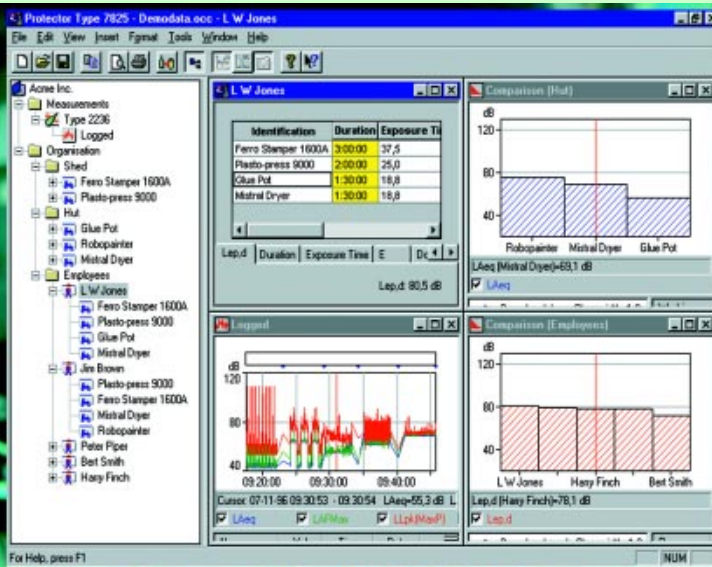


PRODUCT DATA

Protector — Type 7825



PC Software for calculating Personal Noise Exposure

Protector™ is a Windows®-based software package for post-processing, simulating and archiving noise exposure data. Designed to work with the family of Brüel & Kjær sound level meters, noise dose meters and sound level analyzers, Protector allows you to quickly download sample noise profiles for specific locations or persons. Protector can use this data to calculate noise exposure for people or positions under investigation. Protector calculates noise exposure according to ISO 9612.2.

For situations where only work point noise measurements are available, and workers move about, Protector can combine workpoint measurements with a profile of a persons movements, to simulate their personal noise exposure.

7825

USES

- Making comparisons between measured, calculated, and permitted noise exposure values
- Corporate database for all occupational health matters related to noise exposure
- Identifying high-exposure areas and jobs for planning noise-reduction measures

FEATURES

- Import of measurements in common data format from Brüel & Kjær sound level meters and noise processing software
- Data presented in both graphical and tabular formats, exportable to spreadsheet programs or Windows clipboard
- Noise sources assignable to workers according to their daily routine
- Drag-and-drop transfer of data between calculation sheets
- Fulfils ISO 9612 (1997), including sampling method

Noise Exposure at Work

The effects of noise in the workplace on the well being of workers is well known. Older legislation concerning noise exposure concentrated on noise levels for particular tasks and machinery at specific locations, but neglected the effects on workers moving around the workplace and being exposed to noise at different locations throughout the day.

ISO 9612 (1997) provides guidance on the calculation of noise exposure for an 8-hour period based on sampling techniques and direct measurement. This allows more realistic noise exposure values to be calculated. Employers and local authorities need to ensure that their noise exposure calculations have been done in accordance with this standard.

Protector Type 7825 software, used in conjunction with a Brüel & Kjær sound level meter, noise dose meter, or sound level analyzer is the ideal tool for this job – designed specifically for monitoring, calculating, reporting and archiving noise-exposure levels experienced by workers.

Simulation Model

A working point is the place where a person works, typically close to a piece of machinery or plant. Any number of working points and people can be included in a Protector project. A working point can be associated with more than one person, allowing the noise sample from a representative machine to be used with many workers.

Protector simulates the daily work-pattern of a person by combining working point noise level measurements (L_{Aeq} and $L_{pk(MaxP)}$) with the work duration at each working point. From this, the personal noise exposure ($L_{EX,T}$) is found.

If the noise level at a working point changes, all people that are associated with that point automatically have their noise exposure updated accordingly.

Protector is one of a range of software packages from Brüel & Kjær for environmental noise measurement. Integrating fully with the range of Brüel & Kjær environmental noise measuring tools it can import data from:

- Sound level meters/analyzers
- Noise dose meters
- Other Brüel & Kjær software

Sound Level Meters/Analyzers

The sound level meters supported by Protector are Types 2236, 2237, 2238 and Sound Level Analyzer Type 2260 (see Fig. 1).

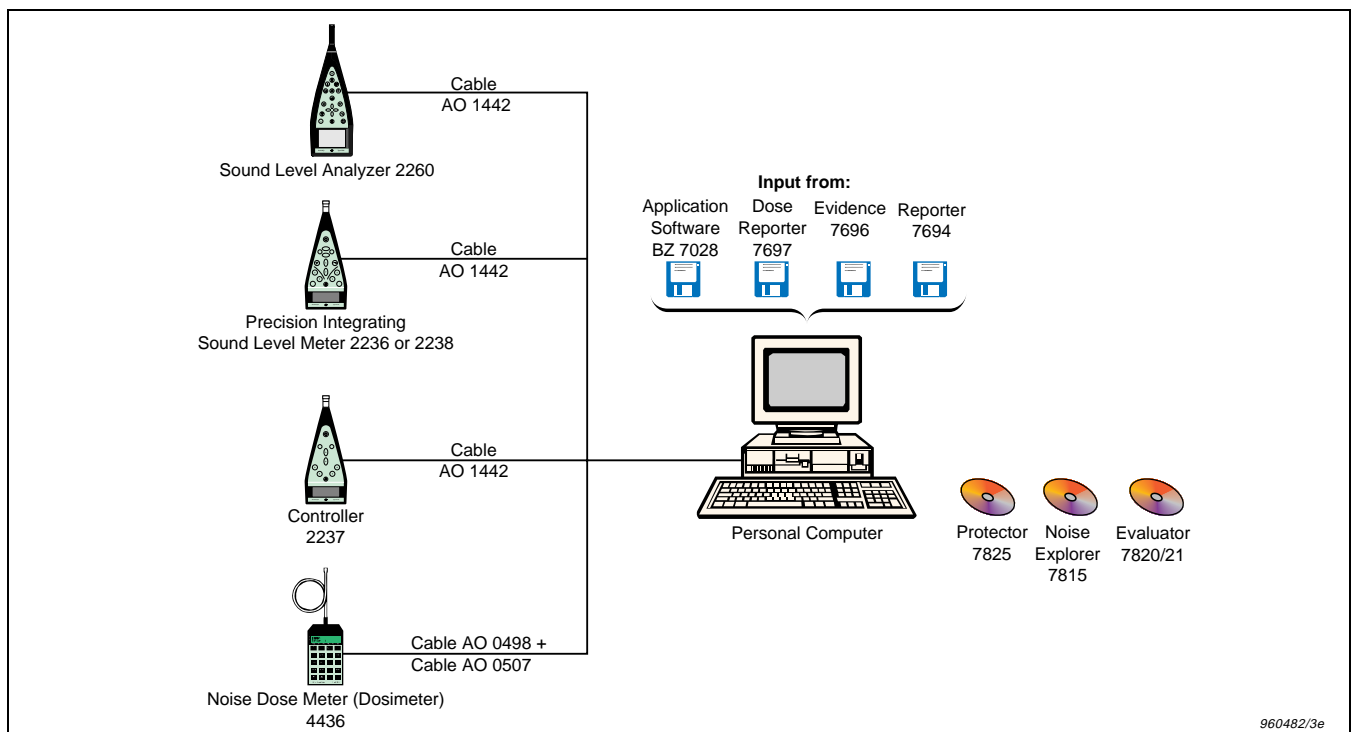
Types 2236, 2238 and 2260 are Type 1 precision integrating sound level meters designed for general use. Combined with Protector, they are ideal for making working point measurements and other fixed location measurements.

Type 2237 has similar functionality to Type 2236, the main differences being that it is a Type 2 instrument and has no time history logging options.

During a measurement session, a 2238, for example, equipped with the logging option produces profiles (time history log, e.g., one set of measured data per second) and an overall results table. The profile is displayed by Protector as a graph, from which a representative noise sample can be captured and made available to working point folders.

You can connect your Brüel & Kjær sound level meter/analyzer or dosimeter directly to a PC running Protector via a serial interface cable as shown in Fig. 1.

Fig. 1 The various possible inputs to Protector software



Noise Dose Meter (Dosimeter)

Type 4436 is a noise dose meter designed specifically to be worn by a worker and acquire noise data. Using Type 4436 with Protector allows you to gather noise data as the person moves from one working point to another. Time history data is available from Type 4436, allowing individual parts of a persons working day to be identified. Noise data for specific machines can be extracted from this information and be used as samples for other workers at similar machines. This reduces the number of people and working points that have to be measured to obtain a complete set of samples.

Other Programs

Protector is able to read data from other Brüel&Kjær programs, e.g., Types 7694, 7696 and 7697 and BZ 7028. Being able to transfer and re-use existing data in Protector, allows you to build up your projects/databases even quicker, since data already available from one of these programs need not be re-measured.

Project Database

Protector Type 7825 is a combination of spreadsheet and database routines tailored by Brüel & Kjær for calculating personal noise exposure.

The spreadsheet part is used to determine and present the results of noise exposure calculations.

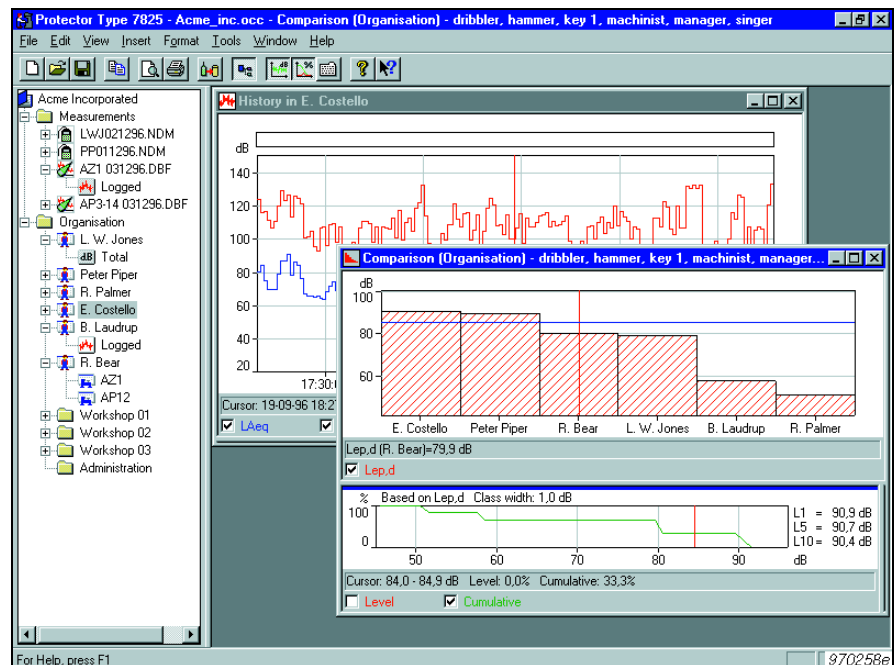
The database manages all the working point and personnel data belonging to a Protector project.

Fig. 2 The main Protector window showing a project tree and graphs of measured data

The Project

A project is the complete collection of Protector files in which all personal noise exposure data belonging to one organisation are stored.

A Protector project has two main folders – Measurement and Organisation (see Fig. 2).



Measurement Folder

The Measurement Folder is used to pool data read into Protector from field measurements.

The measurements can be viewed on the screen as:

- Time history graphs
- Noise profile graphs
- Overall results
- Spectra¹
- Cumulative and level distribution¹

After you have inspected the data, you can select relevant parts for inclusion in working point or person files in the Organisation Folder.

Organisation Folder

The Organisation Folder is the part of a Protector project tree where the layout of the company/site is modelled.

Fig. 2 shows a typical Protector project tree. You can see that the Organisation Folder has sub-folders attached to it. Some of these folders refer to buildings and others refer to people. Typically, working points are grouped into the buildings in which they are situated and workers are grouped according to their trade.

Unlimited levels of folders are possible, meaning that a whole factory site, or indeed all the sites belonging to one company, can be grouped into one Project tree.

Working Point and Person Files

Each working point or person in a Protector project has a record associated with it. This record, usually named after the working point or person it refers to, contains all the attributes associated with the person or working point.

Attributes include:

- Activity percentage
- Effective duration
- Noise dose
- Keywords

While you are building the Organisational Folder up, you can assign the time spent at particular working points to each person. This produces the work-pattern profile, from which the $L_{EX,T}$ is calculated. Once the work-pattern has been established, the worker and working point data remain dynamically linked ensuring automatic updating of the files if something is changed.

Data Extraction

One of Protector's powerful features is its ability to sort data into categories before making statistical calculations. Sorting is based on keywords.

Keywords are user defined labels by the that can be attached to any record, and records can have any number of keywords. For example,

¹ Dependent on data source

you might define a keyword to be “over 45 years old”. You would then assign this keyword to all workers over that age, even though they are likely to be in different work groups, for example tool-cutters and lathe workers.

When you ask Protector to do an analysis, you could specify to only include workers over 45. Protector would then extract only these people from the database.

This means you are not tied to analysing data in only one folder at a time.

Sampling

Protector fulfils ISO 9612 (1997), part of which describes a sampling method for determining the uncertainty with which a working point’s noise level is calculated. Sampling is an attractive solution to noise measurement since the need for long sampling periods is removed, allowing more measurements to be made within a given time.

In essence, the sampling technique allows you to take five or more random samples of short duration at a working point, from which a full 8-hour L_{Aeq} is calculated. Since all 8 hours are not measured, there is a degree of uncertainty with the calculated L_{Aeq} .

Protector calculates the uncertainty. This information indicates if a working point’s noise level lies well above the noise limit, well below it, or is borderline. Borderline noise levels need further investigation to find the actual L_{Aeq} value, but those working points well above and well below need no further investigation. Thus a great deal of field testing time is saved.

Statistical Calculations

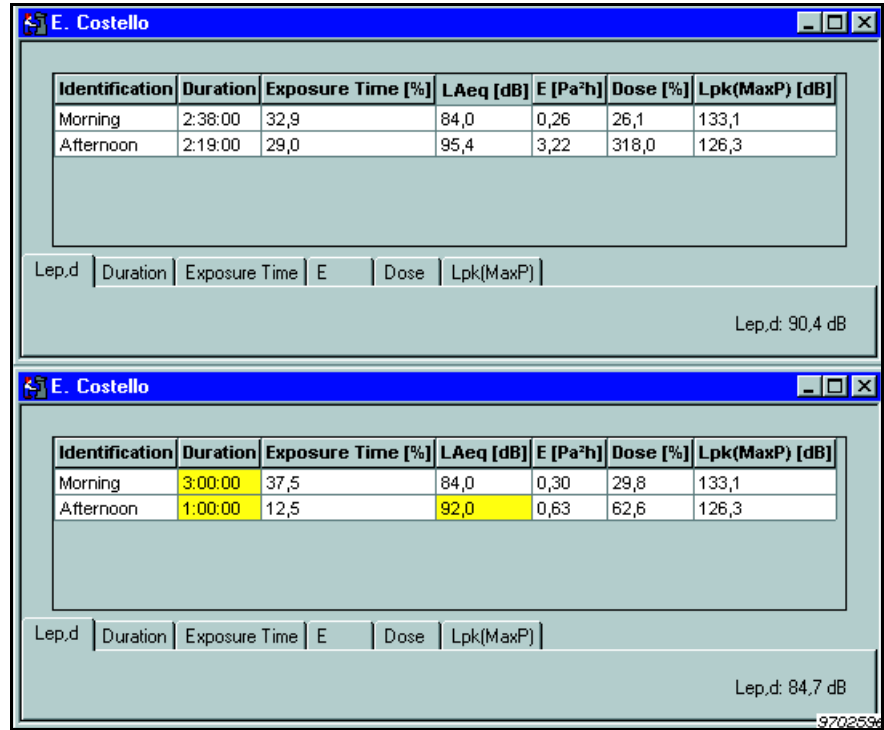
The bar chart in [Fig. 2](#) clearly identifies the people subject to more than the allowed daily noise dose. By presenting the data in this way, you can easily see the magnitude of the problem.

The cumulative and distribution curves show the same data, but plotted in a different way. Here you can see how Protector shows you the number of people that are affected.

The “after” case in [Fig. 3](#) shows the result of noise reduction for one worker. By reducing the exposure time and the exposure level, the daily exposure drops below the threshold level.

By regularly updating working point noise level data, you can continually monitor the personal noise level exposures for all workers.

Fig. 3 Two screen pictures with the same personal data but with different working point noise levels. This shows how Protector helps you identify noise problems by offering “before and after” scenarios



Output

Data in Protector is presented in either tabular or graphical form, both of which can be copied to the Windows clipboard. This allows you to include Protector results in other Windows programs, such as Word or Power Point®.

Protector also has a print function that prints tables and graphs directly to the Windows system printer.

User Interface

Protector Type 7825's Windows type user interface makes it familiar to most PC users, with its extensive on-line and context sensitive help, providing immediate guidance on any queries.

Specifications 7825 (ver. 3.3)

STANDARDS

Conforms with the following:

- ISO 9612 (1997)
- French NF S 31-084, 1987
- German DIN 45 645, part 2, draft 1991

LANGUAGE VERSIONS

English, French, German, Italian

PLATFORM

32-bit software for:

- Windows 3.x
- Windows 95/98
- Windows NT

Specifications 7825 (ver. 3.3) cont.

DATA INPUT

Transfer of measurement data via RS232 from the following Brüel & Kjær instruments:

- Total measurement and Profile data from Precision Integrating Sound Level Meter Type 2236
- Total measurement data from Integrating Sound Level Meter Type 2237
- Total measurement, Profiles and spectra from Type 2238 Mediator
- Total measurement, Profiles and spectra from Type 2260 Investigator with BZ 7210, BZ 7201, BZ 7202, BZ 7203 or BZ 7206
- Total measurement and Profile data from Noise Dose Meter Type 4436

Import of measurement data from Brüel & Kjær software:

- Reporter Type 7694
- Evidence Type 7696
- Dose Reporter Type 7697
- Application Software BZ 7028

DATA STORAGE

Data is stored in a project containing a hierarchical tree based on measurements and corporate organisation

Measurements: Contains measurement data (Profiles, overall results, spectra and statistics)

Organisation: Contains any number of folders, working point records and person records.

Folders can also contain folders, working point records and person records. There are no limits to the number of levels in the hierarchy

PROFILE (TIME HISTORY) CONTRIBUTIONS

Display: A Profile of all measured parameters (including L_{Aeq} and $L_{pk(MaxP)}$) shown graphically as a function of time

Classification: Segments of the Profile can be marked to be excluded or attributed to one of five user-defined classes

WORKING POINT RECORDS

Definition: A working point record combines a number of contributions into an overall noise level for a place where a person works, for example in front of a machine.

Number: Only limited by hard disk space

Contributions: Total measurements or Profile classes

Calculation results:

- L_{Aeq}
- Uncertainty of L_{Aeq} (sampling technique only)
- L_{pk}

PERSON RECORDS

Definition: A person record combines a number of contributions into an overall personal noise exposure taking the work-pattern of this person into account

Number: Only limited by hard disk space

Contributions: Total measurements, Profile classes or working point record results

Calculation results:

- $L_{EX,T}$ with user-definable T
- Duration
- Exposure Time
- E
- Dose
- L_{pk}

DATA COMPARISON

Comparison of data at and below user-defined hierarchical level of organisation

Display:

- Level distribution
- Level versus working point/person

Filter: Keywords can be defined and assigned to each person or working point allowing quick comparison of user-defined data using keyword searches

OUTPUT

On Screen: Results displayed in tabular or graphical form

Windows Clipboard: Tables and screen pictures can be copied to Windows clipboard for inclusion in other Windows programs

Export: To Excel spreadsheets in .xls format or tab-separated ASCII format

Printing: Graphs and tables to all standard Windows output devices

HELP

On-line context sensitive help

RECOMMENDED COMPUTER CONFIGURATION

- Pentium™ based Personal Computer
- Windows 95/98 or NT
- 32 MByte RAM
- 20 MByte of free disk space
- CD ROM drive
- SVGA graphics display/adaptor
- Mouse or other pointing device

Ordering Information

Type 7825-002 Protector (English Language)
Type 7825-003 Protector (French Language)
Type 7825-004 Protector (German Language)
Type 7825-005 Protector (Italian Language)

Optional Accessories

For use with Types 2236, 2237, 2238 and 2260:
AO 1442 9-pin to 25-pin Interface Cable

For use with Type 4436:
AO 0498 LEMO to 25-pin Interface Cable
AO 0507 LEMO to LEMO Interface Cable

Brüel & Kjær reserves the right to change specifications and accessories without notice