



Product Specification

Compass-6000™ Monitoring System Basic Software – Type 7123 Detailed Description of Functionality

The **7123** is the basic software in the **Compass-6000™ Monitoring System** for the Type 3160 Application Software packages. This Product Specification describes the platform monitoring server, database and user-interface software functionality.



Fig. 1 Typical 7123 user-interface

Software Platform Functionality

The Windows-based, web-enabled 7123 software is the fundamental platform to the Compass-6000™ monitoring system upon which the other software modules and machine application packages are built. It provides secure, online data acquisition, alarm handling, data storage and user interface functionality to all Compass-6000™ Type 3160 Monitoring Software modules. The following functionality is included with the software:

- **Remote data acquisition** – Data can be accessed from different systems, and there is a user-defined monitoring interval for automatic measurements
- **Automatic signal conditioning and data processing** – Time stamping and time synchronization of data, detection of machine states, calculated measurements, etc.
- **Communications** – Importing measurement values, relay states, logic values and alarm information from other systems
- **System security** – User login management and software licenses
- **Alarm handling** – Generating monitoring and system alarms and maintaining an alarm log
- **Database management** – Effectively and securely storing data over several years.
- **User interface** – At-a-glance machine drawings with measurement values and alarm status, tracing alarms, multiple plot displays, etc.
- **System setup** – Much of the system is already set up for you when you install the machine application packages, but setup tools are available

for fast, simple and secure way to change or set up new machines to be monitored, measurement points and individual measurements

Remote Data Acquisition

The data acquisition functionality provided by the Compass-6000™ Software is powerful, flexible and versatile. Even if the power has been interrupted, the acquisition will restart automatically.



Fig. 2 VC 6000 Monitoring system hardware modules

Monitoring Systems from which Data can be Acquired - The Compass-6000™ software directly takes in data via an OPC server from the following monitoring hardware systems:

- VC-6000™ monitoring modules.
- Process control system (e.g. DCS)
- Other monitoring systems

Compatibility with COMPASS™ Monitoring System

Brüel & Kjær Vibro's COMPASS™ Monitoring System has been used for many years now in numerous applications around the world, and the Compass-6000™ can be added as an extension to these existing systems. Although the database formats for the Unix-based COMPASS™ system and the Windows-based Compass-6000™ system are incompatible, data and plots from both systems can be displayed in the Compass-6000™ user-interface, and even correlated.

Type of Data that can be Acquired

Scalar signal values (process or vibration parameters), relay changes and logic inputs are acquired directly from the VC-6000™ monitoring hardware or imported from other systems. If there is any alarm information that accompanies the measurement values, this is also acquired. *Time signals* are also acquired from the monitoring hardware for post-processing (e.g. spectra).

Data Acquisition Interval

Data acquisition for condition monitoring and diagnosis purposes normally doesn't have to be done continuously as it is done in safety systems. Most developing faults progress slowly enough so intermittent monitoring is sufficient.

All continuously-streamed primary signals coming from the monitoring hardware are accessed by the Compass-6000™ software using the "dead band" method (event window detection). This means data is processed and stored only if there has been a change within a user-specified range from the last value.

The primary signal acquisition is done automatically by a user-specified scheduling function.

Automatic Signal Conditioning and Data Processing

With today's increased computer processing capacity, much of the signal conditioning and processing can be effectively done in the monitoring software.

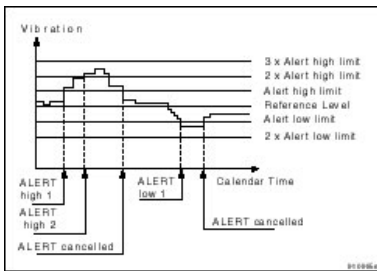


Fig. 3 Overall-level monitoring for scalar measurements.

There are four types of measurements that are generated within the various software modules; *calculated scalars*, *scalar vs. scalars* (e.g. transients such as vibration vs. RPM), *spectra* and *time waveform (orbit)*. The calculated scalars and CPB measurement (a type of spectrum) are offered by the 3160-01 and explained further on in the text. The scalar vs. scalars, time function and the other spectra are provided by the 3160-02 Diagnostic software module and described in the respective Product Specification. In general, automatic signal processing functions provided by the Compass-6000™ software include:

- Time stamping is synchronized to the network master clock
- Machine state classification and detection for generated measurements
- Generating measurements in the monitoring software, e.g. calculated scalars, spectra (CPB), etc.
- Comparison of generated measurements to machine state specific alarm limits
- Registration of monitoring and system alarms for all measurements
- Data compression and storage of all measurements in the database

Communications

Data is imported via the Ethernet LAN. Scalars can also be imported via an OPC server using the RS-232 serial interface. The Compass-6000™ software acts as a web server, so the database and setup functions can be accessed via a browser over the Internet.

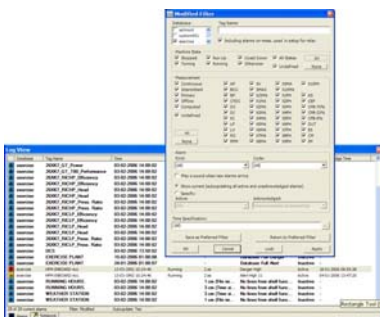


Fig. 4 Alarms log showing alarm filter for viewing alarms

System Security

Restricting different users to specific functions ensures monitoring system reliability. Each Compass-6000™ software user can be assigned their own login name, password, and privilege.

Alarm Handling

Many of the primary scalar measurements from the monitoring hardware are already monitored to safety alarm limits in the modules. This alarm information is displayed in the user interface and logged into the database. Measurements that are generated in the software itself (e.g. calculated scalars, spectra, etc.), are compared to alarm limits in the software itself, and the resulting alarm information is displayed and logged into the database.

Alarm Types

When monitoring limits are exceeded, Compass-6000™ generates machine state specific alarms that are displayed on the Operator's screen and stored in the database. The alarm limits that can be set up for each measurement are *Alert* (high, low), *Reference* (normal value), *Danger* (high, low). System alarms (blue colour alarms) occur if there is anything wrong with the monitoring system itself, such as signal overload, tracking error, divide by zero, etc.

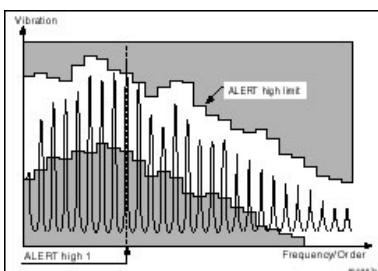


Fig. 5 Spectrum monitoring for earlier fault detection and detailed analysis

Alarm Log

The *Alarm Log* keeps a detailed time-stamped list of all monitoring and system alarms, both old and new. See Fig. 4.

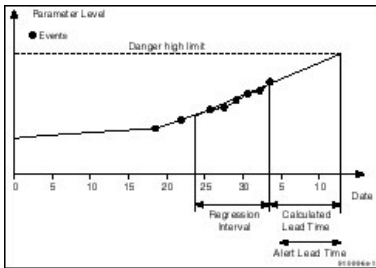


Fig. 6 Automatic trending using a user-defined correlation factor and lead time.

Array Type Alarm Limits

Compass-6000™ allows spectra and scalar vs. scalar measurements (3160-02) to be automatically monitored to alarm limits. A profile type alarm limits follow the contours of the individual frequency components of a spectra, as shown in Fig.5. The same is done for the speed components of a transient bandpass measurement, or any scalar vs. scalar measurement.

Automatic trending alarms

The Compass-6000™ automatically calculates a lead time for all scalar measurements set up for trending, and compares this every 24 hours to limits defined in the individual measurement setups. If the calculated lead-time is less than the user-defined Alert lead-time, an alert alarm is generated.

Database Management

As the database is one of the most important features of the Compass-6000™ software, a great deal of effort has been put into its design and protection. Several databases can be set up, and a number of service commands exist which can be used to fine-tune the overall performance of each database. All data is buffered so no data is lost when being stored in the database. Data can be easily backed up and re-installed.

No data overkill

The unique *data compression* feature of the database can store a store of relevant data going back up to 30 years, with high resolution in the most recent data and coarser resolution for the older data.

The processed scalar measurements are stored in the database by a user-specified “dead band” method. Spectra and time signals are stored by a user-defined the time-based interval method.

Warnings well in advance

Although the Compass-6000™ system is normally configured with adequate storage space for your needs, it is constantly monitored by the Compass-6000™ system. System alarms are generated is there is insufficient storage space.

Exercise database

The exercise database is a special feature of the Compass-6000™ monitoring software that uses an example plant structure and real measured data for demonstration and training purposes. It includes vibration, process and performance monitoring examples.

User Interface

User communications in the Compass-6000™ system have been optimised to a high degree of simplicity and efficiency in the software. This allows operators, maintenance personnel, condition monitoring experts and managers to use the same platform for their information needs.

Main Features

Compass-6000™ user interface provides quick, easy and secure operation of your Compass-6000™ monitoring system within a standard Windows environment. It includes the following features:

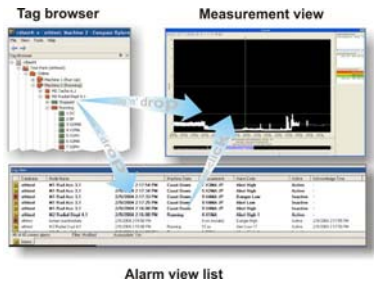


Fig. 8 Alarms and measurements for specific machines and measurement points are easy to see – just click and drag.

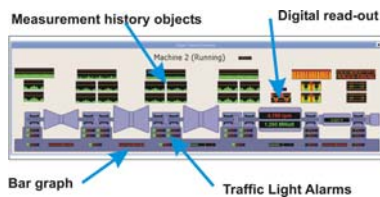


Fig. 9 Compass 6000 software offers several view objects that display current scalar measurement values and alarm status.



Fig. 10 There are unlimited possibilities in configuring a machine view window.

- **Flexible, versatile software that is secure** – The user interface software is a true native client/server software package using the newest .NET technology available from Microsoft. All that is needed to run the user interface is the Microsoft Explorer™ browser and an Internet information server. This makes the software 100% web enabled so data can be accessed by all password users over the Internet, anywhere in the world, depending on firewall settings. Multi-user option allows several users to access the system simultaneously from any computer on the network, while software security is ensured by specific user passwords and privileges.
- **Full overview** – You can easily navigate through machines and measurement points in all databases on your Compass-6000™ server and display the relevant alarm status and measurement data - all in the same screen. This gives you a quick overview of the condition of all machines in your plant, and makes it easier for you to make operation and maintenance decisions.
- **Easy to use** – The Windows functionality used in the Compass-6000™ software is intuitive and can be learned quickly. A user with the necessary privileges can very quickly set up plots and make distributed control system (DCS) type machine mimic view screens. All this information can be easily pasted into a report.
- **Extensive data display** – The monitoring software can present vibration and process data in a number of different, resizable plots. The graphic search window in the Compass-6000™ plots makes it easy to look at and select which data to display in the plots. Data can also be displayed as data read-out objects with alarm colour-coding within existing machine drawings or photographs as a background.

Tag Browser

This function, shown in Fig. 8, allows you to navigate through the machines and measurement points from one or more databases on the server. The colour of the icons in the Tag browser informs you about alarm status, current machine states, disabled tags, etc.

Alarm View

The Alarm view function, shown in Fig. 8, offers an extensive set of features. Alarms from several databases can be shown in the same list, and are automatically and continuously updated. Advanced filtering capabilities allow different users to define exactly what they want to see (e.g. for control room operators, machine specialists, maintenance staff, etc.). The alarm list can show for example only safety related alarms, alarms related to a specific machine, unacknowledged alarms, active alarms, alarms for a specific measurement types or any combination of these, and many others. Each user can save and retrieve preferred filter settings.

Unacknowledged alarms appear as bold, and acknowledged alarms that are still active appear in the list with normal font.

Machine View

Machine view gives an at-a-glance overview on the measurement and alarm status of one or more machines and their measurement points from one or more databases. These windows can be easily created by overlaying view objects over an existing machine drawing or photograph. All the view objects shown in Fig. 9 and 10 also give alarm information.

Plots

All on-line vibration and process measurements can be viewed in various Compass-6000™ plots, and include cursors. Graphic zoom functionality lets you look more closely at the data. The selection window is a unique, powerful tool that displays the data available and allows you to graphically select the data you want to display.

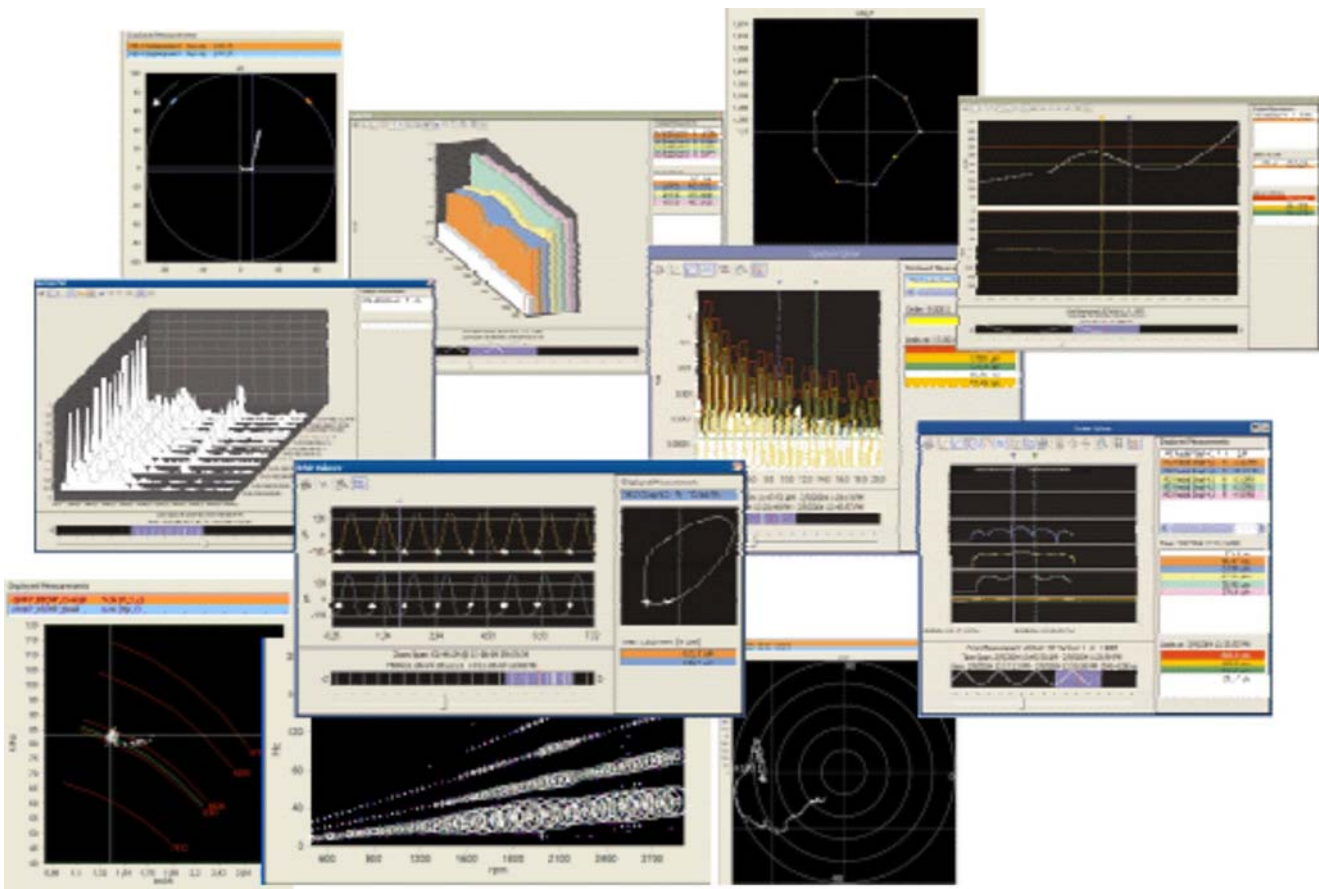


Fig.11. Many plots are available with the Compass-6000™ Basic Software. From the top-left clockwise: Shaft centreline 3D scalar plot, EGT-plot, Bodé plot, Spectrum, Stacked multi-trend scalar history, Vector plot, orbit plot. Campbell plot, Performance scalar vs. scalar plot and Waterfall plot

Documentation and Help Text

A full on-line documentation package plus comprehensive context-sensitive help text is included to help you to learn, set up, and operate the software. A hard copy of the software installation manual is also included. Hard copies of the other documentation can be ordered separately.



Fig. 12 A simple spread sheet type format is used for setting up Compass 6000.

System Setup

Setup plays a crucial role in achieving successful monitoring operation for a specific monitoring purpose and application. Compass-6000™ system provides a simple yet effective means for setting up the plant structure, individual machines, monitoring system hardware, channels, relays, measurements, alarm limits and adaptive monitoring strategy.

For other monitoring software modules such as Diagnostics (3160-02) and Performance monitoring (3160-03), default monitoring setups are available for different machine types. This saves a lot of time in setting up the system.

Services

Compass-6000™ software installation, fine-tuning, commissioning and after-sales support is backed by Brüel & Kjær Vibro's extensive support services.

Specifications Compass-6000™ Monitoring Software

Client System Requirements

Operating system:

Windows 2000, Windows XP or higher with Internet Explorer v. 5 or higher.

Hardware:

CPU - 1GHz or higher. Intel Pentium 4 or similar.

RAM – Minimum 100MB free RAM

LAN – 10Mbit minimum

Graphic card – 1024 x 768 pixels or greater

Windows Server System Requirements

Operating system:

Windows 2000, Windows XP, 2003 Server

Hardware:

CPU - 1GHz or higher. AMD Athlon or Intel Pentium 4

RAM – 512MB minimum

LAN – 100Mbit minimum

Unix Server System Requirements

Operating system:

SCO Open Server 5.0.6 or 5.0.7

Hardware:

CPU - 1GHz or higher. Intel Pentium 4 or similar.

RAM - 256MB minimum

LAN – 100Mbit minimum

Standards Conformance

A complete list of software compliances can be provided on request.

Trademarks

- **Compass-6000, COMPASS** and **ADVISOR** are trademarks of Brüel & Kjær Vibro
- **Ethernet** is a trademark of Xerox Corporation.
- **Windows** is a registered trademark of Microsoft Corporation.
- **SCO, SCO Open Server** are trademarks of the SCO Group, Inc., Lindon, Utah, USA
- **ORACLE, SQL DBA** and **SQL PLUS** are registered trademarks of Oracle Corporation, Redwood Shores, California, USA.

Brüel & Kjær Vibro reserves the right to change specifications without notice