PRODUCT DATA

BK Connect Loudness and Overall Analysis Applets

BK Connect® applets are for customers looking for a point solution that works like they work, providing just what you need in a user-friendly solution. The applets provide the same reliability and thought-through design of an advanced sound and vibration analysis software platform, in a small, self-contained package.

The BK Connect Loudness and Overall Analysis applets are specifically for standard sound tests using the ISO 532-1 loudness calculation and overall analysis on both stationary and non-stationary signals.

There are two applets that provide full loudness and overall analysis testing solutions to help you complete the job at hand:

- ***Type 8490-D** – Go from data acquisition and monitoring to measurement, recording, analysis and reporting*
- ***Type 8490-I** – All-in-one solution for post-processing of time data, data management and reporting*

Uses and Features

Uses

Type 8490-D – Applet for acquisition, recording, batch post-processing, data management and reporting

- General sound data acquisition, analysis and reporting
- Time data recording
- Batch processing of multiple sets of time recordings
- Broadband overall analysis for characterization of noise
- Stationary and non-stationary analysis
- Analysis with different filter settings and resolution of the loudness calculation bandwidths
- Loudness for impulsive events and BSR (buzz, squeak and rattle)

Type 8490-I – Applet for batch post-processing, data management and reporting

- General sound analysis and reporting
- Batch processing of multiple sets of time recordings
- Broadband overall analysis for characterization of noise
- Stationary and non-stationary analysis
- Analysis with different filter settings and resolution of the loudness calculation bandwidths
- Loudness for impulsive events and BSR (buzz, squeak and rattle)

Features

- User interface, task completion and data organization optimized to fit the job at hand – with tools and components that make acoustic analysis quick and easy
- Simultaneous multi-analysis of the same recorded data – loudness according to ISO 532-1 including statistical percentiles 5%, 50% and 90%, and overall analysis
- Visualization, editing and audio playback of time data after recording and in preparation for analysis
- Simple and efficient reporting of results with user-definable layouts metadata
- Embedded reporting using Microsoft® Office products to integrate report creation directly in the test process
- Easy to learn and use, reducing training and test time

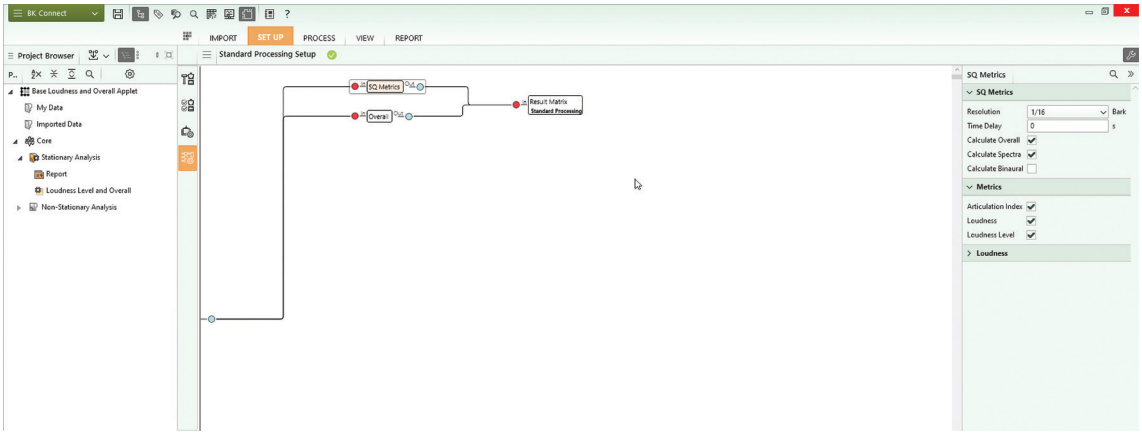
With Type 8490-D, you can record and perform loudness and overall analysis in one seamless workflow. A complete set of real-time monitors is preconfigured and a targeted process (analysis) chain is predefined – ready for you to start analysis. If needed, you can adjust monitor parameters and analysis properties to suit your test specifications. When ready, record data using the simple recorder located in the monitors.

Using the same predetermined processing and analysis tools as Type 8490-D, post-processing applet Type 8490-I allows you to target on the post-processing of time data for on-the-spot broad and sound quality analysis.

Both applets provide two different predefined setups:

- Stationary tests that allow you to perform simultaneous multi-analysis using:
  - Sound Quality (SQ) Metrics – Loudness both level and spectrum (sones), loudness level (phon) ISO 532-1 (2017), tonality based on Terhardt (1982), and articulation index calculation
  - Overall – Broadband analysis that includes acoustic weighting
- Non-stationary tests that allow you to perform time-varying analysis
  - SQ Metrics – Time-varying loudness spectrum, level ISO 532-1 (2017) and articulation index
  - Overall – Time-varying broadband analysis that includes acoustic weighting

Fig. 1 *Example of analysis setup: Stationary loudness and overall analysis*



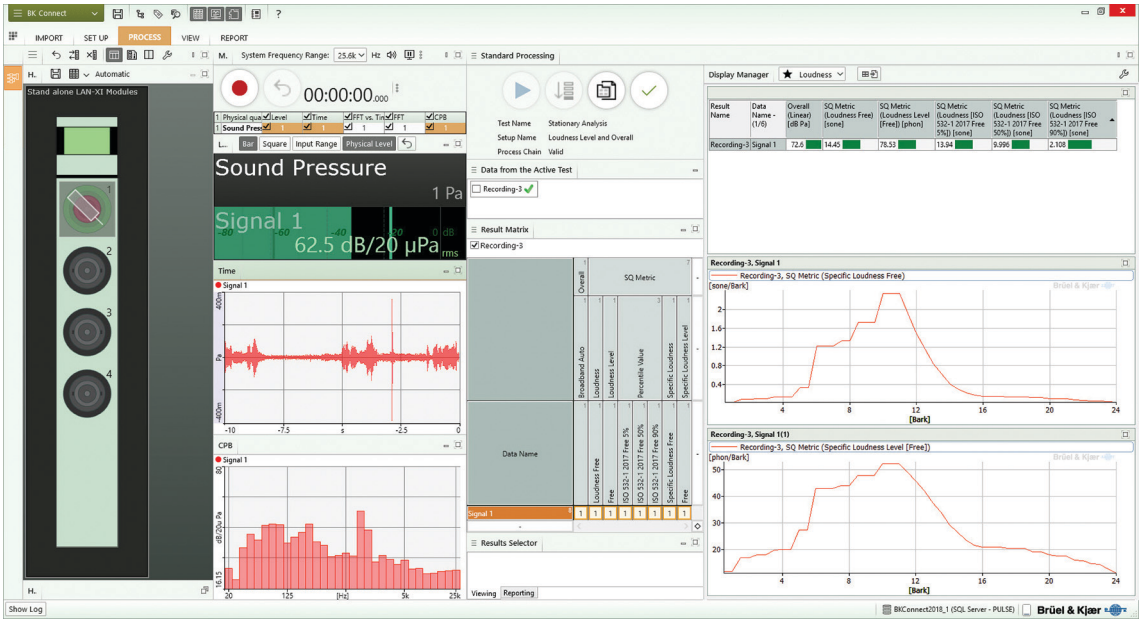
Utilizing BK Connect Application Components

To generate an efficient workflow, the applets take advantage of many of the task-oriented and user-friendly features that are found in full-version BK Connect applications, including:

- In both Type 8490-D and Type 8490-I:
  - Standard Processing Setup and Standard Processing tasks for adjusting the analysis properties and executing the predefined process chains. The practical and adaptable interface provides automated batch processing of data, immediate display and storage of analysis results and automated reporting
  - Integrated Result Matrix and Display Manager tools to validate selected data and set up preferred data displays
  - Time Editor for review and editing of time signal including post-processing of BK Connect recordings or HBK sound level meter data
  - Result Matrix Viewer task to review any data including imported data
- In Type 8490-D only:
  - Hardware Browser and Monitor components for a graphical overview and validation of your front end channels
  - Generator Setup for setting up the generator output in LAN-XI modules with a signal generator
  - Transducer Manager and Verification tasks for configuration and calibration of connected transducers
  - Real-time Monitor including time, profile vs time, level, FFT spectrum, 1/3-octave spectrum, and FFT spectrogram displays and PC sound-card-based audio playback to give you confidence in your hardware setup and ensure you are ready to start acquiring data. A start/stop recorder is included to provide a simple data acquisition option

The applets also include basic data viewing functionality that a standard BK Connect user would have, such as: access to all the metadata attributes; Microsoft® PowerPoint®-based reporting; exporting to Microsoft® Excel®; and BK Connect Notes for on-screen notations.

Fig. 2 *Processing in the Loudness and Overall Analysis Applet*



Automated Operations

BK Connect applets' many automated operations make it easy for the novice user and are perfect for repetitive testing:

- Auto-detection of hardware – Automatic detection of connected LAN-XI data acquisition modules and TEDS-enabled transducers
- Data source management– User-definable default data source for processing. The software will always draw data from that source
- Auto-analysis start – Automatic analysis start-up as soon as data is available in the Standard Processing task
- Auto-sizing of active window – Automatic maximization of the active task/component window
- Result selector – User-definable default combination of outputs and display layout. The software will always display and store these results
- Reporting – With a simple click a report will be created using the predefined template and stored with the project
- Done management – User-definable default task completion operation. The software will always perform this task when you complete a task

Hardware Support

Type 8490-D can be used to measure and record data with any single module within the LAN-XI data acquisition hardware platform – from 1 to 12 channels – including the highly portable, 4-input channel LAN-XI Light Type 3676-B-040. Together with LAN-XI Light, you have a complete stand-alone system ideally suited for small test setups.

If additional channels are required that will require more than one module, then you will need the full-version BK Connect application.

The software is delivered via download option or USB installation media.

System

PC SYSTEM REQUIREMENTS
- Operating System: Windows® 10 or 11, Pro or Enterprise, 64-bit, with either Current Branch (CB), Current Branch for Business (CBB), Semi-annual Channel (Targeted) or Semi-annual Channel servicing model
- Microsoft® Office that includes Microsoft Access®. This can be Office 2019 or 2021 (x32 or x64) or Microsoft 365® Desktop version (x32 or x64)
- Microsoft® SQL Server® 2019 or 2022 (**NOTE:** SQL Server 2022 Express included with software)

RECOMMENDED MINIMUM PC
- Intel® Core™ i9, 3 GHz processor or better
- 32 GB RAM
- 1 TB Solid State Drive (SSD) with 100 GB free space, or better
- 1 Gbit Ethernet network*
- Microsoft® Windows® 10 Pro or Enterprise (x64) with CB
- Microsoft® Office 2021
- Microsoft® SQL Server® 2022
- Screen resolution of 1920 × 1080 pixels (full HD)

FRONT END
Required for real-time measurements and recording
Front-end Support: One LAN-XI-based data acquisition module

Import/Export

SUPPORTED DATA FORMATS	• .bkc (BK Connect native format) – both function and time data • .dat – time data, must also have the ancillary *.rec file (import only • .pti – PULSE LabShop time data • .wav – time data • .csv (based on a predefined format): – Recording data (even abscissa time domain) – 2D complex-valued frequency domain data – Geometry files • .bks – BK Connect shape files
PROJECT FILE EXPORT AND IMPORT	Export a project to an external "transport" file (*.BKConnectTemplate or *.BKConnectProject), with or without imported or processed data, for archiving outside the database, sharing with other BK Connect users, capturing a snapshot of a particular state, or creating a project template

Data Display

Displays enable viewing and comparison of measurements and results. Data is dragged-and-dropped to/from the Project Browser. The User-defined Display task is the container for displaying graphical results

GRAPH TYPES	Display of functions	
	• Waterfall • Bar • Line • Curve	• Curve (step) • Overlay • Overlay (all) • Multi-value
SUPERIMPOSED GRAPHS	A number of functions can be superimposed on the same curve graph	
AXES	• X-axis Scale: Linear, logarithmic and CPB • Y-axis Scale: Linear, logarithmic and dB • Z-axis Scale: Linear and logarithmic	

CURSOR TYPES	Depending on the display type, the following are available: • Main • Delta	
	Alignment: Cursors in different displays can be synchronized to allow the changes to one display to be reflected in other displays showing the same or different functions	
CURSOR READINGS	• Acoustic levels • Cursor indices and values • Delta	• Delta/total • Max. and min. values • Total

Data Management

Data management is based on a data model that interacts with a Microsoft SQL Server database. Connection to the last used database is automatic upon starting BK Connect. However, the user can connect to a different database at any time during a session. Only one database can be connected at a time.
Local database with each BK Connect installation; optionally accessible via a BK Connect service, one user at a time, over a company network

DATABASE HANDLING	Databases can be created, deleted, backed up and restored
DATABASE MIGRATION TOOL	Tool that allows users to start application using an SQLite database and at a later point migrate data to an SQL Server solution
DATA STORAGE	Uses a filefarm (on disk) referenced by the database to store data files, report templates, pictures. File sizes limited by disk only
DATA SHARING	Via external BK Common file enables one file to contain all results from a common source, including their metadata
METADATA AND DEVICE UNDER TEST	Defined by the user as a method to document valuable information about the test. Enables customized searching for input data and results on the BK Connect local database

Time Editor

Display, audio playback and pre-processing of time data in preparation for analysis

DATA SELECTION	• Automated generation of regions from multiple files having similar channel configurations – in preparation for batch processing • Manual grouping of regions – for batch processing • Region selection by group of channels and time range • Append regions to other regions (concatenation) • Save regions to project
DISPLAY	• Fast navigation by scrolling through channels, panning and zooming in time axis • Fast spectrogram display – synchronized with time data display & playback • Interactive order slice and frequency spectrum display synchronized with spectrogram cross-hair cursor
PRE-ANALYSIS	• Automatic calculation of rpm profile from a tachometer pulse train

Data Processing Features

- Analysis of time data including pre-processing
- Immediate display and store of analysis results
- Automated processing using the Standard Processing task
- Automated multi-page reporting

Analyzers: Sound quality (SQ) metrics – loudness and overall analyzers

* For data acquisition: A dedicated data acquisition network (LAN or WAN) is recommended. A network that only handles data from the front end improves the stability of the data.

Process Chains

ANALYSIS ELEMENTS	• SQ Metrics – Loudness and Loudness Level articulation index • SQ Metrics vs Time – Loudness articulation index	• Overall • Overall vs Time
POST-ANALYSIS ELEMENTS	• Frequency Extraction	
GENERAL ELEMENTS	• Result Matrix: Results are presented using the same functionality as in the Result Matrix Viewer, where you can make predefined selections in the matrix, simplifying the process of displaying data	

SQ Metrics

- Stationary Loudness – ISO 532-1 (2017)
- Statistical Loudness (5%, 50% and 90% levels)
- Loudness Level – ISO 532-1 (2017)
- Time-varying Loudness – ISO 532-1 (2017)
- With free- and diffuse-field correction, the level and spectra can be calculated for the ISO 532-1 (2017) loudness
- Articulation index (AI) – Beranek
- Tonality based on Terhardt (1982) algorithm using the ECMA-418-1:2022 standard

SEARCH DATA	• Search using multiple attributes (metadata) • Two search methods: – Basic: Select search criteria from drop-down menu – Advanced: Build search string using standard query syntax • Search strings can be stored as favourites for future reuse • Get overview of query results in Results Matrix • Select one or more results in matrix and view and inspects data in Results Display

Overall Analysis

The overall level analyzer meets the requirements for a class 1 instrument in IEC 61672-1, ANSI S1.43-1997 Type 1, ANSI S1.4-1983 Type 1, IEC 804-1985 and IEC 651. The following specifications apply to all overall-based analysis

AVERAGING	Exponential, Impulse, Linear (Leq), Linear All, True Peak, True Peak All
TRIGGER METHOD	Free run; Fixed time interval An auxiliary signal may be used as a trigger signal
FREQUENCY SPAN	1 Hz – 204.8 kHz in 1, 2, 5 … or 2n (1, 2, 4, 8 …) sequence
ACOUSTIC WEIGHTING	As signals, A, B, C, D, G

Reporting

A separate reporting task enables templates to be created in Microsoft PowerPoint

Team Server

EXPORT	• Measurement and analysis files saved and exported to folder via the Project Browser • Does not require Microsoft SQL database
IMPORT	• Import data directly in BK Connect project
FILE FORMAT	Works for all of file types supported by BK Connect, however the .bkc file has more attributes available to be indexed

Hardware Setup Features

HARDWARE SUPPORT	Support for any single LAN-XI data acquisition module or a single LAN-XI Light module
TRANSDUCER MANAGER	For transducer setup
HARDWARE BROWSER	For channel setup
GENERATOR SETUP	For setting up any LAN-XI module with built-in signal generator
CALIBRATION	Transducer calibration/verification
SIGNAL MONITORING	Real-time monitor including a monitor recorder

Hardware Configuration

The software automatically detects the front-end hardware and configures the system. If IEEE 1451.4 capable transducers (with standardized TEDS) are being used, these are detected and attached automatically to the correct input channels

Hardware Browser

The Hardware Browser combines the Hardware Matrix and HW Setup Table that work together to provide a highly efficient way to work with any size system

HARDWARE MATRIX	An interactive display of the front-end hardware • Signal levels indicated using coloured rings • Channel overload status, using different symbols for different types of overload • Transducer status, using symbols to identify each transducer type • Calibration/verification status when used in the Transducer Verification task • Drop destination for transducers dragged from the Transducer Manager • Channel selector for the HW Setup Table and overall level meter • Automatic indication of TEDS transducers
LAYOUT VIEWS	• Square Grid: Completely dynamic. Signals form a best-fit grid in the available screen space using coloured rings to display signal amplitude • Bar Grid: Completely dynamic. Signals form a best-fit grid in the available screen space using bars to display signal amplitude Note that the grid displays can be sorted according to Signal Name, Maximum Level, Minimum Level and Level Range
MATRIX DISPLAY STYLES	• Physical: A visually representative display of the physical front end • Logical: Channels shown as coloured rings in the same configuration as the physical front end
HW SETUP TABLE	A channel list that contains all information about the front-end hardware and any transducers connected to it. The number of rows displayed in the table depends on the channel selection made in the Hardware Matrix, the default being all channels. The size of the table updates dynamically according to which channels are selected in the Hardware Matrix, making it very easy to focus on subsets of channels when needed
TABLE EDITING	• Manual editing of channel information • Update from an external XML or UFF 1808 (Channel Table) file or from Microsoft® Excel® • Save HW Setup Table contents to an external XML or UFF 1808 (Channel Table) file for later use • Create different (favourite) views to tailor which columns should be shown
BROWSER HEADER BAR	Tools in the Hardware Browser allow for: • Resetting of channel status • Reconnecting the front end • Display of either the HW Setup Table, the LAN-XI home page, or an overall level meter for all channels

Transducer Manager

The Transducer Manager works with a Microsoft Access® database (as used by PULSE LabShop) to manage transducer specifications and calibration information

INCLUDED TRANSDUCERS	A full set of HBK transducer types, with nominal sensitivities, is provided with all BK Connect installations
ADDING TRANSDUCERS	Individual devices, or groups of devices, can be dragged and dropped onto the Hardware Matrix to add transducers to the configuration and/or add calibration/sensitivity information: • Drag a transducer type to many (or all) channels. The HW Setup Table applies the nominal sensitivity for that type to the selected channel(s) • (Typical) Drag specific devices to individual channels where they are known to be physically connected
DATABASE	Each transducer type can have a number of devices of that type, each with its own unique calibration history

Transducer Verification

Transducer Verification can be used either to verify that transducers are functioning correctly, or to make a new calibration
A transducer calibrator is used to apply the necessary excitation for either verification or calibration. Multiple calibrators can be used simultaneously.
The software automatically detects the calibrator signal and performs the verification/calibration, with coloured status indicators in the Hardware Matrix and HW Setup Table showing In Progress, Failed or Passed. At the end of the procedure, the Transducer Manager is updated along with the HW Setup Table and calibration information is added to the device's calibration history

Generator Setup

SETUP	Graphical tools can be used for setting up excitation type, frequency parameters, output level, level ramp up/down times, and whether burst excitation is to be used	
GENERATOR SIGNAL TYPES	• Sine (fixed frequency) • Continuous and Burst Random	• Periodic and Pseudo-random • Periodic chirp

Real-time Monitor

MONITORS	Channel monitor (time, CPB or FFT), channel level meter, channel level history, elapsed time, rpm profile, tachometer. Includes generator stop/start control buttons
FFT MONITOR	Monitors 2D spectra or 3D spectrograms for all active channels or selected channels. Grouped automatically based on the physical quantity
CPB MONITOR	Monitors 2D spectra for all active channels with the option to apply acoustic weighting to sound pressure signals. Channels are grouped automatically based on the physical quantity
LEVELS MONITOR	Monitors the overall levels displayed in voltage or physical quantity for all active or selected channels. The data can be monitored as instantaneous level or max. hold, using slow, fast or impulsive time weighting
TIME MONITOR	Monitors the complete raw time history for the entire length of the recording, while overlaying overload and marker locations

Data Acquisition Features

The Monitor includes a start/stop recorder to provide a simple data acquisition option

Type 8490-D-N-SYS* **Loudness and Overall Analysis Applet**
Type 8490-I-N-SYS* **Loudness and Overall Post-analysis Applet**

SOFTWARE MAINTENANCE AND SUPPORT AGREEMENTS†

M1-8490-D-N-SYS	Agreement for Type 8490-D-N
M1-8490-I-N-SYS	Agreement for Type 8490-I-N

OTHER BK CONNECT PRODUCTS
For an overview of all BK Connect applications and applets, visit the BK Connect web page.
NOTE: Applets cannot be upgraded to full-version applications or added to other applets

* "N" indicates the licence is node locked to a PC or dongle. Floating licences not available
† Agreement expiration date to be agreed at time of contract

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