



**Briuel & Kjaer Vibro**

## PRODUCT SPECIFICATION



## VIBROTEST 80 & VIBROPORT 80

The Allrounder for

- Machine Diagnosis
- Field Balancing
- Condition Monitoring



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## 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 types and support up to 4-Channel functionality as well as the connection of all common vibration sensor types.

VT-80 & VP-80 are “The Allrounder for Machine Diagnosis, Field Balancing & Condition monitoring” and suitable for the most of all demanding applications. For example the VT-80 is the perfect choice for data collection application due to its light weight and handy design. At the same time it is a price attractive option in relation to the VP-80 by offering the same functionality.

For Field balancing, Acceptance Tests or multichannel views VP-80 is the perfect choice due to its large colored display. Of course it might be also the right choice if the main application purposes – Analysis, Balancing, Data Collection – shall be covered on 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 developing faults in bearings, shafts, gear boxes, couplings at auxiliary as well as production critical machines.

### 1.1 Placement of VT-80 & VP-80 within the Portable instruments Productline

The scope of delivery of 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 softwares is available in the corresponding product specification documents.

- *Hardware* VIBROTEST 80 /E & VIBROPORT 80 /E
  - *Firmware* Application Modules
- *Software*
  - **Report & EXaminer** Software – Analysis & Reporting Software
    - With all VT-80/VP-80 firmware modules except module 6 „Data Collector“
  - **Report & ROute Manager** – Database, Route Generation, Analysis & Reporting Software
    - Exclusively with the VT-80/VP-80 firmware module 6 "Data Collector"
- *Standard accessories*
  - such as the charger
  - Connector & adapter cable, e.g. for sensors

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

- **Analyzer „A“**
- **Analyzer & Balancer „AB“**
- **Balancer “B” – *Note: ONLY VT-80***
- **Analyzer & Collector „AC“**
- **Collector „C” – *Note: ONLY VT-80***

More information about the packages later in the 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 with the operational vibration limits in accordance with ISO 10816, 7919 or those 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 over the variable speed or time in an X-Y-diagram or in numeric view mode
- **Up to 4 vibration channels plus 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 (each two channels or only each 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 and the rolling elements bearing condition using both a peak and rms detection parameter in the same frequency range or the CREST-factor.
- **Up to three Vibration values (a,v,d) due to Signal integration** – Allows for simultaneous display of acceleration, velocity and displacement by double integration if an accelerometer is used

- **Known and reliable Bearing condition overalls BCU & ECU** – Beside 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 available. ECU means **Enveloped Condition Unit**, which is derived similar to the BCU algorithm with the difference that the frequency range used for amplification of the “Bearing fault signal information” is not fixed but can be chosen by the user. For instance the desired frequency band can be selected around a known system structure resonance such as the bearing resonance itself. (For BCU the frequency band is fixed around the sensor resonance of the AS-063 acceleration sensor.)

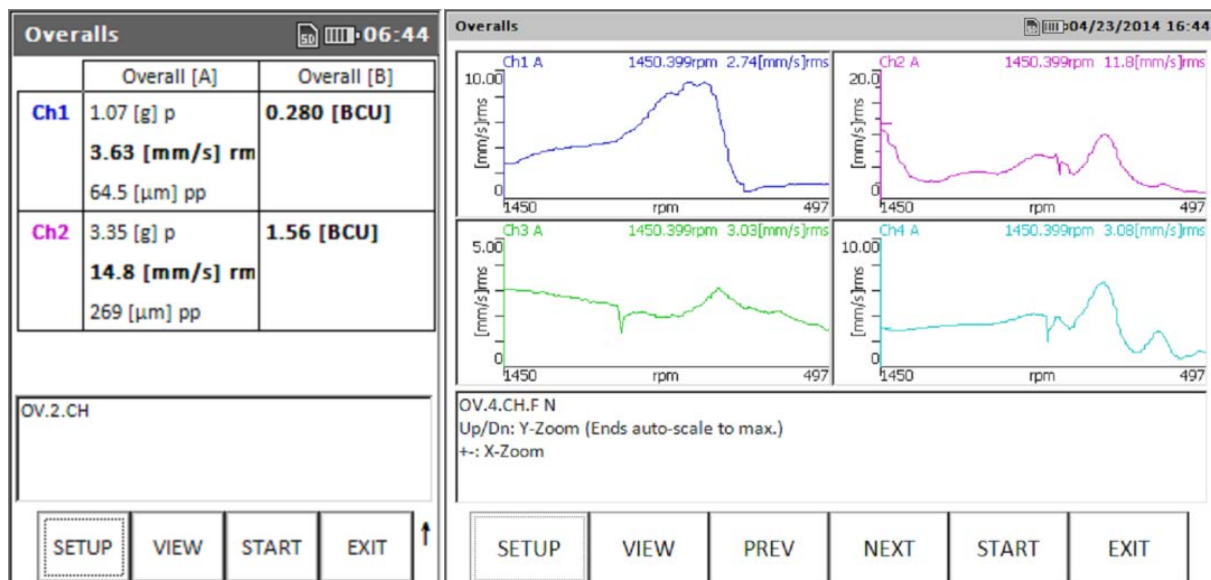


Figure 2: Module 1 Overalls – VT-80 2-channel Measurement with Path B active for Bearing condition overalls and use of double integration (left) / VP-80 4-channel Coast Down Overalls vs. Speed (right)

*Note VP-80's +: VIBROPORT 80 offers here more view options, e.g. 4-Channel view each channel in an own graph (as shown in the figure above on the right)*

## 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 show up to four channels at the same time or to choose subset views (each two channels or only each one channel)
  - **Note: VT-80 offers as subset view only two channels or each single channel at the same time**

- **Simultaneous display of time & frequency domain** – Time signal and spectrum can be displayed simultaneously. In addition the calculated overall value out of the displayed Spectra is shown in the status information bar
- **High-end FFT-frequency range and resolution** – Is realized in the instrument by frequency analysis in the range from DC (DC component removed from 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 with unit BCU and the SED (Selective Envelope Detection) with unit ECU. Both techniques are based on the fault amplitude modulation of a carrier frequency.
- **Order based Spectra (-analysis)** – If a speed reference sensor is connected order based frequency spectra can be measured. Beside showing the phase information of the cursor position of a dedicated frequency peak also the frequency x-axis is displayed in orders as multiples of the current speed. If the cursor for instance is positioned on the first order and the speed changes the cursor will follow the selected order according to the speed variation.
- **Cross-channel phase** – Used to diagnose, for example, misalignment. The phase difference between two channels is acquired without using a speed reference.
- **Orbit** – Orbit measures the movement of the shafts center line during shaft rotation. The orbit is (most often) derived by two relative attached displacement measuring probes arranged radially by 90° shift. Both displacement signals are shown in addition to the orbit plot.

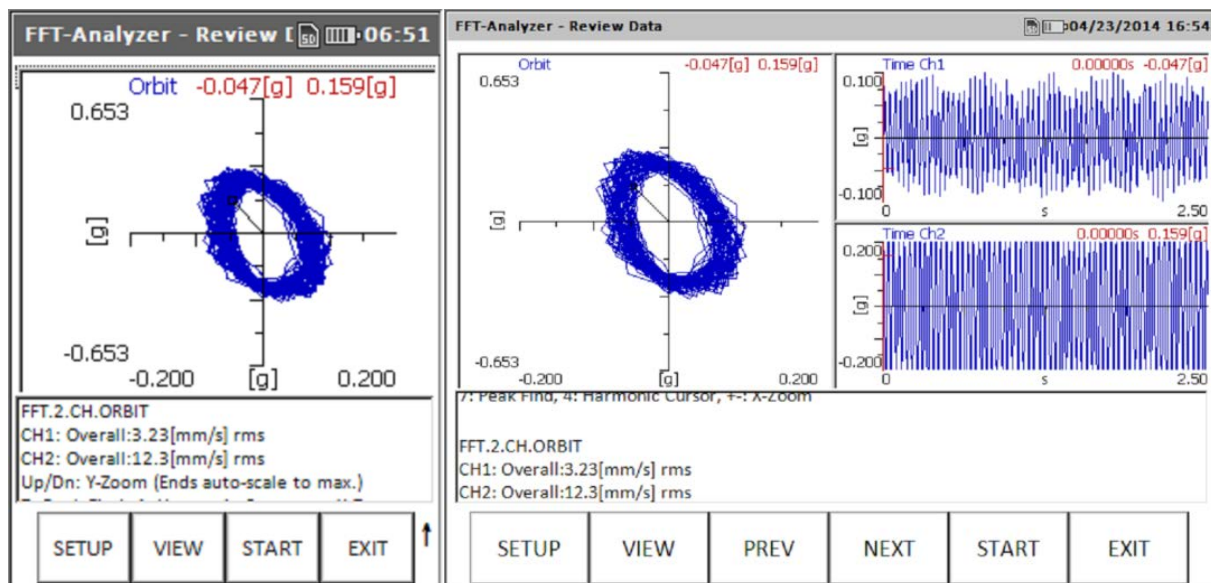


Figure 3: Module 2 FFT-Analyzer – VT-80 Orbit only (left) / VP-80 Orbit and time signals at same time (right)

**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 operation of the machine and serves to analyze the rotor frequency-induced vibration components and their harmonics. The VT-80/VP-80 tracking measurement module can be utilized for both 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. That is a particular advantage if a second measurement is very time-consuming (long machine coast-down times) or if the machine is critical for production and the process should not be interrupted unnecessarily.

#### Properties & Functions:

- **Evaluation of dynamic rotor behavior** – Uses the rotational excitation induced through the inertial force produced by the residual unbalance during shaft rotation run-up and coast-down
- **Acquisition of 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 later post-processing 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 acquire three vibration channels simultaneously from a triax sensor.
- **Order Analysis** – Up to four user defined order+overall can be derived from the post processing and shown simultaneously.

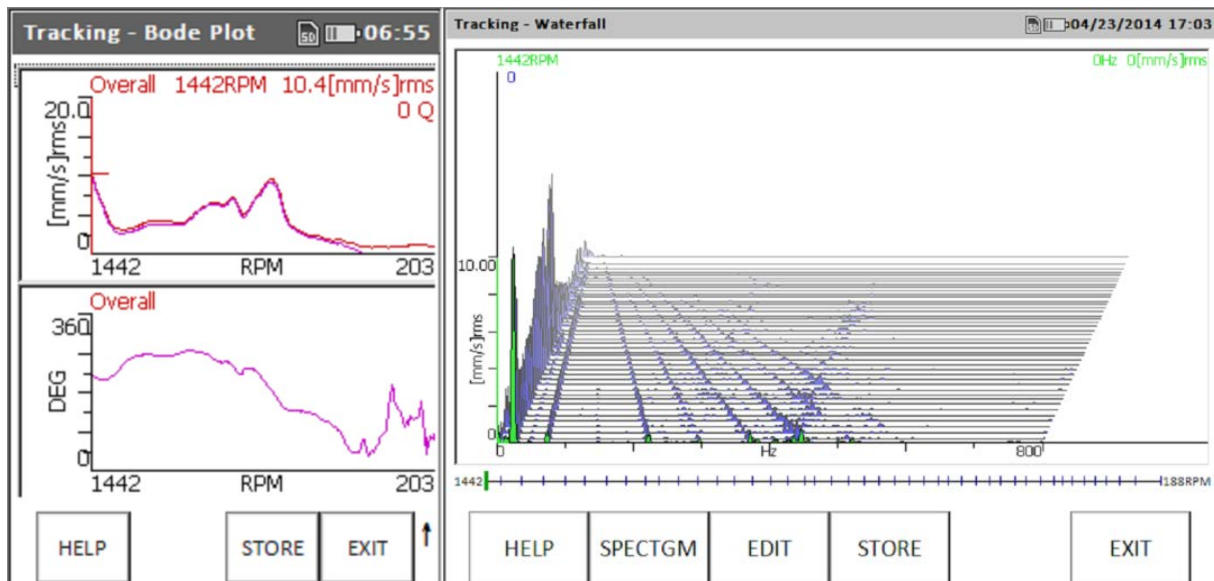


Figure 4: Module 3 Tracking – VT-80 Coast Down Bode Diagram > Amplitude/Phase 1st Order and Overall (left) / VP-80 Waterfall diagram with Order (right)

*Note VP-80's +: VIBROPORT 80 offers here better analysis capabilities in the field as the larger display screen is more appropriate for such 3-D views (Waterfall 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 is delivered with 1-channel functionality released** (within all other available packages in minimum 2-channel functionality is released). Module 4 allows for 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 for upgrade from 1-channel respectively 2-channel to 4-channel functionality. For 4-channel functionality the following dependences and characteristics apply for each module:

- **Module 1 Overall**s – All for measurement channels (Path A and B for each channel included) + speed acquisition can be operated in parallel.
- **Module 2 FFT-Analyzer** – All for measurement channels + speed acquisition can be operated in parallel. Only for cross phase and Orbit the channel density is limited to 2 channels + speed.
- **Module 3 Tracking** – In maximum three channels + speed can be used in parallel. However the post processing of the time waveforms is limited to each channel + speed sequentially and can not be performed in parallel.
- **Module 6 Data Collector** – In maximum two channels + speed can be used. The acquisition is performed sequentially.
- **Module 7 Balancing** – In maximum two channels + speed can be used in parallel.
- **Module 9 Transfer Function** – In maximum three channels can be used in parallel.
- **Module 10 Time Signal** – In maximum four channels or three channels + speed can be used in parallel.
- **Module 11 Acceptance Test** – In maximum three channels are operated sequentially. The speed measurement is also performed sequentially by defining the speed as process value during setting up the machine templates in 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. These impacts and restrictions can be found in more detail in the section “Technical data” within this product specification document. Please note, that obviously with increase of operating channel density mostly a decrease of the bandwidth of measurement parameters results, as the DSP processing power is limited.

### 1.2.6 Module 6 – Data Collector

Offline monitoring, i.e. the systematic acquisition of state values on measuring routes, allows for, condition-based machine maintenance. In operation the "Data Collector" VT-80/VP-80 Module enables the user to cost-effectively monitor a number of measuring points of rotating machinery. The task of data collection is the acquisition of measuring values at predefined 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.

#### Properties & Functions:

- **General measurement functions out of the Overall 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 Overall and FFT spectra, these include:
  - Bearing Condition Overall 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 – in contrast 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 shot. In addition the time function can be filtered during data acquisition at the measuring point by a user-specific band pass filter.
- Process values
- **Unlimited number of measuring routes** – with up to 5.000 measurement tasks (slots) which can be set up and edited simultaneously.
- **Up to 12 measuring slots & automation of 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 route inspection:
  - Arbitrary jumping force and back within a measuring route and between different measuring routes
  - Insertion of comments that will also 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.

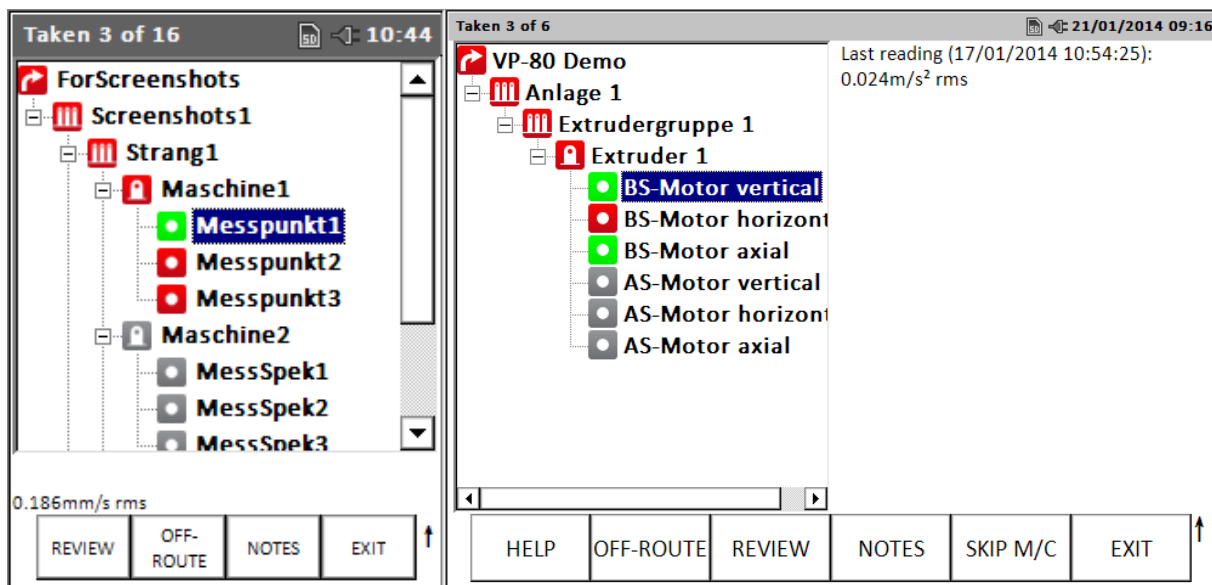


Figure 5: Module 6 Data Collector – VT-80 Route during navigation in Hierarchy tree (left) / VP-80 Route during navigation in Hierarchy tree AND information (right)

### 1.2.7 Module 7 – Balancing

A significant proportion of all machine faults can be attributed to unbalance of rotors. Although rotors are, as a rule, built into the machine precisely balanced 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 on-site mounting conditions (e.g. bearing clearances); independence of rotor-size rotor-weight.

#### Properties & Functions:

- **1 or 2-plane balancing** – For static and dynamic balancing
- **Fast balancing with prognosis** – Is realized via an innovative prognosis algorithm which provides the remaining residual vibration level for both planes already after the first trial run as a prognosis
- **2- plane polar** – For both planes on one display with possibility to switch to a bar graph and table view, which summarizes the steps of the balancing procedure
  - **Note: in VT-80 is 1 plane polar plot displayed separately in case of 2-plane balancing – For both planes only one plane can be shown at the same time. Switching to other plane is easy possible.**
- **Free choice of adjustment method** – The user can choose between polar, component or fixed mass methods, and can switch arbitrarily between polar and components balancing at any 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 test weights at specific locations and performing the for each location the trial run the linearity of the systems respectively rotor shafts behavior can be checked and evaluated.

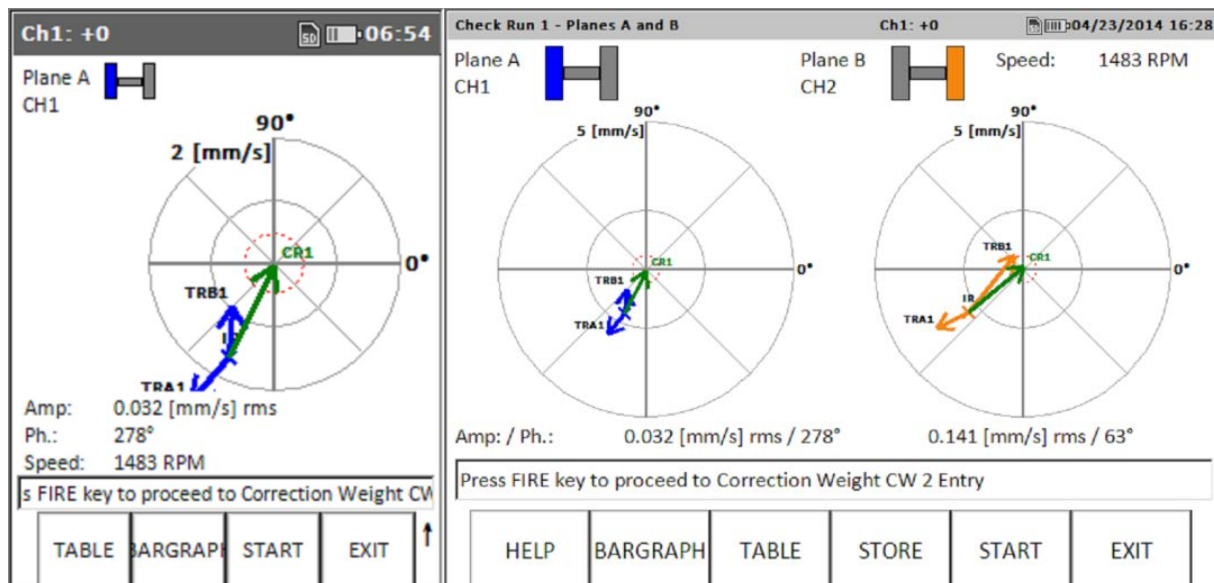


Figure 6: Module 7 Balancing – VT-80 2-Plane Balancing showing Plane A (left) / VP-80 2-Plane Balancing showing Plane A and B (right)

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

### 1.2.8 Module 9 – Transfer Function

For modal analysis of machines with shafts that are not rotating as well as for the analysis of immovable objects such as, for example, foundations or frameworks, the impact analysis method is employed. The transfer function is determined with an impact hammer having a built-in load sensor, and is given by the ratio between the input signal (load introduced by the hammer hits) and the output signal (measured vibration).

#### Properties & Functions:

- **Identifying structural resonances** – By using an instrumented impact hammer for excitation
- **Indication for relative movement of machine components** - Can be determined using Multi-Channel-Function
- **Conventional evaluation methods** – Are available and cover 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 by color coding directly in the bode diagram. The coherence plot allows the user to evaluate the “linearity” of a measurement respectively “ how undisturbed the input hammer impulse is transmitted to the output impulse response”. This can be used for example to identify local disturbance/fault frequencies, which can be interpreted by mistake as structural resonance. (The coherence value is very low in that case 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
- **Autorange-Function** – allows for automatic display- and amplifier ranging to input impulses of the impact hammer as well as high deflection within the impulse response signals.
- **Constant Current Supply of the impact hammer** – direct connection of impact hammer (CCS, ICP®)

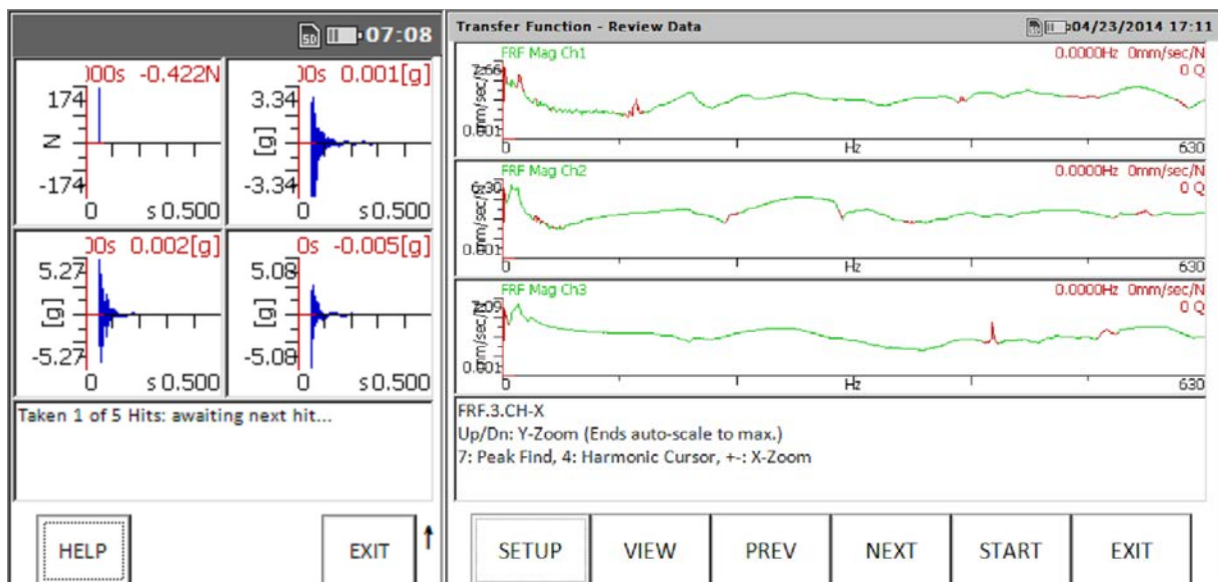


Figure 7: Module 9 Transfer Function – VT-80 Hammer input impulse with Triax impulse responses (left) / VP-80 Bode Diagram Amplitudes for each Channel coherence indication by red color (right) /

**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, for example, the Report & Examiner Software or 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 up to 80MB, external storage on an SD card can be up to 16 GB, with max. 2 GB per data set.

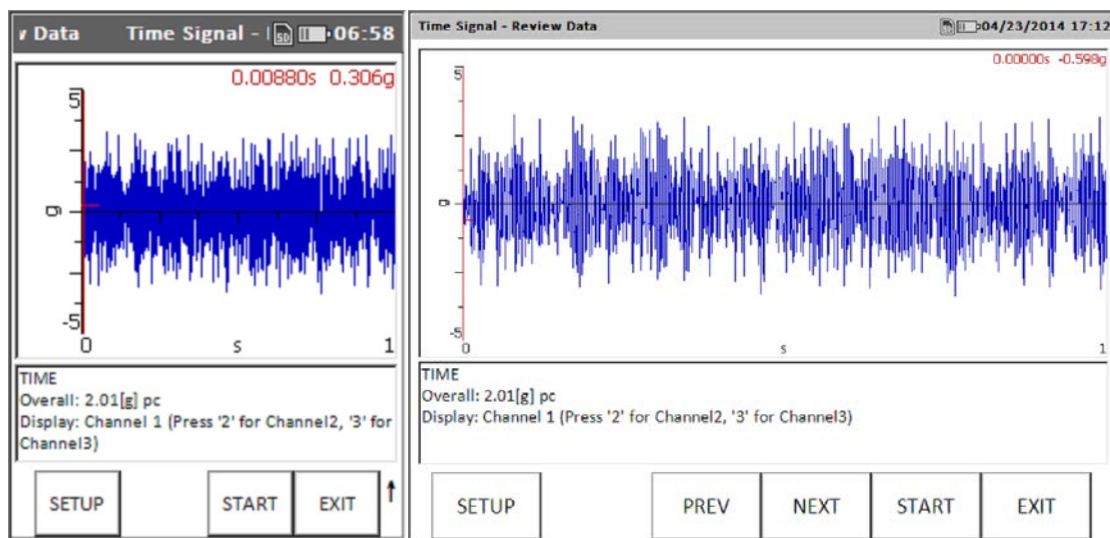


Figure 8: Module 10 Time Signal – Preview short before starting acquisition of raw vibration data (VT-80 left / VP-80 right)

### 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 draw on predefined or personally 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. In addition Report & Examiner Software support with a special and exclusive Reporting for measurement data acquired with the Acceptance Test module.
- **Predefined Standard Machine Templates** – Several and arbitrary predefined machine templates of the most common standard machine types (machine trains) are already available. They are accessible for every user, so that these templates can be used for getting ideas and orientation.
- **Easy and intuitive handling** – With the possibility to create user-defined templates for the acceptance test procedure, including, for example, a picture of a machine. Furthermore the measured overalls can be compared to standard limits (e.g. ISO).
- **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 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 user defined integrated machine picture \*.bmp for better orientation (VT-80 left / VP-80 right)

*Note VP-80's +: VIBROPORT 80 offers a remarkable better overview in case of complex pictures as well as measuring many bands on many sensor positions each with three directions. Those setups result in multicolored view of the calculated overalls which are compared to the specifid 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. On top of that, 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 make for quick access in each module setup
- **Easy to add, modify and delete** – new or existing sensors setups

### 1.3.2 System Setup

The most important and global (partly module independent) system parameters can be set up within the Module System Setup. Those are standard parameters such as language settings, international system units, Time, memory & card settings, Operational parameters according to the user's preferences, Time out, Signal input ranges etc. Within the present product specification those parameters are not treated more in detail. More information can be found in the user instruction manual.

In the following only selected System Setup parameters are 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 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 selected, each channel (sensor) can be setup individually so that the setup menu provides remarkable more parameter settings.

- **Speed acquisition** – The parameter speed defines the speed units and activation. It can be chosen between Round per Minute (RPM), vibration per second (Hz) or if speed shall be deactivated (inactive).
- **Trigger** – Trigger defines how and when the signal of the speed reference channel is processed. For the measurement acquisition the user can choose between automatic, manual, visual.
- **Settings Module Data Collector** – Exclusively for the Firmware Module 6 Data Collector there are several, versatile parameter settings, which e.g. can control the data acquisition during route inspection, simplify the acquisition and hence save time.
- 

### 1.3.3 Global Module independent Setups

- **Pre-defined measurement setups** – For direct, quick access to measurement tasks. Several widely used measurement tasks are already pre-defined and 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 has been developed for use and operation in explosive atmosphere areas. Both offers nearly the same functionality as the standard VT-80/VP-80 but are in addition ATEX certified. Beside some special internal hardware design changes, these are the following minimal operational restrictions – only within the hazardous environment:

- 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 (i.e. no Transfer Function module function for this purpose)
- Maximum ambient temperature: –10 to +50 °C (+14 to +122 °F)

In order to provide full support for your “E”-Package, Brüel & Kjær Vibro can supply to you several 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 is 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 setup parameters to either the most widely used parameters or 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 per each module. When storing the next measurement the last filename can be recalled by pushing LAST NAME. This helps to save time during daily operation with the portable instrument.





Figure 10: All Modules – Storing of last entered filename respectively recall within a firmware Module via 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 offers 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 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** – Customizable view parameters, 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 supports 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 firmware Module 6 Data Collector. The software operates on all common Windows™ supported PCs. The connection to the VT-80/VP-80 is realized via USB-Interface. Measurement which has been stored on the portable instruments (Reports) can be easily transferred to Report & Examiner Software and measurement reports can be generated. The optional Edition “Premium” allows for deeper analysis of measured raw time signal datasets (\*.wav) by digital post processing and generation of post FFTs or Waterfall spectra. For analysis and diagnosis of bearing faults (assignment of 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 Standard Version)
  - DSP (digital signal processing) of .wav files for FFT and waterfall spectra
- **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 according product specification document.

## 1.6 Database Software Report & Route Manager

The Report & Route Manager by Brüel & Kjær Vibro is a professional software used for an 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 perfectly 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 according to 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 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 licenced via a 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 globally working filter function.
- **Special Plots and Cursors** – 3-D Waterfall/Spectrogram and exclusive gearbox cursor.
- **Windows®-based Software** – and due to that a 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 keep the 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 the portable instrument product line. This shall give benefit in to our customers in two main areas:

- by offering our customers a remarkable **cheaper price** for the VIBROTEST 80 at the same time 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 according to the requirements for all dedicated applications** of our customers.

Although the VT-80 offers generally same functionality as the VP-80, there are remarkable key differentiators which we recommend to consider when purchasing either of both handhelds. The VP-80 offers some additional benefit to the VT-80 which is directly related to the VP-80's higher pricing.

Of course there are also requirements where the VT-80 is the right choice, such as obviously the size and weight of the hardware which is typically a good choice for offline monitoring in data collector applications.

To support our customers in the decision process you find in the following the differentiators which have to be understood in the sense: „*What additional benefits does the customer get with VP-80 compared to VT-80 in regards to justifying the higher price ?*“.

Note: All features, measurements types, etc. are identically implemented and available on the VT-80 and VP-80 Firmware. However it will be shown which applications combined with particular functionalities are more appropriate for the VP-80.

At the end a short summary will be given about the benefits of the VT-80 in addition to its key benefit of a remarkable cheaper 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 allow 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 is indicated by the exemplary statements at the check marks explaining why VP-80 is more appropriate:

- A Field Analysis & Diagnosis**
  - ✓ Clearly arranged Multi-channel-views by VP-80's large display for Multichannel measurements & cursors
- B On Site Balancing**
  - ✓ 2-Plane polar graph (only VP-80) and summary table keeping the overview only due to large display
- C Data Collection**
  - ✓ Although the instrument seems to be too big for typical pure offline data collection application a neck strap, two hand straps and the Easy and fast operation via cursor cross support the user compensate the instrument's size.

In the following 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 harmonics) on the instrument
- **Tracking – Module 3** <> **key benefit (1) (4)**
  - 3-D diagrams Waterfall & Spectrogram
  - Bode, Nyquist with several orders
  - Extensive and powerful setup respectively 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 taken measurements on the instrument
  - Docking instrument in office for route download and data unload
- **Balancer – Module 7** <> **key benefit (1) (3)**
  - 2 Plane Polar plot on one screen (VT-80 only switching between planes)
  - better understanding by 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 docking the instrument on table
- **Time Signal – Module 10** <> **key benefit (1)**
  - No real obvious benefit, except looking on detail on the raw vibration data
- **Acceptance Test – Module 11** <> **key benefit (1) (4)**
  - Keeping Overview due to multiple monitoring Bands for several MP locations
  - „Mini Route“ can be display e.g. via a technical drawing on the instrument including Description of Measurement locations and Measuring directions
  - in daily „piece working“ acceptance testing, operation, storing and efficient managing of data becomes important

### 1.7.2 Key benefits VIBROTEST 80

- (1) **Remarkably cheaper than VP-80 by offering the identical functionality**
  - ✓ Every measurement type, multichannel approach, features are the same as VP-80
- (2) **Light weight & Handy instrument**
  - ✓ The instrument can be hold 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 Balancer Base BB 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 daily operation this is an attractive option.

Of course the differentiators mentioned above within the VP-80 firmware modules can be reversed and understood as less appropriate in use of VT-80. Accordingly for the VT-80 no listing is meaningful here.

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 at least customized and managed by function keys which allow the user to decide what to show on the VT-80 screen. For example by toggling between measurement channels or by showing only Orbit or the particular time signals and so on.
- B On Site Balancing**
  - ✓ In case of 2-Plane balancing the user can toggle between the polar plot for each plane arbitrary. That means that only one polar plot of the Plane A or Plane B can be displayed at one time instant. Anyway the polar plot of the chosen Plane is shown in maximum size so that the balancing expert can take his decision according to the vector movements.
- C Data Collection**
  - ✓ This is the core application which – if applied for pure data collection – is perfectly predestinated for use of VT-80. Due to its small handy 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 globally and for all modules, i.e. for the VT-80/VP-80 hardware including the Firmware. Accordingly it might happen, that functionalities such as measurement types are repeated, which have been already described within one of the previous chapters. The objective of this exclusive section is to provide the user a brief summary – without extensive informative content – if the VT-80/VP-80 fulfills the overall technical requirements expected by the user. For the detailed understanding of the specific modules functionalities it is mandatory to read the section 0 in detail.

### 2.1 Signals, Units & Measurement Tasks

#### 2.1.1 Units

- Acceleration (g, m/s<sup>2</sup>, 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, m<sup>3</sup>/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, Spectrogram)

## 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 from 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
<b>Channel CH 1</b> 	(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)
<b>Channel CH 2</b> 	(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
<b>Channel CH R / USB Host / Earphones</b> 	(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
<b>Channel USB DEV / TRIG / PWR</b> 	(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  $\pm 25$  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 removed from spectrum)

Channels	Acceleration		enveloped SED (ECU)		enveloped BCS (BCU)	
	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

Channels	Path A only	Path B “active” with		
	Acceleration	Acceleration	ECUp, ECU	BCUp, BCU
	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)
<b>Environmental</b>		
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 ratings: 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 mAh (VT-80) and 6600 mAh (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 respectively unlocked / enabled 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 “Analyzer” „VT-80/VP-80 A“ packages. Based on the “Analyzer” the two packages “Analyzer & Balancer” „VT-80/VP-80 AB“ and “Analyzer & Collector” „VT-80/VP-80 AC“ are available including also Balancing module respectively the Data Collector module as well as some minor but meaningful changes/add ons in the accessories. In addition two very 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 at initial order or later on request. This belongs to the VT-80/VP-80 firmware modules, Softwares “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 explosive atmosphere (hazardous areas). For example this 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 0 are explaining the Software order options. For more information about both softwares “Report & Examiner Software” as well as “Report & Route Manager” please have a look at the corresponding available product specification documents.

**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 packages below

Scope of Delivery in all packages --> Standards AC's (Accessories)		
VT-80 ONLY	VP-80 ONLY	VT-80 & VP-80
<ul style="list-style-type: none"> <li>&gt; Rechargeable Battery AC-7002</li> <li>&gt; protective caps for input sockets AC-7301/VT-80</li> <li>&gt; Protective case AC-7302</li> <li>&gt; Hand strap (1x) AC-7303</li> <li>&gt; Shoulder Strap AC-7304</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Rechargeable Battery AC-7003 / AC-7004 (ATEX) (inserted)</li> <li>&gt; protective caps for input sockets AC-7301/VP-80</li> <li>&gt; Protective case AC-7305</li> <li>&gt; Hand straps (2x) AC-7308</li> <li>&gt; Shoulder Strap AC-7309</li> <li>&gt; Docking station AC-7307</li> <li>&gt; Leather case for small items/parts AC-7306</li> <li>&gt; SDIO cover kit for contact-pins AC-7311 / AC-7310 (ATEX)</li> <li>&gt; USB-interface connection cable (PC) AC-1390</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Carrying case AC-7101</li> <li>&gt; SDHC-Memory card 4 GB (included) AC-7201</li> <li>&gt; Power supply charger AC-7001</li> <li>&gt; Y-cable USB-Power AC-1389</li> <li>&gt; 1x Magnet AC-273 (2x in Balancer packages "AB" and "B")</li> <li>&gt; 1x Probe tip AC-272</li> </ul>

Figure 11: Scope of delivery of ALL packages – Accessories

Scope of Delivery			VIBROPORT 80						
			Analyzer "Vx-80 A"	Analyzer & Balancer "Vx-80 AB"	Analyzer & Collector "Vx-80 AC"	Balancer "VT-80 B"	Collector "VT-80 C"		
			VIBROTEST 80						
Hardware		Order Code	Identification						
Firmware	Released / licenced Module	VT-80 or VP-80	Hardware Units						
		VT-80/VP-80/Mod 1	Overalls Base 1.1						
			Overalls Extended 1.2 - f(n), f(t)						
		VT-80/VP-80/Mod 2	FFT-Analyzer Base 2.1 - FFT						
			FFT-Analyzer Extended 2.2- BCS/SED						
		VT-80/VP-80/Mod 3	Tracking						
		VT-80/VP-80/Mod 4	2-Channel function						
		VT-80/VP-80/Mod 5	4-Channel function						
		VT-80/VP-80/Mod 6	Data Collector						
		VT-80/VP-80/Mod 7	Balancer						
		VT-80/VP-80/Mod 9	Transfer Function						
VT-80/VP-80/Mod 10	Time Signal								
VT-80/VP-80/Mod 11	Acceptance Test								
Software	Report & Examiner Software	Standard		•	•	Not included	•	Not included	
		Premium							
	Report & Route Manager	Module 1 > Base Function & Analysis					•		•
		Module 2 > Analysis Expert							
		Module 3 > Protocol Expert							
		Module 4 > ("for future expansions")							
		Module 5 > Off-Route & Reports "in development for Version 2"					•		
Module 6 > Route					•		•		
Accessories	Vibration AC's (Accessories)	One Channel Accessories 1xAS-063 & 1xAC-1384 cable (Collector 1xAC-1393)			•		•		•
		Two Channel Accessories 2xAS-063 & 2xAC-1384 cable (Collector 2xAC-1393)				•		•	
	Speed meas. AC's (Accessories)	Speed Reference Sensor P-98 with cable AC-1388 Magnetic Stand AC-525 Reflective Tape AC-526 Mounting bracket AC-3501				•		•	

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

**Note:** In case that module 6 „Data Collector“ shall be upgraded on an already purchased VT-80/VP-80 instrument – NOT a Collector VT-80/VP-80 Package – it is mandatory that the current released firmware version is installed on your VT-80/VP-80 for support of the data collector module. In case of question and support please 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 arbitrary and several time on different PCs, as the copy protection and by that the release / licensing of functionality is 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 is 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 on 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 Spectrogram > 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 arbitrary at any time.

The ordering concept is structured as follows by organizing section 0 accordingly:

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 on an already purchased VT-80/VP-80 instrument – NOT a Collector VT-80/VP-80 Package – it is mandatory that the current released firmware version is installed on your VT-80/VP-80 for support of the data collector module. In case of question and support please 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 of the software in order to generate and manage routes as well as the "Basic Function & Analysis" Module 1 of the software are mandatory.

**Note:** It is currently not possible to purchase the "Off-Route & Reports" Software Module 5 as it is currently in development for version 2. Until Module 5 is completed, the Report & EXaminer Software "Standard/Client" (with USB-Dongle) will be included free of charge when purchasing a VT-80 or VP-80 “Analyzer & Collector” (AC) package, in order to be able to analyse and print measurements from the "Overalls" and "FFT-Analyser" VT-80/VP-80 Modules.

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

Report & ROute Manager Client	Short description
Module 1 > Base Function & Analysis	<ul style="list-style-type: none"> <li>● <b>Is a minimum requirement for software installation</b></li> <li>&gt; Basic functions &amp; high-end filter functionality</li> <li>&gt; Journal, standard analysis, standard protocolling &amp; diagnosis</li> <li>&gt; Machine templates, comments, rolling element bearing database</li> <li>&gt; Xms data import</li> </ul>
Module 2 > Analysis Expert	<ul style="list-style-type: none"> <li>&gt; More in-depth analysis and diagnostics functions</li> <li>&gt; Special cursors (gearbox cursor), peak indicator &amp; list</li> <li>&gt; User-specific symptoms, alarm indicator</li> <li>&gt; Waterfall diagrams &amp; spectrograms</li> </ul>
Module 3 > Protocol Expert	<ul style="list-style-type: none"> <li>&gt; User-specific measurement protocols via Microsoft Word</li> <li>&gt; Management of measurement protocol templates</li> <li>&gt; Management of text blocks/modules</li> <li>&gt; Machine-measurement-protocols in tabular &amp; diagram form</li> </ul>
Module 4 > XXX	("for future expansions")
Module 5 > Off-Route & Reports	<b>"In Development for Version 2"</b> Measurements that were not setup during the route generation, can be: <ul style="list-style-type: none"> <li>&gt; parameterised, executed and directly assigned to the current route measuring point on the route – <b>Off-Route</b></li> <li>&gt; can be assigned to measuring points via a special GUI during the route unload process – <b>Reports</b></li> </ul>
Module 6 > Route	<ul style="list-style-type: none"> <li>● <b>Is a minimum requirement, if the "Data Collector" Module is used on the VT-80/VP-80</b></li> <li>&gt; Route configuration, transfer &amp; management</li> <li>&gt; Comprehensive unload report with statistics</li> </ul>

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

### 3.3.2 Report & Route Manager Client Upgrade

The "Report & Route Manager Client Upgrade" allows 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:** It is currently not possible to purchase the "Off-Route & Reports" Software Module 5 as it is currently in development for version 2.

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

Report & ROute Manager Client Upgrade	Short description
<b>Module 2 &gt; Analysis Expert</b>	<ul style="list-style-type: none"> <li>&gt; More in-depth analysis and diagnostics functions</li> <li>&gt; Special cursors (gearbox cursor), peak indicator &amp; list</li> <li>&gt; User-specific symptoms, alarm indicator</li> <li>&gt; Waterfall diagrams &amp; spectrograms</li> </ul>
<b>Module 3 &gt; Protocol Expert</b>	<ul style="list-style-type: none"> <li>&gt; User-specific measurement protocols via Microsoft Word</li> <li>&gt; Management of measurement protocol templates</li> <li>&gt; Management of text blocks/modules</li> <li>&gt; Machine-measurement-protocols in tabular &amp; diagram form</li> </ul>
<b>Module 4 &gt; XXX</b>	("for future expansions")
<b>Module 5 &gt; Off-Route &amp; Reports</b>	<p><b>"In Development for Version 2"</b>                      Measurements that were not setup during the route generation, can be:</p> <ul style="list-style-type: none"> <li>&gt; parameterised, executed and directly assigned to the current route measuring point on the route – <b>Off-Route</b></li> <li>&gt; can be assigned to measuring points via a special GUI during the route unload process – <b>Reports</b></li> </ul>
<b>Module 6 &gt; Route</b>	<p><b>Is a minimum requirement, if the "Data Collector" Module is used on the VT-80/VP-80</b></p> <ul style="list-style-type: none"> <li>&gt; Route configuration, transfer &amp; management</li> <li>&gt; Comprehensive unload report with statistics</li> </ul>

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 be easily connected via Adapters and further – not in the present specification treated – connection cables. The following table gives a first overview how the measurement chain at VT-80/VP-80 has to be configured.

Sensor	Accessories / Cables	Input Socket
<b>Speed / Reference</b>		
P-95	AC-185 + AC-1381	TRIG/PWR/USB
P-98, PA-98	AC-1388	TRIG/PWR/USB
<b>Acceleration</b>		
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
<b>Velocity</b>		
VS-080	AC-1383	CH1 or CH2
VS-080	AC-1387	CH R
<b>Displacement</b>		
IN-085	AC-425+AC-630+AC-1380	CH1 or CH2
<b>Impact Hammer</b>		
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 in the according product brochure for accessories, visit us in internet or contact [info@bkvibro.com](mailto:info@bkvibro.com).

### 3.4.2 Further available documents

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