)
Recording functions		
	Event mode	Level recording, interval recording, manual recording
	Total mode	Total recording
Simultaneous use with Building Acoustics Card NX-28BA		
	During sound insulation and impact sound measurement	Total recording
	During reverberation time measurement	Total recording with pre-trigger (1 s)

Replay and reanalysis cannot be made with the NA-28 unit.

Software Recorded data by NX-28WR can be displayed and analyzed using optional software.

Waveform processing software

DA-20PA1 Optional accessory

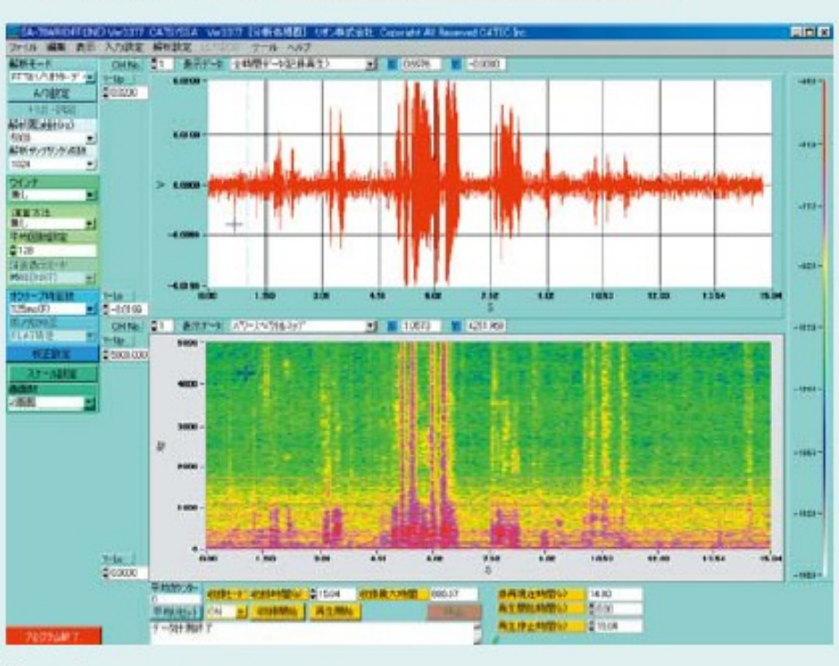
Octave band analysis screen

Operating environment requirements
CPU : Intel Pentium 4, 2 GHz or more
RAM : 512 MB or more
HDD : 10 GB (free space) or more
OS : Microsoft Windows 2000 / XP

Waveform		
	Applicable	Wave format created by NX-28WR
	Display	Scaled time axis, RMS, Percentile sound level (L_N), Equivalent continuous sound level (L_{eq}) and Sound exposure level (L_E)
	Filter	High pass, Low pass and band pass, Reproduction of sound after filtering
	File output	WAVE format and CSV format (Channel separation and interval designation are possible each format)
FFT analysis		
	Frequency range	Decided by settings on Sound level meter NA-28
	Sampling points	64 to 32 768 points
	Averaging function	Linear average
	Window function	Hanning, Rectangular, Flattop
	Display	Power spectrum (Differential & integral calculus available for spectrum area)
Octave band analysis		
	Applicable standard	IEC 61260 Class 1 JIS C 1514
	Mode	1/1 octave band and 1/3 octave band
	Frequency range	1/1 octave band : 0.5 Hz to 8 kHz (15 bands) 1/3 octave band : 0.4 Hz to 16 kHz (47 bands)
	Time weighting	1 ms, 10 ms, 35 ms, 125 ms (Fast), 630 ms, 1 s (Slow), 10 s
	Frequency weighting	FLAT, A, C, G and Lv

Waveform analysis software

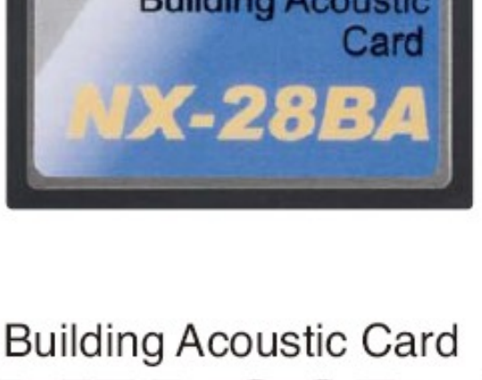
CAT-78WR Optional accessory



Spectrum map screen

Operating environment requirements
CPU : Intel Pentium M, 1 GHz or more
RAM : 512 MB or more
HDD : 5 GB (free space) or more
OS : Microsoft Windows XP Professional

Waveform		
	Applicable	Wave format created by NX-28WR
	Display	Scaled time axis, Differential and integral calculus available
	File output	WAVE format (Channel separation and interval designation are possible) CSV format (Interval designation is possible) and JPEG
FFT analysis		
	Frequency range	Decided by settings on Sound level meter NA-28
	Sampling points	64 to 32 768 points
	Averaging function	Linear average, maximum hold
	Window function	Hanning, Rectangular, Flattop, Exponential, Force
	Display	Power spectrum, Cross spectrum, Transfer function, Coherence, Spectrum map, Differentialand calculus for spectrum area
Octave band analysis		
	Applicable standard	IEC 61260 Class 1 JIS C 1514
	Mode	1/1 octave band and 1/3 octave band and 1/12 octave band
	Frequency range	1/1 octave band: 0.5 Hz to 8 kHz (15 bands) 1/3 octave band: 0.4 Hz to 10 kHz (45 bands) 1/12 octave band: 0.36 Hz to 11 kHz (180 bands)
	Time weighting	1 ms, 10 ms, 35 ms, 125 ms (Fast), 630 ms, 1 s (Slow), 10 s
	Frequency weighting	FLAT, A, C



Building Acoustic Card

NX-28BA

NX-28BA is a program card used in NA-28 for simple and easy measurement of airborne and floor impact sound insulation of buildings and the reverberation time.
The measurements conforming to ISO and single-number quantities can also be calculated by the main body of NA-28. Data is stored as text files.
Furthermore, when used in conjunction with the waveform recording card NX-28WR, sound waveforms during measurement can be recorded simultaneously.

Applicable specifications

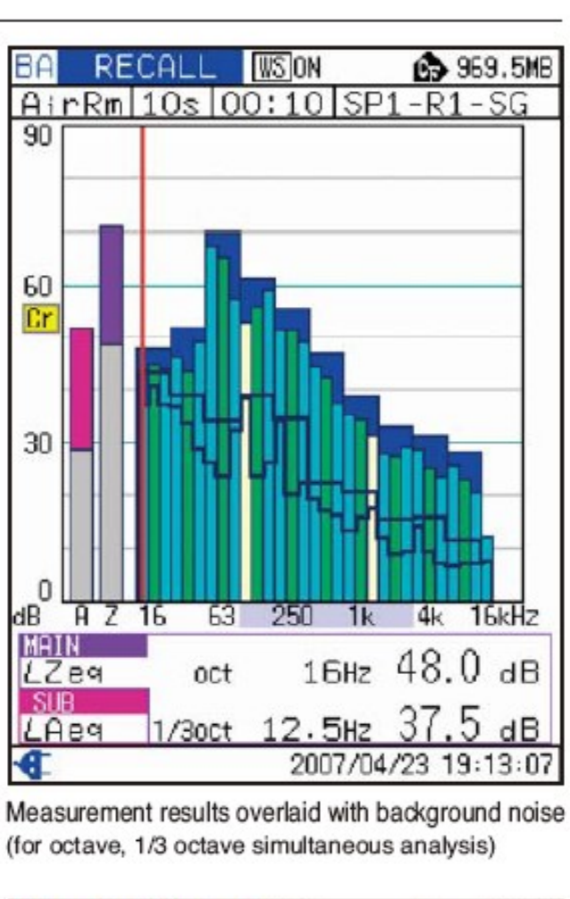
ISO 140-4	Acoustics – Measurement of sound insulation in buildings and of building elements – Part 4: Field measurements of airborne sound insulation between rooms
ISO 140-7	Acoustics – Measurement of sound insulation in buildings and of building elements – Part 7: Field measurements of impact sound insulation of floors
ISO 717-1	Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation
ISO 717-2	Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation
ISO 140-5*	Acoustics – Measurement of sound insulation in buildings and of building elements – Part 5: Field measurements of airborne sound insulation of façade elements and façades
ISO 16032*	Acoustics – Measurement of sound pressure level from service equipment in buildings – Engineering method

*The main body performs measurement only.

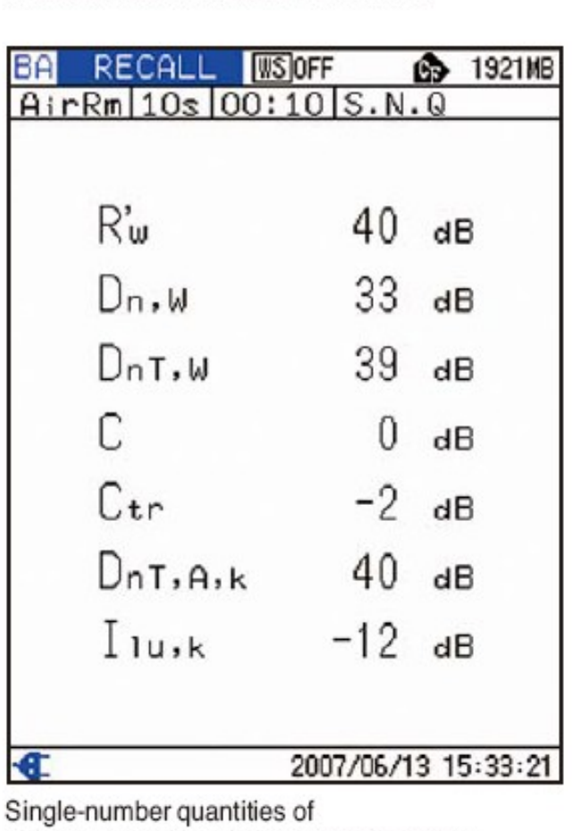
Screen display – Example

MENU Building Acoustic
Measurement Mode AirRm(D)
Store Name DD_0001
Measurement Time 10s
Source Position 2
Source Room Meas. Pos. 5
Receive Room Setting
Measurement Position 5
BGN Mode Before
Source Room Data None
Surface Area 172.0㎡
Room Volume 043.0㎥
Return ⇨ MENU
Measurement Screen ⇨ START
06/11 16:43:20

Setup menu of airborne sound insulation measurement between two rooms

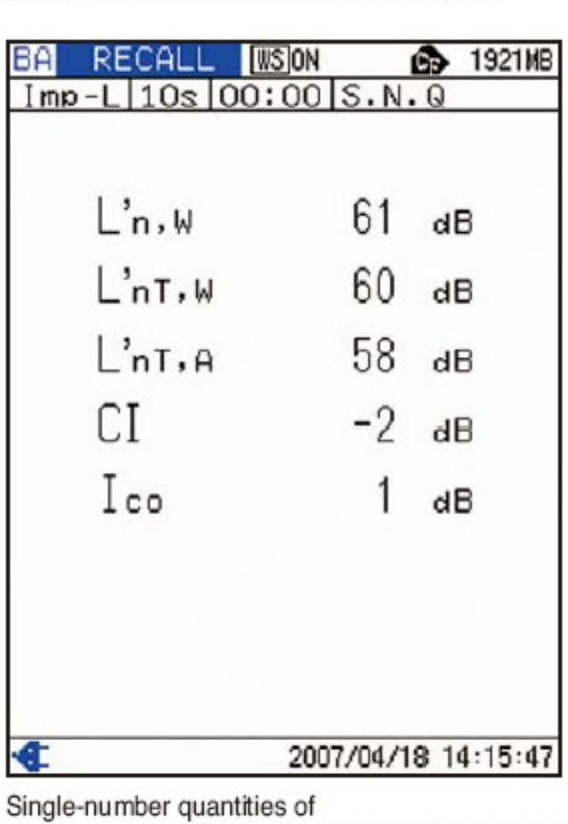


Measurement results overlaid with background noise (for octave, 1/3 octave simultaneous analysis)



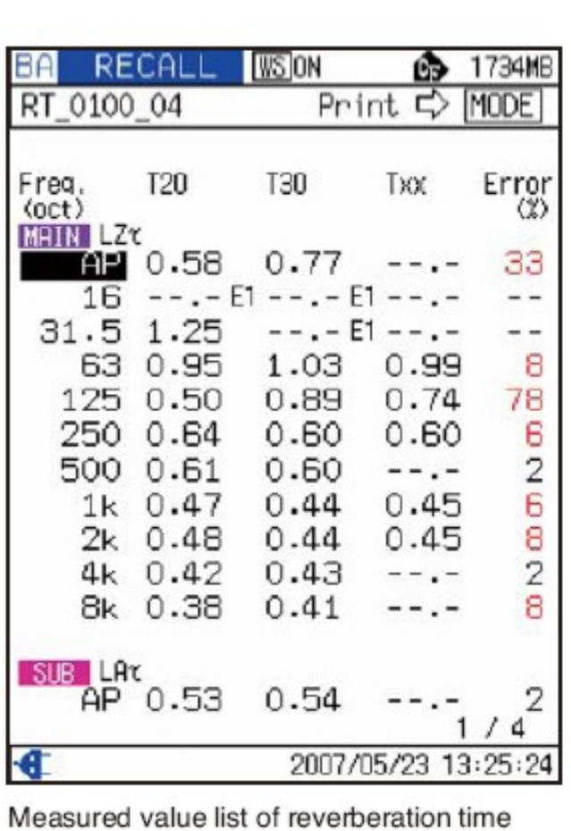
BA RECALL 1921MB
AirRm 10s 00:10 S.N.Q
R'w 40 dB
Dn,w 33 dB
DnT,w 39 dB
C 0 dB
Ctr -2 dB
DnT,A,k 40 dB
Ilu,k -12 dB
2007/06/13 15:33:21

Single-number quantities of airborne sound insulation between rooms



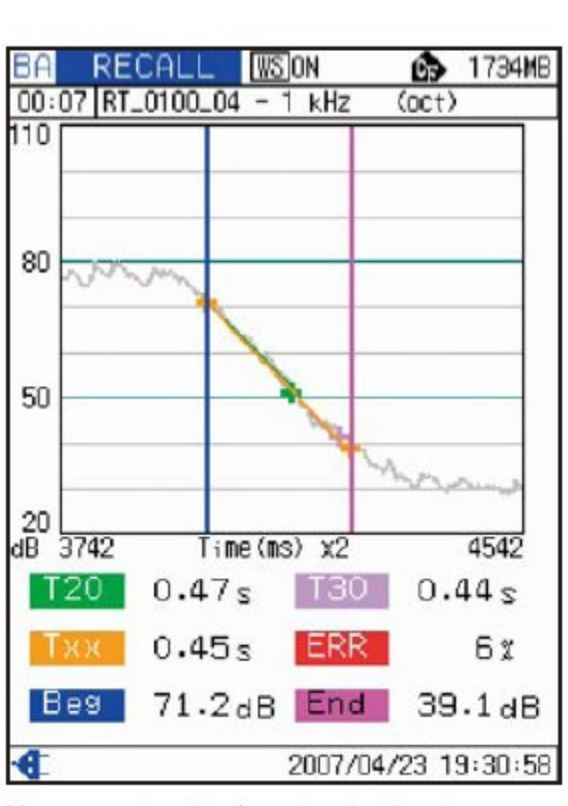
BA RECALL 1921MB
Imp-L 10s 00:00 S.N.Q
L'n,w 61 dB
L'nT,w 60 dB
L'nT,A 58 dB
CI -2 dB
Ico 1 dB
2007/04/18 14:15:47

Single-number quantities of floor impact sound insulation (light impact source)



```
BA RECALL      1734MB
RT_0100_04   Print ⇨ MODE
Freq.  T20    T30    Txx   Error
(oct)                       (%)
MAIN LZτ
  AP 0.58   0.77   --.-   33
  16 --.-E1 --.-E1 --.-   --
31.5 1.25   --.-E1 --.-   --
  63 0.95   1.03   0.99    8
 125 0.50   0.89   0.74   78
 250 0.64   0.60   0.60    6
 500 0.61   0.60   --.-    2
  1k 0.47   0.44   0.45    6
  2k 0.48   0.44   0.45    8
  4k 0.42   0.43   --.-    2
  8k 0.38   0.41   --.-    8
SUB LAτ
  AP 0.53   0.54   --.-    2
                         1 / 4
          2007/05/23 13:25:24
```

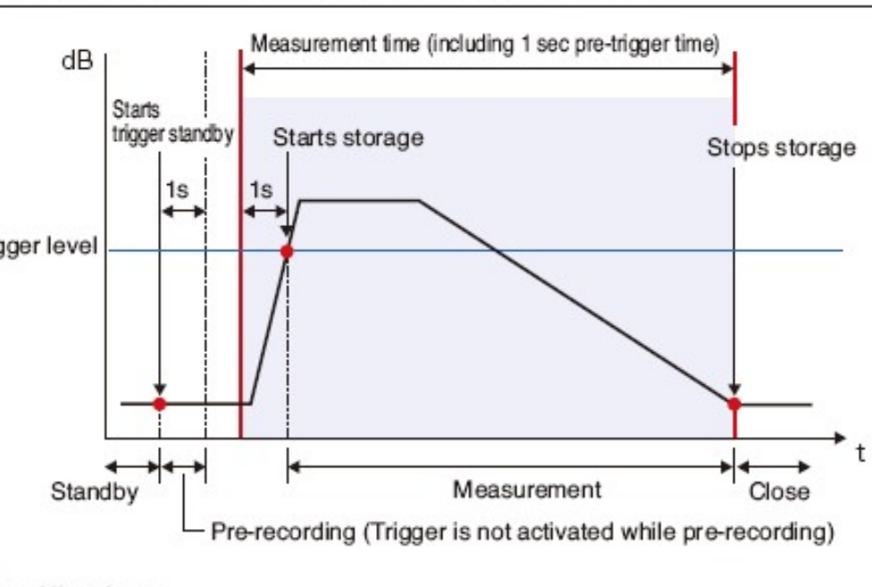
Measured value list of reverberation time



BA RECALL 1734MB
00:07 RT_0100_04 - 1 kHz (oct)
T20 0.47s
T30 0.44s
Txx 0.45s
ERR 6%
Beg 71.2dB
End 39.1dB
2007/04/23 19:30:58

Measurement results of reverberation time decay curve

Measurement of reverberation decay curve



Specifications

Analysis mode		Real-time octave band analysis, Real-time 1/3 octave band analysis Real-time octave, 1/3 octave band simultaneous analysis (Sound level meter mode is not available)
Measurement items (vary with measurement mode)		Instantaneous sound pressure level L_p Equivalent continuous sound pressure level L_{eq} Maximum instantaneous sound pressure level L_{max}
Measurement of airborne sound insulation between two rooms		
	Settings	Measurement time 1 to 60 sec Number of setting sound sources 1 to 8 points Number of measurement points in sound source room 1 to 10 points Number of measurement points in sound receptor room 1 to 10 points Background noise measurement mode None (none)/Once (1 point)/Before/During
	Calculations	Average measured value, single number quantity, insulation factor value (D-value)
	Display	L_p/L_{eq} (Background noise sound level), L_p/L_{eq}/L_{max} (Sound level in sound receiving room) Displays results overlaid with background noise (for measurement in sound receiving room) Displays alarm when the SPL difference with background noise is too small (for measurement in sound receiving room)
Measurement of floor impact sound insulation (for light impact source)		
	Settings	Measurement time 1 to 60 sec Number of setting sound sources 1 to 8 points Number of measurement points in sound receiving room 1 to 10 points Background noise measurement mode None (none)/Once (1 point)/Before/During
	Calculations	Average measured value, single number quantity, insulation factor value (LL-value)
	Display	L_p/L_{eq} (Background noise sound level), L_p/L_{eq}/L_{max} (Sound level in sound receiving room) Displays results overlaid with rating curve Displays results overlaid with background noise Displays alarm when the SPL difference with background noise is too small
Measurement of floor impact sound insulation (for heavy impact source)		
	Settings	Measurement time 1 to 60 sec Number of setting sound sources 1 to 8 points Number of measurement points in sound receiving room 1 to 10 points Number of measurements 1 to 5 times Background noise measurement mode None (none)/Once (1 point)/Before/During
	Calculations	Insulation factor value (LH-value)
	Display	L_p/L_{eq} (Background noise sound level), L_p/L_{max} (Sound pressure level in sound receiving room) Displays results overlaid with rating curve Displays results overlaid with background noise Displays alarm when the SPL difference with background noise is too small
Measurement of indoor noise rating		
	Calculations	Indoor noise rating value (NC-value or N-value)
	Display	Displays results overlaid with rating curve
Measurement of reverberation time		Interrupted noise method
	Settings	Measurement time 2 to 60 sec (varies with sampling cycle) Repeat count 1 to 10 times
	Calculations	T20, T30 (using the least squares method) Reverberation time calculated for random segments
	Display	Averaged reverberation time, reverberation decay curve
Other measurements		Measurement of exterior wall sound insulation, Measurement of equipment noise
Other capabilities		Dedicated address display and Auto-increment, Alarm display, Settings change monitoring function, Waveform recording function (NX-28WR is separately needed)

Specifications

Applicable specifications			Sound level meter: Measurement method precision sound level meter IEC 61672-1: 2002 Class 1 IEC 61260 : 1995 Class 1 ANSI S1.4-1983 Type 1 ANSI S1.43-1997 Type 1 ANSI S1.11-2004 Class 1 JIS C 1509-1: 2005 Class 1 JIS C 1513 : 2002 Class 1 JIS C 1514 : 2002 Class 1
Measurement functions			With both a sound level meter mode and analyzer mode, it is capable of simultaneous main channel and sub-channel measurement in either mode. Time and frequency weighting are set separately for the main and sub-channels.
	Measurement modes		
		Sound level meter mode	Measurement of all-pass values indicated in the measurement items below in the main or sub-channel Measurement of either L_{peak} or L_{tm5} in the sub-channel
		Analyzer mode	Real-time octave and 1/3 octave band analysis and all-pass measurement in the main channel Only all-pass measurement in the sub-channel
	Measurement items		Simultaneous measurement of all items in the selected time weighting and frequency weighting characteristics 1) Instantaneous sound pressure level L_p 2) Equivalent continuous sound pressure level L_{eq} 3) Sound exposure level L_E 4) Maximum sound pressure level L_{max} APMax and BandMax can be selected as maximum 5) Minimum sound pressure level L_{min} 6) Maximum 5 time ratio sound levels L_N (1 to 99 %, 1 % Step) Calculation from L_p or $L_{eq,1sec}$ One of the following is possible in the sub-channel in the sound level meter mode: Peak sound level L_{peak} Takt-max sound pressure level L_{tm5} Frequency weighting characteristics are the same as sub-channel
Measurement time			1 to 59 sec, 1 to 59 min, 1 to 24 hours
Microphone and preamplifier			Microphone: UC-59 Sensitivity: -27 dB±2 dB (re 1 V/Pa) Preamplifier: NH-23
Measurement range			A 25 dB to 130 dB C 33 dB to 130 dB Z 38 dB to 130 dB
Total range (A-characteristics, 1 kHz)			25 dB to 140 dB
Maximum peak sound level measurement			143 dB
Inherent noise			A 17 dB or less C 25 dB or less Z 30 dB or less
Frequency range			10 Hz to 20 kHz
Analysis frequency range			Center frequency
	Octave analysis		16 Hz to 16 kHz
	1/3 octave analysis		12.5 Hz to 20 kHz
Frequency weighting			A, C and Z
Time weighting			
	Main channel		F (Fast), S (Slow), 10 ms
	Sub-channel		F (Fast), S (Slow), 10 ms, Impulse
Linear operating range			
	All-pass (A-characteristics)		110 dB
	Spectrum		95 dB
Level range			
	Sound level meter mode		Bar graph display range: maximum 100 dB 30 dB to 130 dB 20 dB to 120 dB 20 dB to 110 dB 20 dB to 100 dB 20 dB to 90 dB 20 dB to 80 dB
	Analyzer mode		Bar graph display range: 90 dB 40 dB to 130 dB 30 dB to 120 dB 20 dB to 110 dB 10 dB to 100 dB 0 dB to 90 dB -10 dB to 80 dB
Sampling frequency			
	L_{eq}, L_E, L_{max}, L_{min}, L_{peak}		15.6 µs (20.8 µs for octave, 1/3 octave simultaneous analysis)
	L_N		100 ms
Correction functions			
	Windscreen correction		Frequency response correction to ensure standard compliance with windscreen installed correction on/off setting via menu
	Diffuse sound field correction		Correction of frequency characteristics in order to comply with standards (ANSI S1.4) in diffuse sound fields Correction function on/off operation implemented on the menu screen
Display			Color semi-transparent TFT-LCD display with backlight (240 x 320 dots)
	Refresh cycle		100 ms
Trigger			Controls measurement and memory storage start.
	Level 1		Measurement starts with the trigger level (1 dB intervals) as threshold and stops when the set measurement times elapses. Slope +/− is set.
	Level 2		1 time only measurement when the trigger level is exceeded.
	External		Starts when a falling signal in the logic level of the external trigger terminal is detected.
	Time		Sets start time and trigger repeat interval.
Delay time			After the start key is pressed, the time until the start of the measurement or trigger detection is set.
	Time setting		1 sec intervals within the range of 0 to 10 sec
Back erase function			Measurement is temporarily suspended by pressing the pause key and the previous 5 seconds of data is eliminated from the calculation.
Storage			The sound level or calculation results are recorded in the manual or auto-store mode. Data is recorded either in the internal memory or CF card. Internal memory has 1 block and it is possible to select either manual storage or auto-storage 1, 2.
Manual store			Manual recording of measurement results per address together with the measurement start time
	Record data count		
		Internal memory	Maximum 1 000 sets
		CF card*	Maximum 1 000 sets per file name, maximum 100 files can be stored
Auto store			Continuous recording of measurement results at the set time interval (It is possible to append 4 types of marker data in order to be able to identify events that occur while recording) Pause does not function during auto-storage
	Auto 1		
		Measurement time	Maximum time: 1 000 hours (when using the CF card, refer to the following if using internal memory)
		Sound level meter mode	Continuous recording in the CF card every 100 ms of L_p, L_{eq}, L_{max} and L_{min} as 1 set It is not possible to record sub-channel measurement results.
		Sampling cycle	100 ms (L_p, L_{eq}, L_{max}, L_{min}) only
		when using internal memory	Maximum time: 3 hours
		Analyzer mode	Continuous recording in CF card instantaneous sound pressure level (L_p) in each band level and all-pass values
		Main channel	All-pass values and band level values
		Sub-channel	All-pass values only
		Sampling cycle	1 ms to 1 sec, $L_{eq,1s}$
		when using internal memory	Maximum 10 000 sets (1 sec or, for $L_{eq,1s}$, 2.7 hours)
	Auto 2		
		Sound level meter mode	Continuous recording in CF card of main channel and sub-channel all-pass values and measurement start time for each measurement time
		Analyzer mode	Continuous recording in CF card of main channel band levels and all-pass values and sub-channel all-pass values and measurement start time for each measurement time
		Record data count	Internal memory: Maximum 1 000 sets CF card: Maximum 300 000 sets
Data recall			Stored data access and time/level display (selected frequency band 1 only)
Memory store of settings			Maximum 5 sets of settings can be stored in internal memory and retrieved Start-up is possible under file setting conditions stored in the CF card in advance.
Printout			Measurement results can be printed using the special USB printer(Optional)
	Screen print mode		1-page printing of the displayed screen
	Memory print mode		Continuous printing of data in the specified address range in memory
Input/output			
	AC output		Selection and output of all-pass signals of either the main channel or sub-channel
		Output voltage	1 V (effective value) at range full scale
		Output resistance	600 Ω
		Load resistance	10 kΩ or more
	DC output		Selection and output of all-pass signals of either the main channel or sub-channel
		Output voltage	3.0 V, 25 mV/dB at range full scale
		Output resistance	50 Ω
		Load resistance	10 kΩ or more
	Comparator output		Open collector output. Determination is also possible at the band level. The terminal is also used for the external trigger.
		Maximum applied voltage	24 V
		Maximum driving current	50 mA
	External trigger input		Falling edge is detected at 0V to 5 V logic level. The terminal is also used for the comparator.
	USB		Besides connection to a PC as a storage device, it is also possible to use communication device class and execute control by communication commands (however, settings relating to the transfer of stored data and storage action are not possible with communication commands).
	Remote control reception		Control of NA-28 by infrared remote control (remote control NA-27RC1, optional)
Power supply			Four IEC R14P (size"C") batteries or external power supply
Operating time (23 ℃, normal operating conditions)			When following not functioning ; sub-channel, backlight, AC output, DC output, USB function, remote-control, autostore
	Manganese batteries		R14PU, 6 hours
	Alkaline batteries		LR14, 16 hours (10 hours if backlight is continuously activated)
	AC adapter		NC-94A
	External power supply voltage		5 V to 6 V (rated voltage: 6 V)
	Consumption current		230 mA (during normal operation at rated voltage)
Ambient conditions for operation			-10 ℃ to +50 ℃, 10 %RH to 90 %RH
Dimensions, weight			331 (H)×89 (W)×51 (D) mm, approx. 730 g (including batteries)
Supplied accessories			Memory card (128 MB) MC-12CF1 × 1, Storage case × 1, Soft case × 1, AC adapter NC-94A × 1, Windscreen WS-10 × 1, BNC-RCA cable CC-24 × 1, Strap × 1, IEC R14P (size"C") batteries (alkaline)× 4

Options

name	model
Building acoustic card	NX-28BA
Waveform recording card	NX-28WR
Remote control	NA-27RC1
Sound calibrator	NC-74
Memory card	128 MB, 256 MB, 1GB, 2 GB
USB printer	BL-112UI

name	model
Printer paper(10 rolls/pkg)	P-112-30
USB miniB-B cable(For printer)	CC-97
Battery pack	BP-21
Dual output adaptor	CC-59S01

* Use only RION supplied cards for assured operation.

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