Brüel & Kjær Vibro

PRODUCT SPECIFICATION

VIBROTEST 80 & VIBROPORT 80

The Allrounder for

- Machine Diagnosis
- Field Balancing
- Condition Monitoring

Content

1 Product Specification

VIBROTEST 80 & VIBROPORT 80 are Brüel & Kjær Vibro's newest portable measuring instruments within the product line "portables". Ease of operation, versatility, modular setup and flexibility in demanding applications were the important design criteria in developing this particular instrument. The VIBROTEST 80 (VT-80) and VIBROPORT 80 (VP-80) offer you versatile measurement possibilities and support up to 4-Channel functionality while connecting all common vibration sensor types.

VT-80 & VP-80 are "The Allrounder for Machine Diagnosis, Field Balancing & Condition monitoring" and suitable for most all demanding applications. For example the VT-80 is the perfect choice for data collection application due to its light weight and practical design. At the same time, it is cost effective while offering the same functionalities as VP-80.

For field balancing, acceptance tests or multichannel views, VP-80 is the perfect choice not only due to its large colored display, but also due to the fact that all main applications – analysis, balancing, data collection –are being consolidated in one single instrument.

In this product specification document, you'll find more about the "The Allrounder VIBROTEST 80 & VIBROPORT 80" suitable for early fault detection, analysis, diagnosis of emerging faults in bearings, shafts, gear boxes, couplings at auxiliary as well as in production critical machinery.

1.1 Placement of VT-80 & VP-80 within the portable instruments product line

The entire VIBROTEST 80 & VIBROPORT 80 product family consists of hardware with the VT-80/VP-80 firmware application modules, two available software packages as well as accessories - more information about the software is available in the corresponding product specification documents.

- *Hardware* VIBROTEST 80 /E & VIBROPORT 80 /*E*
  - *Firmware* Application Modules
- *Software*
  - **Re**port & E**X**aminer Software – Analysis & Reporting Software
    - For all VT-80/VP-80 firmware modules except module 6 „Data Collector"
  - **Re**port & R**O**ute Manager – Database, Route Generation, Analysis & Reporting Software
    - Exclusively for the VT-80/VP-80 firmware module 6 "Data Collector"
- Standard accessories
  - The charger, etc.
  - Connector & adapter cable, e.g. for sensors

Hardware, firmware, software and accessories are supplied as packages, which are modular and can easily be upgraded according to customer needs. The following listed packages are available with VT-80 respectively as well as with VP-80; also as *E-Types* (certified in hazardous areas).

- **A**nalyzer „**A**"

- **A**nalyzer & **B**alancer „**AB**"
- **B**alancer "**B**" – ***Note: ONLY VT-80***

- **A**nalyzer & **C**ollector „**AC**"
- **C**ollector „**C**" – ***Note: ONLY VT-80***

See more information respectively the packages in Section 3 „Order information"

1.2 Application Firmware Modules

Figure 1: Overview of VT-80 (left) & VP-80 (right) Firmware Modules on Main screen

1.2.1 Module 1 (1.1 & 1.2) – Overalls

The overall condition of a machine and its bearings can be evaluated by means of characteristic values. A characteristic value (overall) is, for example, the root mean square (rms) of the vibration components within a defined frequency range. These values can be compared to the operational vibration limits in accordance with ISO 10816, 7919 or those of which provided by the manufacturer. In addition to the vibration overall measurements, the Overalls Module also supports process measurements (DC measurements).

Module 1.1 Base – Overalls, Bearing Condition Overalls, Speed, Process values, Crest-Factor

Module 1.2 Advanced – Overalls vs. Time and vs. Speed

Properties & Functions:

- **Overall values as function of speed f(n) & time f(t)** – Displaying the measured values of the variable speed or time in an X-Y-diagram or in numeric view mode
- **Up to 4 vibration channels plus the rotational speed** – This provides high channel density. Tri-axial measurements are also supported.
- **Multi-Channel views (Channel 1 to 4) –** It is possible to show up to four channels at the same time or to choose subset views (displaying either two channels or one single Channel).
  - ***Note: VT-80 offers as subset view only each single channel***
- **Two path A & B signal processing / detection per channel** – Enables the user to select two different weighting or detection parameters for a signal from a single channel. This can be, for example, the simultaneous measurement of the overall machine together with the rolling elements bearing condition using both peak and rms detection parameters within the same frequency range or the CREST-factor.
- **Up to three Vibration values (a,v,d) due to Signal integration** – The simultaneous display of acceleration, velocity and displacement via double integration, if an accelerometer is being used.

- **Known and reliable Bearing condition overalls BCU & ECU** – Besides the common (VT-60) Bearing condition value BCU, further Bearing Condition values BCUp (peak detection) and a new envelop based bearing condition value called ECU (ECUp) are also available. ECU (**E**nveloped **C**ondition **U**nit) is derived from the similar BCU algorithm; the only difference is that the frequency range used for amplification of the "Bearing fault signal information" is not fixed, therefore can be selected by the user. For instance, the desired frequency band can be selected for a known system of structure resonance such as the bearing resonance itself. (For BCU, the frequency band is already fixed around the sensor resonance of the AS-063 acceleration sensor.)

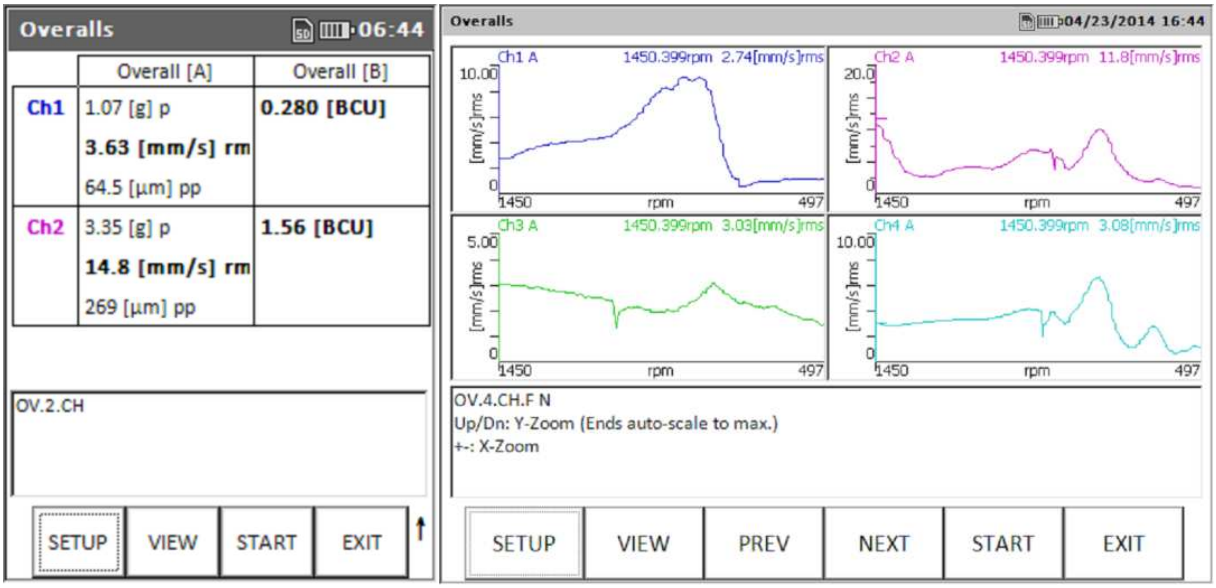


Figure 2: Module 1 Overalls – VT-80 2-channel measurement with Path B active for bearing condition overalls and use of double integration (left) / VP-80 4-channel Coast Down Overalls vs. Speed (right)

Note VP-80's +: VIBROPORT 80 offers more view options here, e.g. 4-Channel view: each channel displaying its own graph (as see figure right above)

1.2.2 Module 2 (2.1 & 2.2) – FFT-Analyzer

Module 2.1 Base – FFT-Spectra

Module 2.2 Advanced – BCS-/SED Envelope Spectra

The FFT-Analyzer module is the perfect tool for finding the source/cause of the vibration. The FFT and envelope analysis techniques resolve the total vibration into its individual frequency components. Each spectral line has its specific frequency and amplitude. The amplitude typically represents the "fault severity" while the frequency represents the "fault location". This makes it easier to reliably diagnose machine faults such as unbalance, gearbox damage, misalignment and rolling-element bearing damage.

Properties & Functions:

- **Cursors and zooming** – The handheld supports single, peak find and harmonic cursors. A user-friendly zooming feature for evaluation purposes is provided in X- and Y-axis direction.
- **Multi-Channel views (Channel 1 to 4) –** It is possible to display up to four channels at a time or to choose subset views (displaying either two channels or one single Channel at a time).
  - ***Note: VT-80 offers as the main view only two channels or as the subset view each single channel at a time***

- **Simultaneous display of time & frequency domain** – Time signal and spectrum can be displayed simultaneously. In addition, the calculated overall value measured out of the displayed Spectra is shown in the status information bar
- **High-end FFT-frequency range and resolution** – The data can be collected by frequency analysis within the range of DC (DC components are omitted from the spectrum) up to 80 kHz with up to 25600 lines resolution.
- **Envelope Spectra BCS / SED** – Are offered by two spectral analysis techniques: BCS (Bearing Condition Signature) analysis by the BCU unit and the SED (Selective Envelope Detection) by the ECU units. Both techniques are based on the fault amplitude modulation of a carrier frequency.
- **Order based Spectra (-analysis)** – If a speed reference sensor has already been connected, the order based frequency spectra can be measured. Besides showing the phase information of the cursor position of the dedicated frequency peak; the frequency x-axis is also being displayed in orders as multiples of the current speed. If the cursor is positioned on the first order and the speed changes, the cursor will follow the selected order and its speed variation.
- **Cross-channel phase** – It is being used to diagnose misalignment. The phase difference between the two channels can be determined without using a speed reference.
- **Orbit** – Orbit measures the movement of the shafts' center line during the shaft rotation. The orbit formed by the two relatively attached displacement measuring probes arranged radially by a 90° shift. Both displacement signals can also be displayed individually together with the orbit plot.

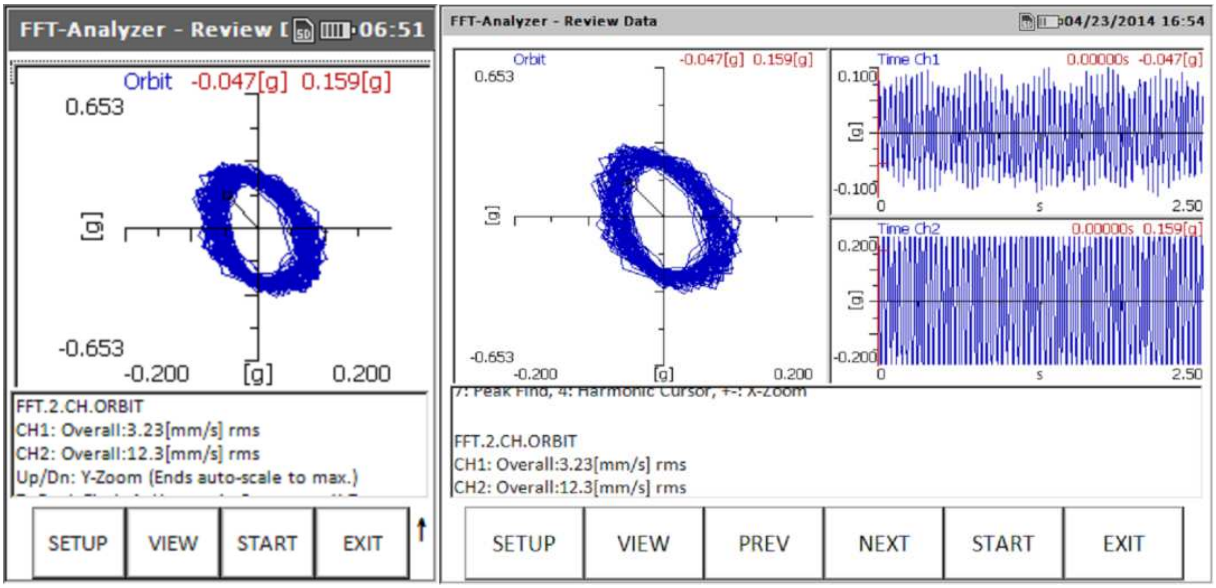


Figure 3: Module 2 FFT-Analyzer – VT-80 Orbit only (left) / VP-80 Orbit and time signals at same time (right)

Note VP-80's +: VIBROPORT 80 offers here more view options, e.g. 2-Channel FFT+Time & Orbit+Time in one single view

1.2.3 Module 3 – Tracking

Order analysis is carried out during the operation of the machine and helps to analyze the rotor frequency-induced vibration components and their harmonics. The VT-80/VP-80 tracking measurement module can be utilized for both the run-up and coast-down of the machine. The new feature here is the two-step procedure:

Step 1: Recording of the raw vibration signal and the rotational speed during the run-up or coast-down.

Step 2: Post-processing of the stored raw vibration signal. The user can repeat the analysis as often as he/she wants with different setups. This is a particular advantage; especially if a second measurement turns out to be extremely time-consuming (prolonged machine coast-down times) or if the machine is essential for production and the process should not be interrupted unnecessarily.

Properties & Functions:

- **Evaluation of the dynamic rotor behavior** – Uses the rotational excitation induced through the inertial force produced by the residual unbalance during the shaft rotation run-up and coast-down
- **Acquisition of the machine resonances** – Shown in a diagram with magnitude and phase (Bode plot)
- **Innovative two-step procedure >> Recording & post-processing** – First, the raw signal is recorded for the post-processing later with different setup parameters
- **Multiple post-processing solutions** – Such as Bode, Nyquist, FFT waterfall, spectrogram and table view can be obtained with several user-definable settings for viewing the results
- **Up to 3-channel support** – Enables the user to measure three vibration channels simultaneously from a triax sensor.
- **Order Analysis** – Up to four user defined orders overall can be derived from the post processing and shown simultaneously.

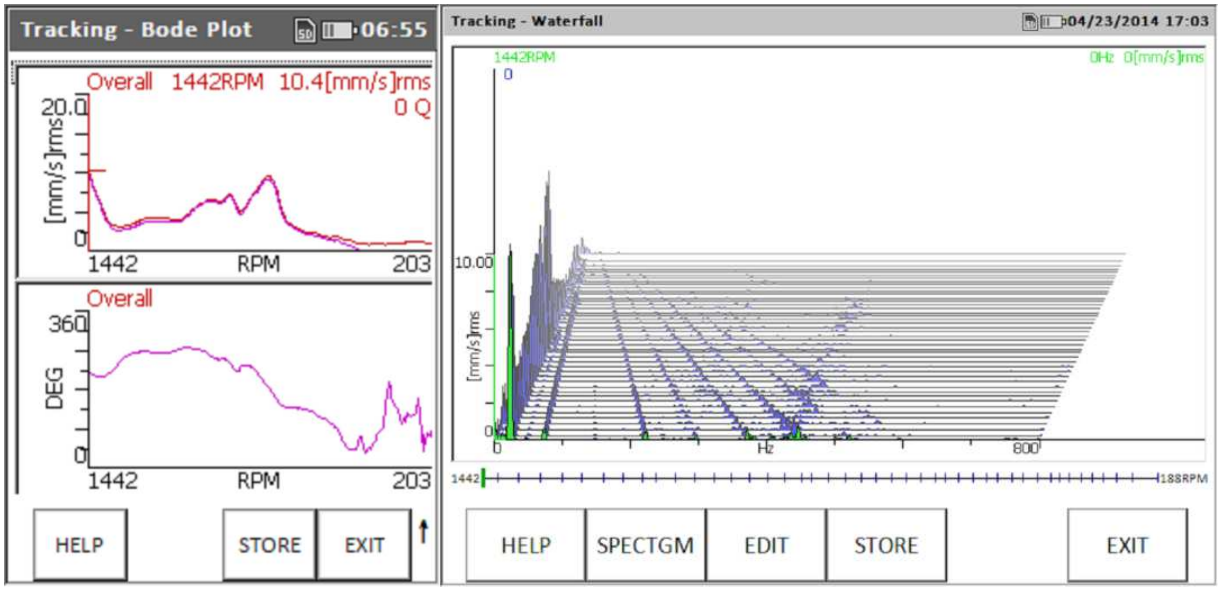


Figure 4: Module 3 Tracking – VT-80 Coast Down Bode Diagram > Amplitude/Phase 1st Order and Overall (left) / VP-80 Waterfall diagram with order (right)

Note VP-80's +: VIBROPORT 80 offers better analysis capabilities in the field as the larger display screen is more appropriate for such 3-D views (Waterfall diagram or spectrogram)

1.2.4 Module 4 – Two-Channel-Function

Note: Module 4 is only applicable on the VT-80 Collector package "VT-80 C", as this package has been released with a 1-channel functionality (within all other available packages; at least 2-channel functionality has been released). Module 4 allows the user to upgrade from 1-channel to 2-channel functionality.

1.2.5 Module 5 – Four-Channel-Function

Module 5 can be applied to all VT-80/VP-80 packages. Module 5 allows the user to upgrade from 1-channel to 2-channel up to 4-channel functionality. For 4-channel functionality, the following dependencies and characteristics apply for each module:

- **Module 1 Overalls** – All four measurement channels (Path A and B for each channel + speed acquisition can be operated simultaneously.
- **Module 2 FFT-Analyzer** – All four measurement channels + speed acquisition can be operated simultaneously. Only for the cross phase and the Orbit, the channel density is limited to 2 channels + speed.
- **Module 3 Tracking** – For maximum three channels + the corresponding speed can be measured simultaneously. However, the post processing of the time waveforms can only be done sequentially – that is one channel at a time including speed and it cannot be performed simultaneously.
- **Module 6 Data Collector** – Usable for maximum two channels + speed. The data acquisition is being performed sequentially.
- **Module 7 Balancing** – For maximum two channels + the speed is done simultaneously.
- **Module 9 Transfer Function** – Usable for maximum three channels in parallel.
- **Module 10 Time Signal –** Used simultaneously either for maximum four channels or three channels + speed.
- **Module 11 Acceptance Test** – Maximum three channels are operated sequentially. The speed measurement is also performed sequentially via defining it as a process value during the configuration of the machine templates with the aid of the Report & Examiner Software.

Further impact of the number of used channels (connected sensors) on parameters of the measurement types has to be considered within each module, e.g. the number of FFT-lines, bearing condition values BCU etc. More detailed information regarding the impacts and restrictions can be found in the section "Technical data" within this product specification document. Please note, with the increase of the operating channel density; a decrease in the bandwidth of the measurement parameters occurs, since the DSP processing power is limited.

1.2.6 Module 6 – Data Collector

Offline monitoring, i.e. the systematic acquisition of the state values on measuring routes, makes the condition-based machine maintenance possible. During the operation, the "Data Collector" VT-80/VP-80 Module enables the user to monitor a number of measuring points of rotating machinery in a cost-effective manner. The task of data collection is the acquisition of measuring values at pre-defined measuring points or locations. For this purpose, the systematic order and the settings of each measuring point of a Route are specified using the Report & Route Manager software. The Route is transferred to the VT-80/VP-80 and stored on its memory card.

<u>Properties & Functions:</u>

- **General measurement functions of the Overalls and FFT-Analyzer Module –** The Data Collector VT-80/VP-80 Module uses a number of powerful measuring functions of these two VT-80/VP-80 Modules in the background. In addition to the standard Overalls and FFT spectra, these include:
  - Bearing Condition Overalls for rolling element bearings ECU and BCU. ECU is a new bearing condition value, where the frequency range used for signal amplification can be selected by the user in an application-specific manner as opposed to the BCU bearing condition overall,

which uses a fixed frequency range located around the specific sensor resonance for the signal amplification.
    - Envelope spectra SED with the unit ECU as well as BCS with the unit BCU
    - Time function, is the recording of a time signal sequence. This sequence can also be filtered during the data acquisition at the point of measurement by a user-specific band pass filter.
    - Process values
- **Unlimited number of measuring routes –**up to 5.000 measurement tasks (slots) can be set up and edited simultaneously.
- **Up to 12 measuring slots & automation of the data acquisition –** up to twelve measurements / measurement types can be specified per measuring point, which are acquired automatically and sequentially by a single key press.
- **Efficient, intuitive & comfortable operation –** the user is supported by a variety of operational aids during the route inspection:
    - Arbitrary back and forth jumping within a measuring route and between different measuring routes
    - Insertion of comments that would automatically be transferred to the database during the "unload" process
    - Review function on-site for examination of up to 12 measurements per measuring point
    - Graphic settings, such as the spectra background, gridlines in the background, etc.
    - Two possibilities for unloading and downloading the VT-80/VP-80 routes via USB interface
- **Comprehensive analysis & diagnostic features** – during the route inspection, the user can access a variety of implemented features in order to perform first analyses and diagnoses on site.
    - Cursors: Individual, harmonic and "Peak-Find" cursor
    - Zooming in x- and y-axis directions
    - Displaying of the percentage change of the current overall in relation to the last measured overall
    - Specification and display of up to 10 band alarms as part of the FFT- and envelope spectra
    - Color indication in case a limit value is exceeded
- **Practically unlimited storage due to the 16 GB SD Card –** by replacement of different, available SD cards when unloading routes, which are stored on the cards.

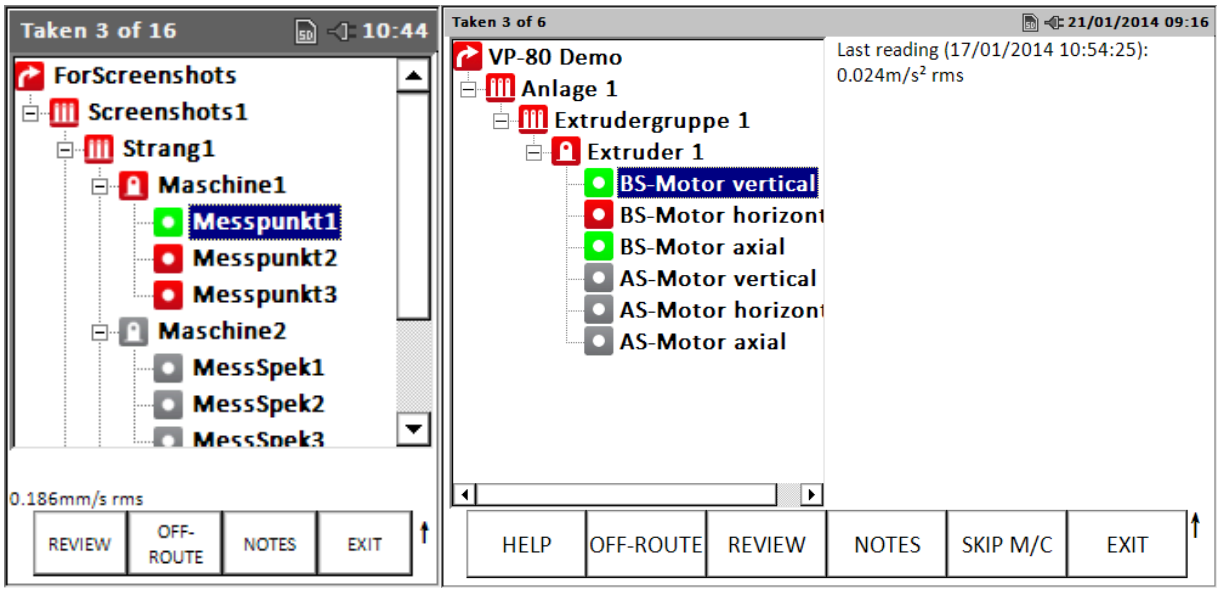


Figure 5: Module 6 Data Collector – VT-80 Route during navigation in Hierarchy tree (left) / VP-80 Route during navigation in Hierarchy tree AND information (right)

1.2.7 Module 7 – Balancer

A significant proportion of all machine faults are due to unbalance of rotors. Although rotors are, as a rule, built into the machine in a precisely balanced manner after the manufacturing process, unbalance can result because of mounting tolerances and the residual unbalance of components over a period of time. On-site field balancing offers several advantages, such as: No dismounting and transport of the rotor; taking into account the on-site mounting conditions (e.g. bearing clearances); independence from the rotor-size or rotor-weight.

Properties & Functions:

- **1 or 2-plane balancing** – For static and dynamic balancing
- **Fast balancing with prognosis –** Is realized via the innovative prognosis algorithm which provides the remaining residual vibration level for both planes soon after the first trial being run as a prognosis
- **2- plane polar –** Both planes can be viewed on one display with the possibility to switch to a bar graph and table view, which summarizes the steps of the balancing procedure
- ***Note: in VT-80, in case of the 2-plane balancing, the 1-plane polar plot is being displayed separately; – For both planes, only one plane can be shown at a time. Switching to the other plane can easily be done.***
- **Free choice of adjustment method** – The user can choose between polar, component or fixed mass methods, and can arbitrarily switch between polar and components balancing at any desired time.
- **2-plane, one sensor** – Allows the user to perform a two-plane balancing job with only one vibration sensor.
- **Trial weight estimation** – Supports the user in finding an appropriate trial weight
- **Multiple Trial Runs** – By systematic attachment of the test weights at specific locations and performing the respective trial runs, the linearity of the systems and the rotor shaft behavior can be checked and evaluated.

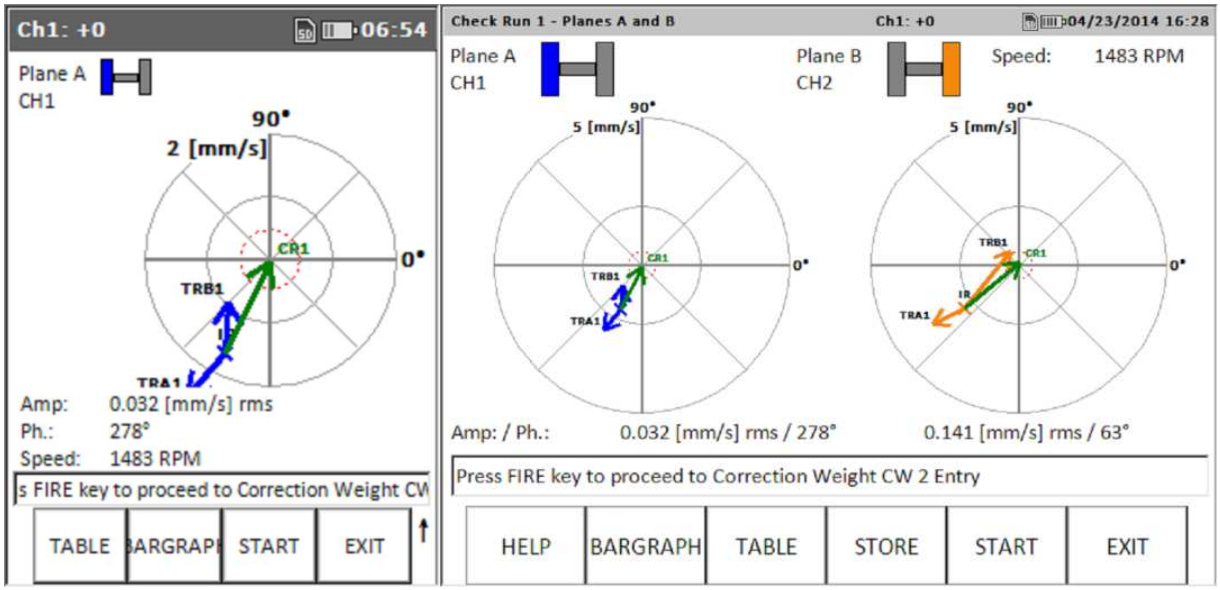


Figure 6: Module 7 Balancer – VT-80 2-Plane Balancing showing Plane A (left) / VP-80 2-Planne Balancing showing Plane A and B (right)

Note VP-80's +: VIBROPORT 80 offers 2-Plane polar graph on the same display (VT-80- only by switching between each plane via the cursor cross)

1.2.8 Module 9 – Transfer Function

For modal analysis of machines with shafts that are in non-rotational mode as well as for the analysis of immovable objects, such as the foundations or frameworks, the impact analysis method is being employed. The transfer function is derived by the ratio between the input signal (load introduced by the hit of an impact hammer which has a built-in load sensor) and the output signal (measured vibration).

Properties & Functions:

- **Identifying the structural resonances** – By using an instrumented impact hammer for excitation
- **Indication for the relative movement of machine components** - Can be determined by using the Multi-Channel-Function
- **Conventional evaluation methods** – Are available and comprise of load, acceleration and displacement leading to various FRF (Frequency Response Function) types such as apparent mass, compliance, stiffness and others
- **Integrated coherence analysis** – Is provided through the color coding directly in the bode diagram. The coherence plot allows the user to evaluate the "linearity" of a measurement that is; "how undisturbed the input hammer impulse is being transmitted to the output impulse response". This can be used to identify local disturbance/fault frequencies, which can mistakenly be interpreted as structural resonance. (The coherence value, in this case, is very low as the fault frequency has no relation to the transmitted input impulse to the impulse response)
- **Up to 3 input channels** – For tri-axial measurements
- **Auto range-Function** – enables automatic display and input amplifier ranging in order to adjust to the impulses of the impact hammer as well as to the high deflection within the impulse response signals.
- **Constant Current Supply of the impact hammer** – direct connection to the impact hammer (CCS, ICP®)

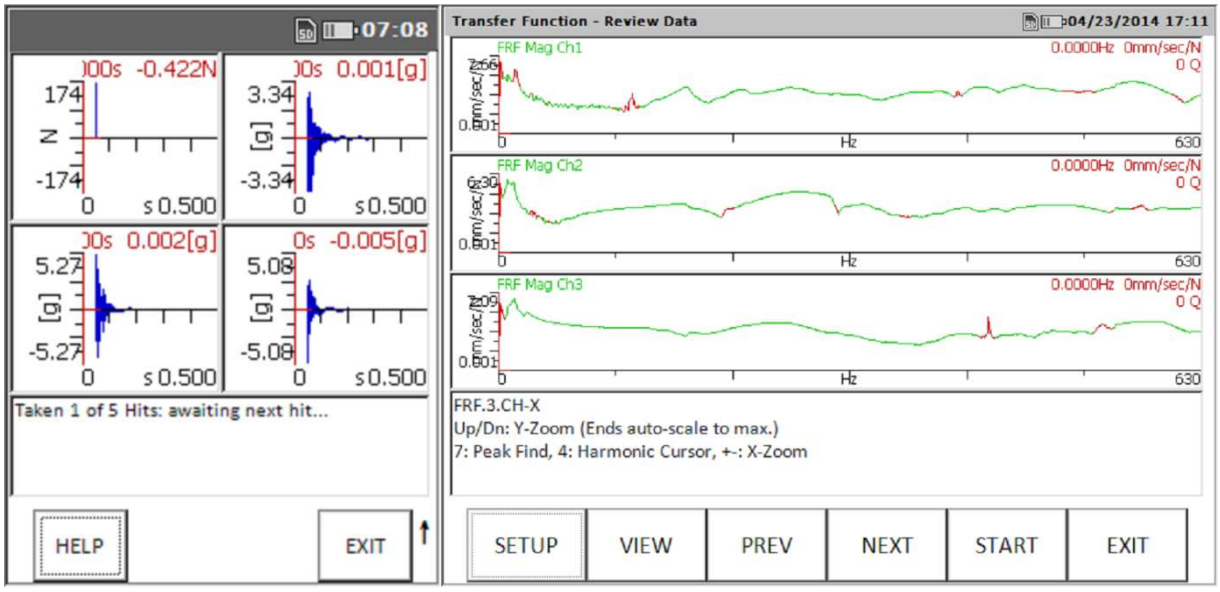


Figure 7: Module 9 Transfer Function – VT-80 Hammer input impulse with Triax impulse responses (left) / VP-80 Bode Diagram Amplitudes for each Channel coherence indication with the red color (right) /

Note VP-80's +: VIBROPORT 80 offers for Triax analysis better overview especially when viewing all three magnitude courses at once

1.2.9 Module 10 – Time Signal

The time signal function enables the user of the Report & Examiner Software Premium Version to visualize the raw signal and store it in a standard (.wav) format. This format permits subsequent post-analysis by the Report & Examiner Software or e.g. MatLab™.

Properties & Functions:

- **Up to 4 input channels** – 4 x vibration signals, for example, or 3 x vibration signals + 1 x speed reference (rotational speed) can be recorded
- **Standard .wav file format** – Enables to import the measured data file in several different analysis software
- **Storage internal or external** – Internal storage can be done up to 80MB, external storage on an SD card can be done up to 16 GB, with max. 2 GB per data set.

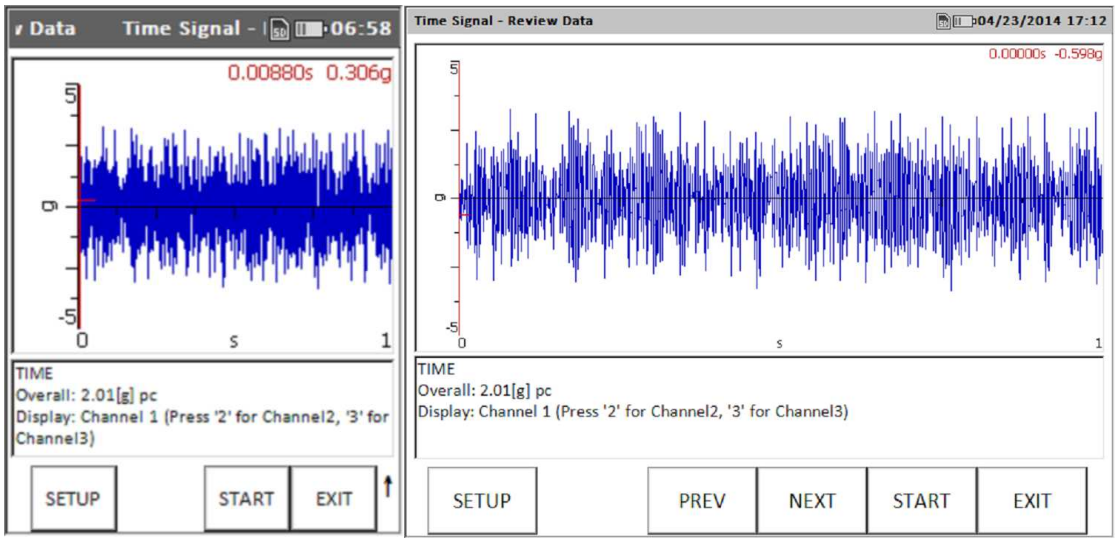


Figure 8: Module 10 Time Signal – Short preview before starting the acquisition of raw vibration data (VT-80 left / VP-80 right)

1.2.10 Module 11 – Acceptance Test

The module Acceptance Test is often used for quality inspections in batch production (final acceptance). It compares characteristic values with limits established by standards, such as ISO 10816 or 7919. The module also allows you to access pre-defined or user defined measurement tasks (setups).

Properties & Functions:

- **Generation of Machine Templates in Report & Examiner Software** – The generation, set up and management of user customized machine templates can be performed efficiently via Report & Examiner Software. Moreover, the Report & Examiner Software supports a special and exclusive reporting system to report and print out the data acquired with the Acceptance Test module.
- **Predefined Standard Machine Templates** – Several pre-defined machine templates of the most common standard machine types (machine trains) are already at hand. They are accessible to each and every user, and these templates can be used for getting ideas and orientation.
- **Easy and intuitive handling –** There is the possibility to create customized templates for the acceptance test procedure, including a picture of a machine; the user can easily compare the measured overalls to the standard limits (e.g. ISO) or user defined limits for the particular application.
- **Highly flexible acceptance profiles** – Can be set up by the user. Up to 64 bands in the frequency domain with 8 levels can be defined.
- **Color coding of the levels** – For a quick and better overview.

- **Quick and easy data export** – Via USB, SD card as .csv format for display in Microsoft™ or straight into the Report & Examiner Software

Figure 9: Module 11 Acceptance – Displays of customized integrated machine picture *.bmp for better orientation (VT-80 left / VP-80 right)

Note VP-80's +: VIBROPORT 80 offers a remarkably better overview in case of the complex pictures ; for instance while measuring many bands with many sensor positions and each with three directions. Those setups result in multicolored view of the calculated overalls which are being compared to the specified limits

1.3 Setups Modules

1.3.1 Sensor Setup

The module sensor setup supports the customization of the sensor types. Of course, a broad range of Brüel & Kjær Vibro sensors are already predefined in the sensor setup. Moreover, the user can set up his or her own sensor types. This setup will then be available for each measurement module.

Properties & Functions:

- **Brüel & Kjær Vibro sensor setups** – Already available in VT-80/VP-80
- **User defined sensor setups** – Integration of the user's sensor types irrespective of the type,so as to have a quick access in each module setup
- **Easy to add, modify and delete** – new or existing sensor setups

1.3.2 System Setup

The most important and general (partly module independent) system parameters can be set up within the Module System Setup. Those are the standard parameters such as language settings, international system units, time, memory & card settings, operational parameters based on users' preferences, time out, signal input ranges etc. Therefore, within this product specification, such parameters have not been described in detail. More information can be found in the user instruction manual.

Below, only selected System Setup parameters are being emphasized and described, which are characterized by the remarkable impact on the functionality within the VT-80/VP-80 firmware modules.

Properties & Functions:

- **Channel-Setup** – In the case of multi-channel measurements with the identical sensors, it is enough to set up one of the sensors. This setup can then be transferred automatically to the other sensors by a "copy to all" function in the System Setup. If „individual" is being selected, each channel (sensor) can

then be setup individually, to that effect, the setup menu provides remarkably more parameter settings.

- **Speed acquisition** – The parameter speed defines the speed units and activation. One can select among: Revolution per Minute (RpM), vibration per second (Hz) or when the speed is deactivated (inactive).
- **Trigger** – Trigger defines how and when the signal of the speed reference channel is being processed. For the measurement acquisition the user can select among automatic, manual, visual.
- **Settings Module Data Collector** – Exclusively for the Firmware Module 6 Data Collector there are several, versatile parameter settings, the user can control the data acquisition during the route inspection and simplify the acquisition, hence save time.

1.3.3 General Module Setups

- **Pre-defined measurement setups –** For direct and quick access to measurement tasks. Several widely used measurement tasks have already been pre-defined and are directly accessible via an icon. This feature is available in all modules.
- **Easy Sensor setup –** Pre-defined setups for Brüel & Kjær Vibro sensors can be complemented by customized setups of other sensor types. Once saved, these setups are automatically available in all modules. In the case of multi-channel measurements with identical sensors, it is enough to set up one of the sensors. This setup can then be transferred automatically to the other sensors by a "copy to all" function in the System Setup.

1.4 Further Specifications

1.4.1 VT-80 *E* & VP-80 *E*– ATEX / IECEx / CSA

VIBROTEST 80 *E* and VIBROPORT 80 *E* have been developed for use and operation in potentially hazardous areas. Both handheld devices offer nearly the same functionality as the standard VT-80/VP-80, but are, in addition, ATEX certified. Besides some special internal hardware design changes, here are some minimal operational restrictions – only within the potentially hazardous areas:

- Up to three vibration channels with three single ATEX sensors + reference (rotational speed)
- No audio output for headphones and no docking station
- No use of an Impact hammer (therefore no Transfer Function module function) Maximum ambient temperature: –10 to +50 °C (+14 to +122 °F)

In order to provide full support for your “E”-Package, Brüel & Kjær Vibro supplies various intrinsically safe spare parts, such as cables and our special laser speed reference sensor PA-98.

1.4.2 Easy & Efficient Operation

- **Flexible access to measurement tasks via Function keys** – For context sensitive use during operation
- **Quick balancing procedure via the fire-key** – This provides a fast and easy balancing procedure, especially when similar machines are balanced in sequences. Pressing the fire key can guide you through the balancing procedure.
- **Fast data entry** – VT-80 / VP-80 are equipped with an alpha-numeric key pad for quick and convenient entry of data or text.
- **Overview function keys for setup parameters –** The function keys EXPAND and REDUCE can be used to adjust the view of the setup parameters to either the most widely used parameters or the additional ones for a more sophisticated measurement task.
- **New function key “LAST NAME” in all Modules** – The last file name which has been entered by the user is memorized by each module. When storing the next measurement, the last filename can be recalled by pushing the LAST NAME function key. This helps to save time during the daily operation with the portable instrument.

Figure 10: All Modules – Storing of the last entered filename; i.e. the possibility to recall -within a firmware Module- via the function key „LAST NAME“ (left) / comparison of VT-80/VP-80 key pad with function keys, alpha numeric keys and Cursor cross with Fire Key for quick navigation (right)

Note VP-80's +: VIBROPORT 80 offer a cursor cross with one more fire key in the center which allows for quicker handling and acknowledgement of parameters, etc.

1.4.3 Analysis & Evaluation

- **Customized post-processing of the measurement data** – The Tracking module allows you to post-process your stored measured raw data with different setup parameters as often as required.
- **Efficient operation** – The Viewing of the parameters can be customized; a large, colored LCD display and the alpha-numeric key pad will allow you to easily store, reload, view and evaluate your measurements.
- **Multiple cursors for diagnostic evaluation** – This feature support you in becoming an expert in vibration measurement.

1.5 Report & Examiner Software

Report & Examiner Software supports the VT-80/VP-80 application modules, except for the firmware Module 6 Data Collector. The software operates on all common Windows™ supported PC's. The connection to the VT-80/VP-80 is realized via the USB-Interface. Measurement which has been stored on the portable instruments (Reports) can easily be transferred to the Report & Examiner Software and measurement reports can be generated. The optional Edition "Premium" enables the detailed analysis of the measured raw time signal datasets (*.wav) via digital post processing for generation of post FFTs and the Waterfall diagrams . For analysis and diagnosis of the bearing faults (assignment of the bearing fault frequencies) Report & Examiner Software offers a bearing database including all common manufacturers including the fault symptoms of the bearing components.

Highlights:

- **Used on all VT-80/VP-80 instruments** – With extensive reporting and analysis functionality
- **Single-client & multi-user server support** – Both available with a USB hardware dongle
- **Standard Edition** – Basic features for reporting and analysis
- **Premium Edition** – Enhanced features in addition to standard such as:
  - Can be retrofitted (upgrade of the Standard Version)
  - DSP (digital signal processing) of .wav files for FFT and waterfall diagram
- **93 days trial version** – Test the Report & Examiner Software including Premium functionality for 3 months free-of-charge

NOTE: For more details please have a look into the Report & Examiner Software user instructions and the corresponding product specification document.

1.6 Database Software Report & Route Manager

The Report & Route Manager by Brüel & Kjær Vibro is a professional software used for a powerful realization of the "condition-based maintenance" concept. Report & Route Manger is mainly used with VT-80/VP-80 Module 6 „Data Collector“. Report & Route Manager will fully support you to manage the collected machine data by means of an intelligent database. The modular design offers all possibilities to adapt the functionality of the software based on your individual needs.

Highlights:

- Report & Route Manager comprises the entity of different modules of a modern software package for data collection and for the evaluation of vibration measurements. The measurement data is provided to the software after the offline operation using the VT-80/VP-80
  - Module 1 – "Basic Function & Analysis“
  - Module 2 – "Analysis Expert“
  - Module 3 – "Protocol Expert“
  - Module 6 – "Route““
- **Single User (Client) & Multi User (Client Server) configuration** – both controlled and licensed via the software dongle (no Concurrent Licensing).
- **90 days Demo Test Version** – enables the user to test the full functionality of all available software modules.
- **Easy and efficient operation** – Easy setup of measurements, alarms, and routes as well as a high-level working filter function.
- **Special Plots and Cursors** – 3-D Waterfall/Spectogram and exclusive gearbox cursor.
- **Windows®-based Software** – hence the Windows®-based database.
- **Database Import of VIBROTEST 60 / xms-Software** – i.e. data, setups into Report & Route Manager by a special import assistant dialogue helping the user to have an overview.

NOTE: For more details; please have a look into the Report & Route Manager user instructions and the according product specification document.

1.7 Key Differentiators VIBROTEST 80 & VIBROPORT 80

With our new VIBROTEST 80 we are completing our portable instrument product line. This shall benefit our customers in two main areas:

- by offering our customers a remarkably **cheaper price** for the VIBROTEST 80 while including **same features and functionality** as the VP-80
- by enhancing the product portfolio in such a way that B&K Vibro offers portable instruments with **maximum flexibility based on the requirements for all the dedicated applications** of our customers.

Although the VT-80 offers generally the same functionality as the VP-80, there are some extraordinary key differentiators which we would like to point out when purchasing either of both handhelds. The VP-80 offers some additional benefit to the VT-80 which results in VP-80's higher price category
Obviously, there are certain requirements where VT-80 turns out to be the right choice, such as the size and weight of the hardware which ends up being a better choice for offline monitoring in data collector applications.

To support our customers in the decision process, you shall find the following differentiators listed below which will help you to answer the frequently asked question: *„What are the additional benefits of VP-80 that would justify the higher price category? "*.
Note: All features, measurements types, etc. are identically implemented and available on the VT-80 and VP-80 Firmware. However, the applications combined with particular functionalities that are more appropriate for VP-80 are also listed below.
At the end; you shall find a short summary about the benefits of VT-80 on top of its economical price.

1.7.1 Key benefits VIBROPORT 80

(1) Larger LCD screen size
- ✓ VP-80's display is 130x100 mm (vs 76x57 mm)

(2) Docking Station & Supporting Leg
- ✓ For work in office and at trainings/service

(3) 2-plane Polar Plot
- ✓ shown during Balancing on ONE single screen

(4) Easy & fast operation
- ✓ Availability of all function keys (6 instead of 4 -> or remaining 2) & cursor cross allowing efficient operation

(5) Versatile Application
- ✓ VP-80 is the „real" 3 in 1 instrument „Analyzer, Balancer, Collector"

The VIBROPORT 80 is the solution for customers who are using the instruments 3-in-1 versatility for arbitrary applications on one and the same instrument, i.e. using VP-80 as Analyzer, Balancer and Collector at the same time. According to the following core applications, VP-80 offers for all those applications appropriate solutions by Firmware, Hardware as well as accessories. This has been exemplified at every check mark explaining why VP-80 is a better fit:

A Field Analysis & Diagnosis
- ✓ Well- organized multi-channel-views on VP-80's large display for multi-channel measurements & cursors

B On Site Balancing
- ✓ 2-Plane polar graph (only VP-80) and a summary table giving an overview; which is only possible because of a large display

C Data Collection
- ✓ Although the instrument seems to be too big for the a typical offline data collection application; a neck strap and a two hand strap as well as the easy and fast operation via cursor cross support the user in compensating compensate the instrument's size.

Below the five key benefits for VP-80 are assigned to each VP-80 application firmware module in order to emphasize which particular functionality and measurement types in the firmware modules are more appropriate to be used with VP-80

- **Overalls – Module 1** **<>** **key benefit (1) (2)**
  - 3 to 4 Channel overall measurements + Speed
  - Overalls vs. speed f(n) and vs. time f(t)
- **FFT-Analyzer – Module 2** **<>** **key benefit (1) (2) (4)**
  - Orbit Measurement and Display with both time signals of each probe
  - 1 to 2 channel spectra+time measurements
  - 3 to 4 Channel spectra measurements + Speed
  - Review and analysis by cursors (even for harmonics) on the instrument
- **Tracking – Module 3** **<>** **key benefit (1) (4)**
  - 3-D diagrams Waterfall & Spectogram
  - Bode, Nyquist with several orders
  - Extensive and powerful setup: i.e. parameterization by the user
- **2-CH & 4-CH Functionality – Module 4 & 5** **<>** **key benefit (1)**
  - Multichannel measurements need a large display
- **Data Collector – Module 6** **<>** **key benefit (1) (2) (4)**
  - Band Alarms & Cursors in Spectra during Route inspection
  - Hierarchy Tree visibility & Quick navigation
  - Review and analysis of the taken measurements on the instrument
  - Docking instrument for office use for route downloading and data unloading
- **Balancer – Module 7** **<>** **key benefit (1) (3)**
  - 2 Plane Polar plot on one screen (VT-80 only switching between planes)
  - better comprehension through the Overview Table
- **Transfer Function – Module 9** **<>** **key benefit (1) (2) (4)**
  - 1 channel measurement: Bode + coherence results in 3 x 1 plot
  - 2 to 3 channel measurement
  - Review and analysis by cursors on the instrument
  - Testing in research departments with the help of the docking stations
- **Time Signal – Module 10** **<>** **key benefit (1)**
  - A detailed look at the the raw vibration data
- **Acceptance Test – Module 11** **<>** **key benefit (1) (4)**
  - A better overview due to the multiple monitoring Bands for several MP locations
  - „Mini Route“ can be displayed e.g. via a technical drawing with a description of measurement locations and measuring directions
  - In daily repetitive operational work ,acceptance testing, operation, storing and efficient management of the data have become very mportant

1.7.2 Key benefits VIBROTEST 80

(1) Remarkably cheaper than VP-80 by offering the identical functionality
- ✓ For every measurement type, multichannel approach, features are the same as VP-80

(2) Light weight & practical instrument
- ✓ The instrument can be held easily with one hand with a weight of 715 g (vs. 1540 g VP-80)

(3) Ideal for pure Data Collection Application
- ✓ VT-80 is the instrument ideal for data collection especially in large plants with multiple routes and several measurement points

(4) Low Cost Balancer package VT-80 "B" available
- ✓ This package is exclusively established within the VT-80 Product line and not available with VP-80. Especially for customers who require several Onsite Balancing instruments during the daily operation, this would then be an attractive option.

Evidently the differentiators mentioned above for the VP-80 firmware modules can also be applied to VT-80 though with certain limitations and restrictions respectively via converse argumentation; therefore a detailed listing of the VT-80 features are no longer necessary.

However, to be consistent with the approach above, some comments shall be given to the core applications with emphasis on and in relation to VT-80.

A Field Analysis & Diagnosis
- ✓ On the VT-80 Multichannel views can be customized and managed by function keys which allow the user to decide what to show on the VT-80 screen; e.g. by toggling between measurement channels or by showing only Orbit or the particular time signals, etc.

B On Site Balancing
- ✓ In case of 2-Plane balancing the user can toggle between the polar plot for each plane arbitrarily. That means that only one polar plot of the Plane A or Plane B can be displayed one at a time In any case, the polar plot of the chosen Plane is shown in maximum size so that the balancing expert can reach a conclusion based on the vector movements.

C Data Collection
- ✓ This is the core application which – if applied for pure data collection – is perfectly predestinated for the use of VT-80. Due to its small size, the versatile functionality and the light weight VT-80 might be the perfect choice.

2 Technical Data

The technical data summarized within this chapter apply generally for all modules, i.e. for the VT-80/VP-80 hardware including the Firmware. There might be a likely chance that the functionalities such as the measurement types have already been described in the, previous chapters. The objective of this exclusive section is to provide the user with a brief summary– to see if the VT-80/VP-80 fulfills the overall technical requirements requested by the user. For a better understanding of the specific module functionalities; it is strongly advised to read the section 1.2 in full detail.

2.1 Signals, Units & Measurement Tasks

2.1.1 Units

- Acceleration (g, m/s_2, BCUp, ECUp, BCU, ECU)
- Velocity (mm/s, in/s)
- Displacement (µm, mils)
- Volts (V, mV)
- Process values such as Pressure P, Temperature T, Nm, A, kW, m3/s, MP, bar, °C, F, N, EU etc.
- Single- or Double-Integration
- Switchable between metric and imperial units

2.1.2 Signal types & -detections

- RMS
- Peak (True peak)
- Pk-Pk (True Pk-Pk)
- Peak calculated
- Pk-Pk calculated
- CREST
- Max X/Y
- Averaging: RMS, Time-synchronous, peak hold, exponential

2.1.3 Measurement tasks

Time domain

- Overalls (total vibration and Rolling-element bearing fault frequencies)
- Overalls vs. speed and time f(n) resp. f(t)
- CREST factor
- Max. X/Y (2-channel function)
- Time signal (raw signal) of the vibration and the reference signal
- Time signal short (in FFT-Analyzer module max. 65536 samples)
- Orbit (2-channel function)
- Process value (DC, Volt)
- Rotational Speed
- Phase
- Gap (DC, Volt)

Frequency domain

- FFT-spectrum (100 to 25600 lines)
  - FFT window functions: Hanning, Hamming, flat-top, rectangular
  - Overlap: 0 to 99%
- Envelope-spectrum (BCS, SED)
- Phase
- Orders
- Cross-Channel- Phase (2-channel function phase difference)
- Transfer function
- Tracking (Bode, Nyquist, Waterfall Diagram, Spectogram)

2.2 Sensors, Input- & Output Channels

2.2.1 Sensors

- Vibration Acceleration
- Vibration Velocity
- Vibration Displacement,
- AC/DC sensors
- Reference sensor (tachometer)
- Voltage
- Sensor supply (vibration sensors): CCS (Constant Current Supply) typically 2,4 mA (2,0 mA minimum)
- OK monitoring/ Transducer check: Bias Voltage Integrity (Automatic over-voltage and under-voltage Bias voltage check.)

2.2.2 Input- & Output Channels

No of Input channels:

- 4xVibration channels (1/X, 2/Y, 3/Z and 4/R) + reference/rotational speed, Tri-ax support 1/X, 2/Y, 3/Z @CH1
- In Zone use: (E-Types) max. 3 vibration channels 1/X, 2/Y, 3/Z (Triax) + reference/rotational speed

Note: the input sockets CH1, CH2 & USB DEV/TRIG/PWR are supplied by one single voltage source + 5 V within the instrument! For VT-80/VP-80 and VT-80E/VP-80E applies the following

- VT-80/VP-80: +5V @193mA in total
- VT-80E/VP-80E: +5V @78mA in total (limitation in Hazardous Areas)

Input Sockets:

- CH1 (Measurement Channel 1 or 1,2,3 vibration): 6-pin Fischer channels 1X/, 2/Y, 3/Z (CCS; AC/DC input, Tri-ax and +5V out)
- CH2 (Measurement Channel 2 vibration): 6-pin Fischer 2/Y (CCS, AC/DC input and +5 V out)
- CH USB HOST/ CH R (Measurement Channel 4 vibration): 7-pin Fischer R (CCS; AC/DC input), USB HOST, Impact Hammer, Headphones Audio out (no use of this socket for E-Types in Zone 2)
- CH USB DEV/TRIG/PWR: 7-pin Fischer USB DEV, charger, ext trigger aux, +5 V Tachometer out

Outputs & Other Connections:

- Power Supply/Charge (Battery)
- Audio out (headphones)
- USB host
- USB device

2.2.3 Pin Assignment

Fig. 3 Connection plate

[1] Channel CH 1
[2] Channel CH 2
[3] Channel USB HOST / CH R / Earphones
[4] Channel USB device / TRIG / PWR

Connection	Pin assignment	Standard sensors
Channel CH 1 	(1) Measuring channel 1/X, (2) Measuring channel 2/Y, (3) Digital Gnd, (4) +5V-EXT, (5) Analog Gnd, (6) Measuring channel 3/Z Measuring channels 1X, 2Y, 3Z: (CCS supply, AC/DC input)	AS(A)-063 + AC-1393 / AC-1384 or in combination with AC-1382 (Triax)
Channel CH 2 	(1) Measuring channel 2/Y, (2) N/C, (3) Digital Gnd, (4) +5V-EXT, (5) AnalogGnd, (6) +5V-Tacho-Out Measuring channel 2/Y: (CCS, AC/DC input)	AS(A)-063 + AC-1393 / AC-1384
Channel CH R / USB Host / Earphones 	(1) Measuring channel 4/R, (2) USB BVUS, (3) USB-Host D+, (4) USB-Host D-, (5) Gnd, (6) Audio Out, (7) Analog Gnd Measuring channel 4/R: (CCS supply, AC/DC input), (with VIBROTEST 80 *E* do not use in potentially explosive atmospheres / Zone 2)	Impact hammer AC-7501 + AC-1387 or alternatively AS-063 + AC-1386
Channel USB DEV / TRIG /PWR 	(1) EXT-DC-IN, (2) USB-Host Digital+, (3) USB-Host Digital-, (4) Digital Gnd, (5) EXT-TRIG-AUX, (6) USBV, (7) +5V-EXT	P(A)-98 + AC-1388 or AC-1389

2.3 Measurement Range

2.3.1 General

- Sockets CH1, CH2 and USB HOST/ CH R: Maximum ±25 V, Auto range, Sensor Units
  (Over voltage protection +/- 50 V sustained against high-voltage transients)
- Dynamic range: >90 dB
- Rotational Speed (Tachometer): min 0.1 Hz to max. 10 kHz
- Reference (speed and phase tracking): min 0.1 Hz to max. 10 kHz
  - Trigger: Automatic, Fixed

2.3.2 Signal & Module related

Frequency range limits depending on Module:

FFT-Analyzer module: General DC up to 80 kHz (DC component being omitted from the spectrum)

	Acceleration		enveloped SED (ECU)		enveloped BCS (BCU)	
Channels	**Fmax**	**Lines**	**Fmax**	**Line**	**Fmax**	**Lines**
1	80000	25600	40000	25600	40000	25600
2	80000	12800	40000	12800	40000	12800
3	40000	6400	40000	6400	40000	6400
4	40000	6400	40000	6400	40000	6400

- Enveloping filters: 612.5 – 1250Hz, 1250 – 2500Hz, 2500 – 5000Hz, 5k – 10kHz, 10k – 20kHz, 40 - 80Hz, 80 – 160Hz, 160 – 315Hz, 315 – 630Hz,630 – 20kHz, 20k – 40kHz, 50 – 1000Hz, 500 – 10kHz, 1k – 10kHz, 5k – 40kHz and fixed for BCUp + BCS
- FFT resolution: 100 – 25,600 lines (see table FFT-analyzer above)
- Time block length: 256 – 65,536 samples

Overall module: General 0.18Hz up to 80 kHz

	Path A only	**Path B "active" with**		
	Acceleration	Acceleration	ECUp, ECU	BCUp, BCU
Channels	**Fmax**	**Fmax**	**Fmax**	**Fmax**
1	80000	40000	40000	Yes (Fixed Cutoff)
2	40000	20000	40000	Yes (Fixed Cutoff)
3	20000	10000	10000	Not Available
4	20000	10000	10000	Not Available

- Bearing condition: BCUp, BCU (max dual-channel operation), ECUp, ECU, acceleration band pass, enveloped BCS (BCU) and enveloped SED (ECU)

2.3.3 Measurement accuracies

- Overalls (AC, broad-band): 5% amplitude accuracy
- Vector amplitude (AC, narrow band): 5% amplitude accuracy
- Phase: +-3 degree for the first three peaks and then +-6 degrees for all subsequent peaks @60Hz
- DC: 1% amplitude accuracy overall
- Speed: 1% tolerance in rpm or better

2.4 Instrument, Certifications & Ratings

2.4.1 Enclosures

Hardware	VIBROTEST 80	VIBROPORT 80
Size (HxWxD)	186 x 134 x 45 mm	220 x 220 x 71 mm
Weight	715g (1,6 lb)	1540 g (3,4 lb)
Display (Backlight Color LCD)	1/4 VGA color TFT screen, (320x240 resolution, 16 bit color)	6.4" TFT VGA, (640x480 resolution, 18 bit color)
Environmental		
Sealing	EN60529 IP65 (Dust- and waterproof)	
Drop test (to MIL STD-810F)	2 m (6.6 ft)	1.2 m (4 ft)
Vibration	MIL STD-810 transportation	

2.4.2 Certifications

Certifications:

- VIBROTEST 80 & VIBROPORT 80: CE, RoHS (Category 9)
- Power supply: CE, RoHS (Category 9)
- Docking station (**VP-80 only**): CE, RoHS (Category 9)

Note: C-Tick requires B&K Vibro importer registration number (see product labels)

Electromagnetic compatibility: According directive 2004/108/EC

Low voltage directive: According directive 2006/95/EC

Hazardous Areas (Certification), E-Types only

- ATEX II 3G Ex ic IIC T4 Gc Ta= -10°C to +50°C according to directive 94/9/EC and standards EN60079-0 and EN60079-11
- IECEx II 3G Ex ic IIC T4 Gc Ta= -10°C to +50°C according to IEC60079-0 and IEC60079-11

Hazardous Areas (Certification), Standard types only

- CSA Class I, Div 2 Groups A, B, C & D, temperature Code T4A@Ta=50C

2.4.3 Ratings

Temperature ratings: VIBROTEST 80 & VIBROPORT 80

- ***VIBROTEST 80*** -> Operating temperature: –10 to +50 °C (+14 to +122 °F)
- **VIBROPORT 80** -> Operating temperature: –10 to +60 °C (+14 to +140 °F)Storage temperature: –20 to +60 °C (–4 to +140 °F)
- Humidity: 10 to 90 % RH, non-condensing at 0 to +50 °C (+32 to +122 °F)

Temperature rating: VIBROTEST 80 E & VIBROPORT 80 E

- Operating temperature (Ambient temperature): –10 to +50 °C (+14 to +122 °F)
- Storage temperature: –20 to +60 °C (–4 to +140 °F)
- Humidity: 10 to 90 % RH, non-condensing at 0 to +50 °C (+32 to +122 °F)

2.5 System

Communication:

- USB via rear panel
- Via Docking Station **(VP-80 ONLY)**
- Microsoft Windows XP® / ActiveSync®
- Microsoft Windows 7® / Mobile Device Center®

User indicators: Blue, Green, Amber and Red LEDs

Battery: Li-Ion, 2600 mAhr (VT-80) and 6600 mAhr (VP-80)with integral gas gauging (typically 8 hours continuous operation minimum)

Battery recharge: Internally using external power supply
Via docking station **(VP-80 ONLY)** – no use in hazardous areas

Operating system: Microsoft® Windows®Embedded CE 6.0

Processor: Marvell 806 MHz PXA320

DSP: Motorola Freescale DSP56311

Memory:

- Internal RAM: 128 MB DDR SDRAM
- External: support up to 16 GB SD Card or SDHC Card (max. 2 GB/report file)

3 Order information

More detailed information, pictures and photos of the versatile accessories such as cables, adapters and standard accessories can be found in a separate Accessories Brochure. Furthermore, all of the modules listed in the following that are marked with a dot are included in the packages; released on the VT-80/VP-80. All other modules are optional and can be retrofitted as an upgrade at any time.

3.1 VT-80/VP-80 Packages "Analyzer & Balancer & Collector"

For both instruments VT-80 / VP-80 the basic packages are the "**A**nalyzer" „VT-80/VP-80 **A**" packages. Based on the "**A**nalyzer" the two packages "**A**nalyzer & **B**alancer" „VT-80/VP-80 **AB**" and "**A**nalyzer & **C**ollector" „VT-80/VP-80 **AC**" are available including also the Balancing module as well as the Data Collector module and some minor but necessary changes/add-ons in the accessories. In addition to all that, two extremely price attractive low entry packages are available ONLY with VT-80, namely "VT-80 **B**" Balancer and "VT-80 **C**" Collector.

From the available packages arbitrary upgrades are possible, either during the initial order or later on request. This feature is a part of the VT-80/VP-80 firmware modules, Software "Report & Examiner Software" and "Report & Route Manager" as well as the single Software modules, sensors, cables, accessories and so on.

All Packages are also available as E-Types (explosive atmosphere / hazardous areas) by keeping the structure of the scope of delivery nearly the same (released Modules, sensor types, cables, etc.). Differences of the E-packages to the Non-E-packages are only given by accessories and electronic parts which are certified for operation in hazardous areas. Such is valid for the vibration sensor, speed sensor, dust caps for interface contacts at VT-80/VP-80 etc.

On the following page the tabular overview shows what is included in each package and what firmware modules are available for upgrade. Furthermore the next two sections about the available Software Section 0 and Section 3.3 are explaining the Software order options. For more information about both software "Report & Examiner Software" as well as "Report & Route Manager" please take a look at the corresponding product specification documents available.

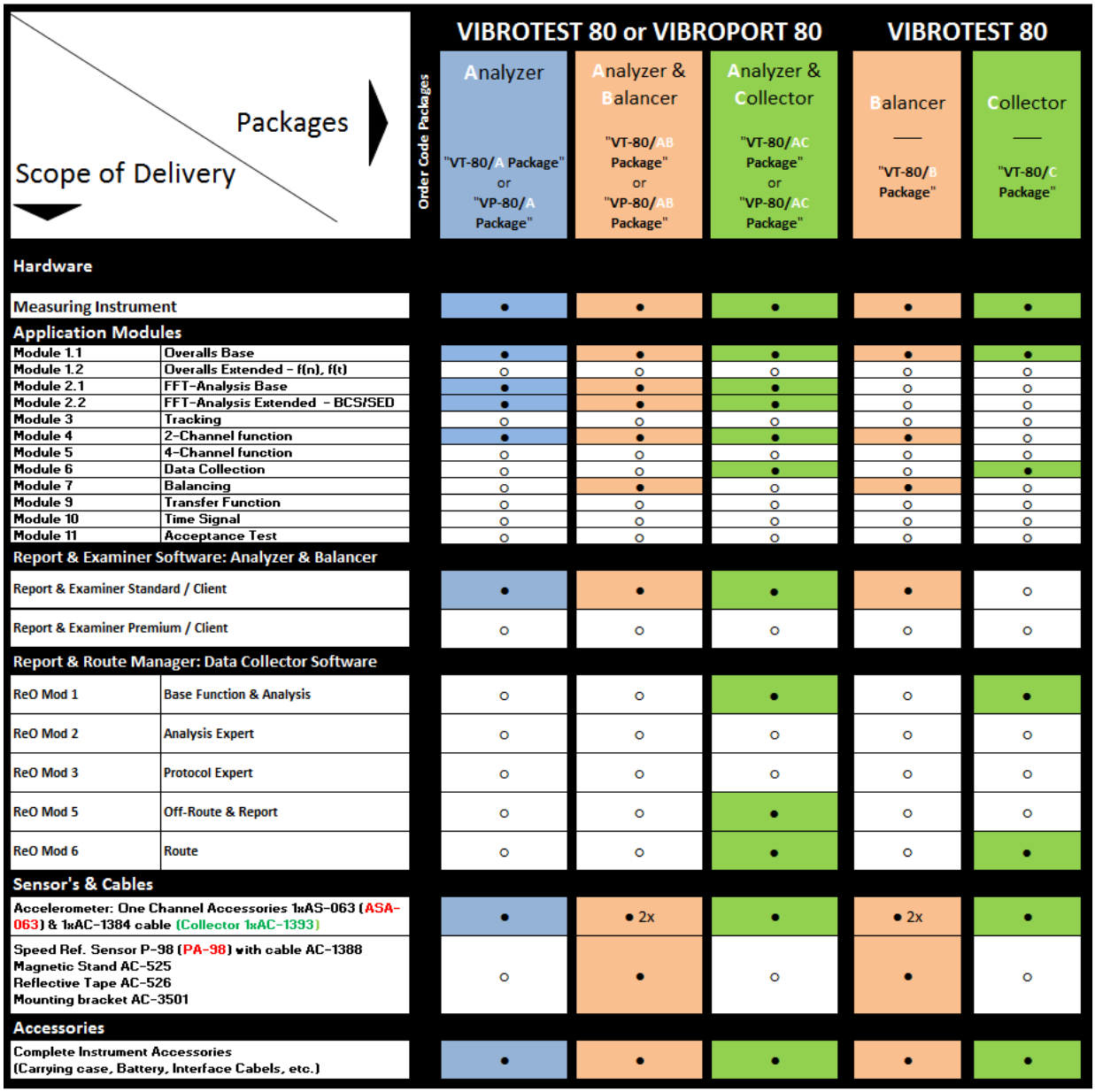
Note: the following differences for E-Types Sensors in the E-Type packages below are valid:

E-Type Reference Sensor:	PA-98 (instead of P-98)
E-Type Acceleration Sensor:	ASA-063 (instead of AS-063)

Note: the following scope of accessories is included in all the packages below

Scope of delivery in ALL packages --> Standard AC's		
VT-80 ONLY	**VP-80 ONLY**	**VT-80 & VP-80**
> Rechargable Battery AC-7002 > protective caps for input sockets AC-7301/VT-80 > Protective case AC-7302 > Hand strap (1x) AC-7303 > Shoulder Strap AC-7304	> Rechargable Battery AC-7003 / AC-7004 (ATEX) (inserted) > protection input sockets AC-7301/VP-80 > Protective case AC-7305 > Hand straps (2x) AC-7308 > Shoulder Strap AC-7309 > Docking station AC-7307 > Leather case items/parts AC-7306 > SDIO cover kit for contact-pins AC-7311 / AC-7310 (ATEX) > USB-interface connection cable (PC) AC-1390	> Carrying case AC-7101 > SDHC-Memory card 4 GB (included) AC-7201 > Power supply charger AC-7001 > Y-cable USB-Power AC-1389 > 1x Magnet AC-273 > 1x Probe tip AC-272

Figure 11: Scope of delivery of ALL packages – Accessories



Scope of Delivery / Packages	Order Code Packages	VIBROTEST 80 or VIBROPORT 80			VIBROTEST 80	
		Analyzer "VT-80/A Package" or "VP-80/A Package"	Analyzer & Balancer "VT-80/AB Package" or "VP-80/AB Package"	Analyzer & Collector "VT-80/AC Package" or "VP-80/AC Package"	Balancer "VT-80/B Package"	Collector "VT-80/C Package"
Hardware						
Measuring Instrument		●	●	●	●	●
Application Modules						
Module 1.1	Overalls Base	●	●	●	●	●
Module 1.2	Overalls Extended – f(n), f(t)	○	○	○	○	○
Module 2.1	FFT-Analysis Base	●	●	●	○	○
Module 2.2	FFT-Analysis Extended – BCS/SED	●	●	●	○	○
Module 3	Tracking	○	○	○	○	○
Module 4	2-Channel function	●	●	●	●	○
Module 5	4-Channel function	○	○	○	○	○
Module 6	Data Collection	○	○	●	○	●
Module 7	Balancing	○	●	○	●	○
Module 9	Transfer Function	○	○	○	○	○
Module 10	Time Signal	○	○	○	○	○
Module 11	Acceptance Test	○	○	○	○	○
Report & Examiner Software: Analyzer & Balancer						
Report & Examiner Standard / Client		●	●	●	●	○
Report & Examiner Premium / Client		○	○	○	○	○
Report & Route Manager: Data Collector Software						
ReO Mod 1	Base Function & Analysis	○	○	●	○	●
ReO Mod 2	Analysis Expert	○	○	○	○	○
ReO Mod 3	Protocol Expert	○	○	○	○	○
ReO Mod 5	Off-Route & Report	○	○	●	○	○
ReO Mod 6	Route	○	○	●	○	●
Sensor's & Cables						
Accelerometer: One Channel Accessories 1xAS-063 (ASA-063) & 1xAC-1384 cable (Collector 1xAC-1393)		●	● 2x	●	● 2x	●
Speed Ref. Sensor P-98 (PA-98) with cable AC-1388 Magnetic Stand AC-525 Reflective Tape AC-526 Mounting bracket AC-3501		○	●	○	●	○
Accessories						
Complete Instrument Accessories (Carrying case, Battery, Interface Cabels, etc.)		●	●	●	●	●

Figure 12: Order information VIBROTEST 80 /E & VIBROPORT 80 /E Packages

Note: In case that module 6 „Data Collector“ shall be upgraded to an already purchased VT-80/VP-80 instrument – NOT a Collector VT-80/VP-80 Package – it is mandatory for the current released firmware version to be installed on your VT-80/VP-80 to support the data collector module. If you have any further queries or need any support, please feel free to contact our Hotline or the B&K Vibro Service Center.

3.2 Report & Examiner Software

Report & Examiner Software is copy protected and can be installed arbitrarily and several times on different PCs, as the copy protection and the respective release of functionality are assigned to a USB-Hardware-Dongle. Single User (Client) as well as Multi User (Server) solutions (USB Dongles) are available, whereas in the present product specification only the Client Version has been described, as this is the only Version which is part of all Analyzer "A" and Balancer "B" / "AB" VT-80/VP-80 packages as Edition "Standard".

NOTE: For more detailed information as well as how the multi user (server) solution can be ordered please have a look at the available Report & Examiner Software product specification document.

Report & EXaminer Software	
Ordercodes "Client"	**Short Description**
Report EXaminer Standard/Client	Standard Software Package, Single User License (Client) USB-Dongle licensed for Standard Edition
Report EXaminer Premium/Client	Premium Software Package ,Single User License (Client) USB-Dongle licensed for Premium Edition
Report EXaminer Upgrade/Client/A	Upgrade Code Standard to Premium, Single User License (Client) at initial order (A) of VT-80 / VP-80
Report EXaminer Upgrade/Client/N	Upgrade Code Standard to Premium, Single User License (Client) at subsequent i.e. Later Upgrade (N)

Figure 13: Report & Examiner Software Order overview Single User (Client)

Report & EXaminer Software		
Short Description	**Standard**	**Premium**
Connection & Datatransfer > Datamanagement > Basic Functionality and Features	●	●
Enhanced Display > Properties > Multichannel Plots, Plottypes	●	●
Interfaces > Print, Save > Dataimport -Export > Acceptance Test Generator	●	●
Measurement Protocolls > Microsoft Word	Fixed Predefined Templates	Unlimited user specific Templates
Bearing Database > Management > Display		●
DSP - Digital Signal Processing of *.wav > FFT-Spectra		●
DSP - Digital Signal Processing of *.wav > Waterfall- and Spectogram > delta RpM (Speed) & delta t (Time)		●

Figure 14: Report & Examiner Software Capability Overview „Standard" vs. „Premium"

3.3 Report & Route Manager

The Software “Report & Route Manager” is only included in the Collector Packages “C” / “AC” but can also be upgraded arbitrarily at any given time.

The ordering concept is as follows:

3.3.1 Ordering of individual "Report & Route Manager Client“ software
3.3.2 Subsequent "Report & Route Manager Client Upgrade“ software upgrade

Note: In case that module 6 „Data Collector“ shall be upgraded to an already purchased VT-80/VP-80 instrument – NOT a Collector VT-80/VP-80 Package – it is mandatory for the current released firmware version to be installed on your VT-80/VP-80 to support the data collector module. If you have any further queries or need any support, please feel free to contact our Hotline or the B&K Vibro Service Center.

3.3.1 Report & Route Manager Client

All software modules listed in the following are optional and can be purchased separately.
When purchasing the data collector packages for the VT-80/VP-80, the "Route" Module 6 --in order to generate and manage routes-- as well as the "Basic Function & Analysis" Module 1 of the software are mandatory.

Note: The "Basic Function & Analysis" Software Module 1 is mandatory in any case.

Report & ROute Manager Client		Short description
Module 1 > Base Function & Analysis	●	**Is a minimum requirement for software installation** > Basic functions & high-end filter functionality > Journal, standard analysis, standard protocoling & diagnosis > Machine templates, comments, rolling element bearing database > Xms data import
Module 2 > Analysis Expert		> More in-depth analysis and diagnostics functions > Special cursors (gearbox cursor), peak indicator & list > User-specific symptoms, alarm indicator > Waterfall diagrams & spectrograms
Module 3 > Protocol Expert		> User-specific measurement protocols via Microsoft Word > Management of measurement protocol templates > Management of text blocks/modules > Machine-measurement-protocols in tabular & diagram form
Module 4 > XXX		**("for future expansions")**
Module 5 > Off-Route & Reports		Measurements that were not setup during the route generation, can be: > parameterised, executed and directly assigned to the current route measuring point on the route – **Off-Route** > can be assigned to measuring points via a special GUI during the route unload process – **Reports**
Module 6 > Route		**Is a minimum requirement, if the "Data Collector" Module is used on the VT-80/VP-80** > Route configuration, transfer & management > Comprehensive unload report with statistics

Figure 15: Ordering Information for “Report & Route Manager Client” Software

3.3.2 Report & Route Manager Client Upgrade

The "Report & Route Manager Client Upgrade“ enables the retrofitting of software modules. This applies to two scenarios:

- The customer already possesses a VT-80/VP-80 "Collector" (C / AC) Package
- The customer has purchased the "VT-80/ VP-80 Data Collector Module 6" and the "Report & Route Manager Client" and would now like to add additional software modules

Note: The "Basic Function & Analysis" Software Module 1 cannot be obtained as an upgrade afterwards, as it has already been included in the two scenarios described above.

Report & R**O**ute Manager **Client Upgrade**		**Short description**
Module 2 > Analysis Expert		> More in-depth analysis and diagnostics functions > Special cursors (gearbox cursor), peak indicator & list > User-specific symptoms, alarm indicator > Waterfall diagrams & spectrograms
Module 3 > Protocol Expert		> User-specific measurement protocols via Microsoft Word > Management of measurement protocol templates > Management of text blocks/modules > Machine-measurement-protocols in tabular & diagram form
Module 4 > XXX		**("for future expansions")**
Module 5 > Off-Route & Reports		Measurements that were not setup during the route generation, can be: > parameterised, executed and directly assigned to the current route measuring point on the route – **Off-Route** > can be assigned to measuring points via a special GUI during the route unload process – **Reports**
Module 6 > Route		**Is a minimum requirement, if the "Data Collector" Module is used on the VT-80/VP-80** > Route configuration, transfer & management > Comprehensive unload report with statistics

Figure 16: Ordering Information for “Report & Route Manager Client Upgrade” Software

3.4 Documents for VT-80/VP-80 Productline

3.4.1 Accessories AC-Brochure

Further Sensor types of Brüel & Kjær Vibro (e.g. AS-065, AS-020, ASA-020, IN-085, INA-085) or other manufacturer types can easily be connected via Adapters and further – not in the present specification treated – connection cables. The following table gives a first overview of how the measurement chain at VT-80/VP-80 needs to be configured.

Sensor	Accessories / Cables	Input Socket
Speed / Reference		
P-95	AC-185 + AC-1381	TRIG/PWR/USB
P-98, PA-98	AC-1388	TRIG/PWR/USB
Acceleration		
ASx-063, ASx-069, AS-073, AS-079	AC-1393 or AC-1384	CH1 or CH2
AS-063, AS-069, AS-073, AS-079	AC-1386	CH R
AS-065	AC-436/AC-437 + AC-1380	CH1 or CH2
AS-020	AC-162 + AC-630 + AC-1380	CH1 or CH2
Velocity		
VS-080	AC-1383	CH1 or CH2
VS-080	AC-1387	CH R
Displacement		
IN-085	AC-425+AC-630+AC-1380	CH1 or CH2
Impact Hammer		
AC-7501 (Impact Hammer)	AC-1387	CH R

Figure 17: Optional connections at VT-80/VP-80 inputs and configuration of the measurement chain

NOTE: For further and more detailed information please have a look into the corresponding product brochure for accessories, visit us at www.bkvibro.com or contact us at info@bkvibro.com.

3.4.2 Further available documents

- ✓ User Instruction manuals each for:
  - o VP-80, VT-80, Report & Route Manager, Report & Examiner Software
- ✓ Product Specification Documents each for:
  - o Report & Route Manager, Report & Examiner Software