VibroSight®
# Total monitoring solution

FEATURES

» From the Vibro-Meter® product line

» Supports the VM600 XMx16 extended monitoring card pairs: XMV16 / XIO16T, XMVS16 / XIO16T and XMC16 / XIO16T

» Supports the VibroSmart® DMS devices: VSV300, VSI010 and VSN010

» Automatic data acquisition and storage

» Limit checking and event logging

» Online and offline data visualisation and analysis

» User-friendly application software modules

» Machinery analysis project management

» Runs on Windows® 7, Windows XP and Windows Server 2003/2008 operating systems

» Uses Sybase® SQL Anywhere 11

APPLICATIONS

» Machinery vibration monitoring and analysis

» Air-gap monitoring and analysis for hydroelectric generators

» Dynamic combustion monitoring and analysis

» Digitisation and recording of continuous long-duration waveforms
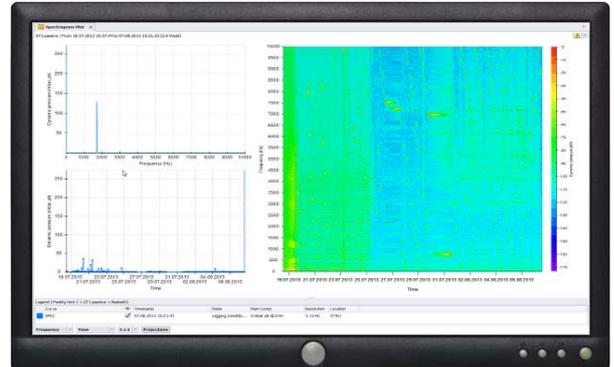
DESCRIPTION

Total monitoring solution

The VibroSight® total monitoring solution, from Meggitt Sensing Systems' Vibro-Meter® product line, is a highly integrated software suite that supports the effective monitoring of all rotating machinery.

Designed for operation with the VM600 XMx16 cards and the VibroSmart® DMS (distributed monitoring system) devices, the VibroSight software forms part of a modular machinery monitoring system that enables the predictive methodologies which can be used to help improve the effectiveness of industrial machinery.

In particular, a VibroSight-based monitoring system can be used to:

» Minimise downtime through the planning and scheduling of maintenance activities.

» Maximise component life by avoiding known critical operating conditions.

» Improve equipment reliability through the effective prediction of equipment failures.

» Use condition monitoring techniques to maximise equipment performance.

When used by technicians, operators and engineers, VibroSight enables them to identify a problem rapidly, evaluate the situation and determine the appropriate action to take.
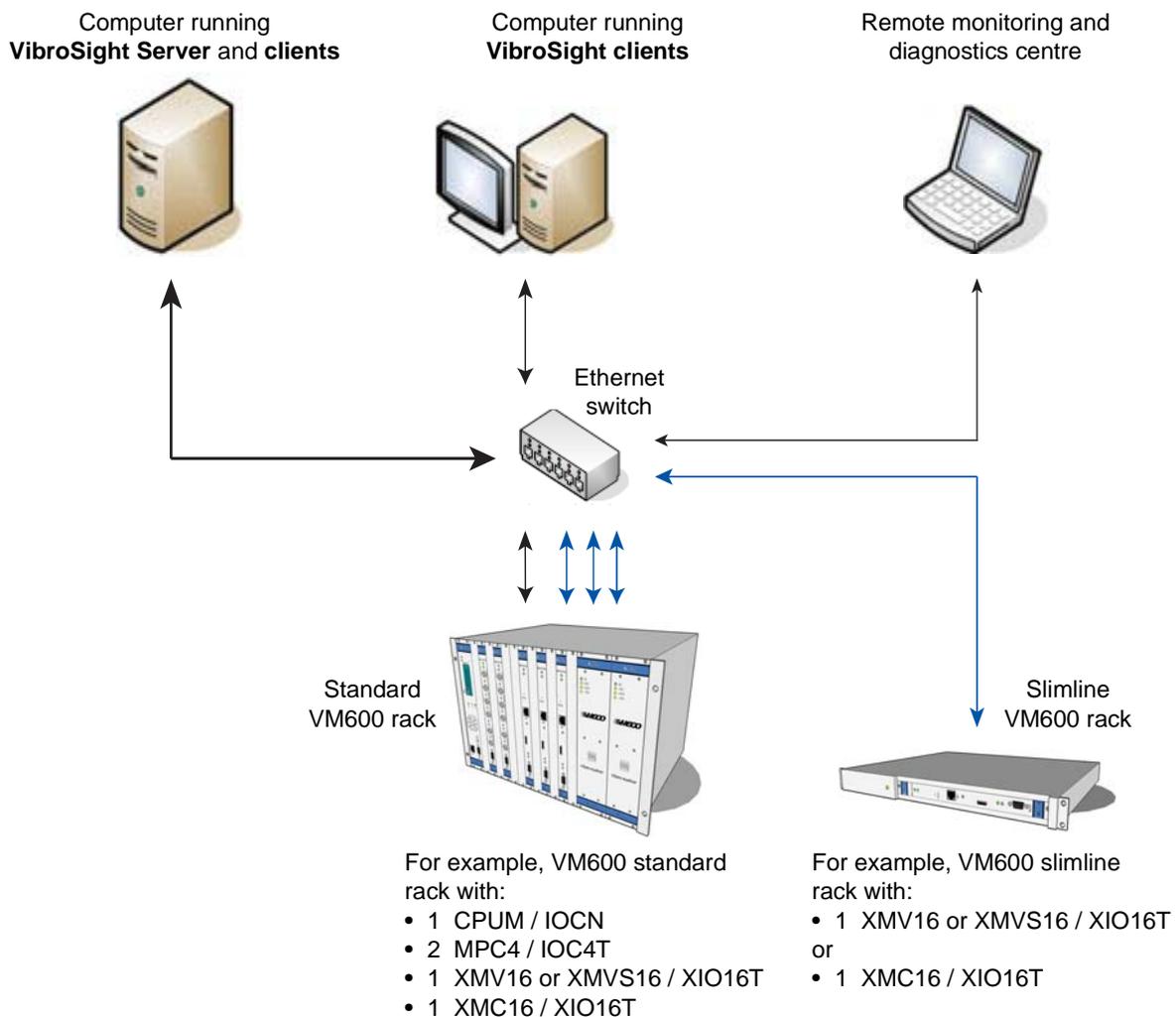

Computer running
VibroSight Server and **clients**

Computer running
VibroSight clients

Remote monitoring and
diagnostics centre

Ethernet
switch

Standard
VM600 rack

Slimline
VM600 rack

For example, VM600 standard
rack with:
• 1 CPUM / IOCN
• 2 MPC4 / IOC4T
• 1 XMV16 or XMVS16 / XIO16T
• 1 XMC16 / XIO16T

For example, VM600 slimline
rack with:
• 1 XMV16 or XMVS16 / XIO16T
or
• 1 XMC16 / XIO16T

Figure 1: VibroSight system architecture – the relationship between the computers running VibroSight and the underlying VM600 hardware

DESCRIPTION *(continued)*

VibroSight architecture

The VibroSight software is a truly modular design that adapts to different machinery monitoring applications. The software uses a predominantly client-server architecture to distribute the functional requirements and workload across several software modules.

As shown in Figure 1, the VibroSight software can run on a single host computer or be distributed across a number of computers connected to the monitoring system hardware (VM600 XMx16 cards or VibroSmart DMS devices) by an Ethernet network. This allows configuration, acquisition, data visualisation and analysis, and troubleshooting tasks to be performed from a single location or distributed between several workstations.

Advantages of distributed configurations include allowing specific functions to be performed on dedicated computers by the appropriate personnel.

Distributed configurations also enable remote data collection and analysis, allowing configuration and troubleshooting tasks to be performed via remote access if necessary.

The VibroSight software takes advantage of industry standard platforms. It runs on Windows 7, Windows XP and Windows Server 2003/2008 operating systems, uses a Sybase SQL Anywhere database and has a fully graphical interface for ease of use.

For integration in industrial environments, VibroSight supports external interfaces that enable the exchange of data with third-party systems using industry standard protocols. For example, this enables the correlation of vibration data with other parameters that are already available from separate field devices, so that there is no need to remeasure.

Monitoring system operation

The VibroSight software is designed to be easy to use: from the configuration of the measurements and parameters for the machinery being monitored (using VibroSight Configurator), to automated data acquisition and signal processing, and the display of data to assist in the advanced analysis and diagnosis of industrial machinery (using VibroSight Vision).

The VibroSight Welcome Centre is a window into the VibroSight software. It can be used to open existing or create new VibroSight Vision projects, start other VibroSight application software modules and to access product information and customer support.

The configuration of parameters depends on the monitoring system hardware used and the particular machinery monitoring application. For example, with XMx16 card pairs (XMV16 / XIO16T, XMVS16 /

XIO16T and XMC16 / XIO16T), data acquisition is continuous, there is extended event and alarm (severity state) handling, and extended processing capabilities.

The principal data acquisition mode for VM600 XMx16 card pairs captures measurement data continuously (every 1 s) and is suitable for normal operation of the machinery being monitored, such as increasing vibration levels and the capture of transients. An auxiliary mode is also available, which is typically used to capture more detailed data at slower update rates. In addition, a VibroSight monitoring system has the ability to adapt automatically to the criticality of the machinery being monitored by applying specific data logging scenarios, depending on machine operating conditions (machine states).

VibroSight software modules, base and application specific packages and external interfaces

The VibroSight software's architecture consists of several software modules for use with VM600 XMx16 cards or VibroSmart DMS devices (see Figure 2). This flexibility also allows base and application specific packages to be provided for different machinery monitoring applications.

The standard VibroSight software (base application package) provides full support for vibration analysis,

including the functionality and plots required for absolute or relative vibration, position, displacement, eccentricity and expansion.

In addition, application specific packages are available for other industrial areas. For example:

» Combustion monitoring – the measurement of dynamic pressure levels and combustion dynamics in a gas turbine.
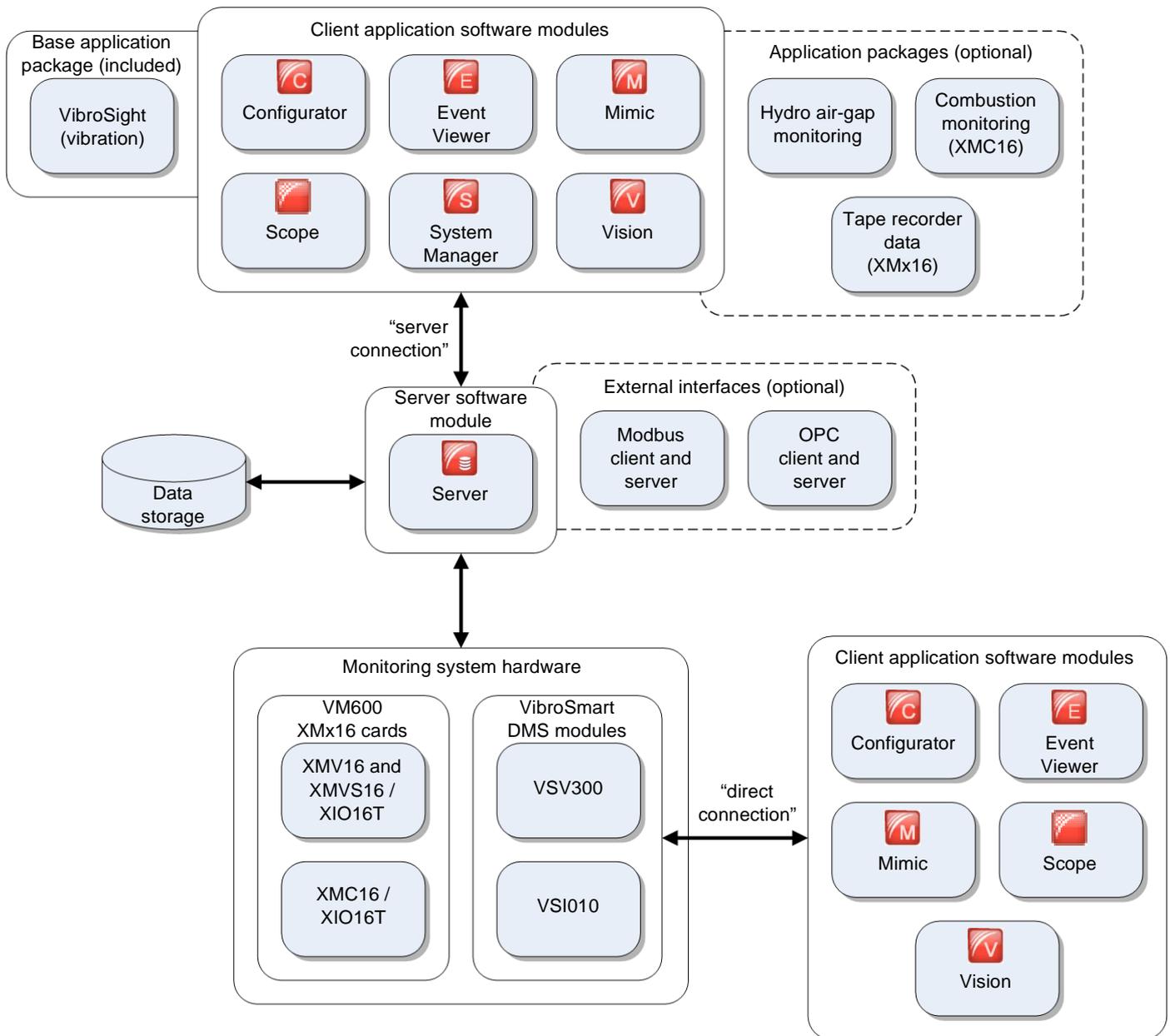
DESCRIPTION *(continued)*

*Figure 2: VibroSight software architecture – the relationship between software modules,
application specific packages, external interfaces and the underlying monitoring system hardware*

Hardware compatibility

The VibroSight software is designed to take advantage of the extended processing capabilities and higher data throughput of the VM600 XMx16 extended condition monitoring card pairs:

» XMV16 / XIO16T for vibration monitoring.

» XMVS16 / XIO16T for vibration monitoring.

» XMC16 / XIO16T for combustion monitoring.

DESCRIPTION *(continued)*

VibroSight is also compatible with the VibroSmart DMS devices that have been designed for condition monitoring and machinery protection applications with lower channel counts:

» VSV300 vibration monitoring module.
» VSI010 communications interface module.
» VSN010 real-time Ethernet switch.

SOFTWARE MODULES

The VibroSight software architecture consists of the following software modules.

C	Configurator	VibroSight Configurator is the client application software module that is used to configure the monitoring system hardware (VM600 XMx16 cards or VibroSmart DMS devices) to provide the required measurements from the machinery being monitored. The configuration of specific parameters for the machinery being monitored is also required, for example, in order to allow data logging and the capture of transients. Configurator is also used to configure the external interfaces with third-party devices using industry standard protocols such as Modbus and OPC.
E	Event Viewer	VibroSight Event Viewer is the client application software module that is used to used to log and view the events stored in VibroSight databases. Such events may have been created automatically by the monitoring system or defined by users. For example, Event Viewer can provides a comprehensive overview of alarms (severity states), which may have been triggered by factors such as excessive vibration levels in the machinery being monitored.
M	Mimic	VibroSight Mimic is the client application software module that is used to used to provide an overview of the machinery being monitored, using live measurement data. Shortcuts in Mimic can also be used to automatically open VibroSight Vision and display a measurement in more detail. Different hierarchical views (Mimics) of the machinery being monitored can be created from a library of predefined objects, then customised and associated with specific measurements, using a simple to use drag-and-drop interface. For example, one object could display the current value of a measurement, while another object could change colour whenever a measurement exceeds a predefined alarm limit.
	Scope	VibroSight Scope communicates directly with a VibroSmart DMS, whether the DMS is a single module or a network of multiple measurement blocks. Unlike most of the VibroSight software modules, which use a client-server architecture, Scope is a lite-client application that communicates directly with VibroSmart DMS modules (bypassing VibroSight Server). Scope has a simplified user interface that allows the live static measurement data being streamed from DMS modules to be displayed. It also allows the control and monitoring of DSI inputs such as alarm bypass (AB), alarm reset (AR) and trip multiply (TM).
	Server	VibroSight Server is the core server software module that interacts with all other parts of the monitoring system. Server is the only software module to access the Sybase SQL Anywhere database, monitoring system hardware (VM600 XMx16 cards or VibroSmart DMS modules) and external device interfaces. All requests for information from a VibroSight Server database, monitoring system hardware and external device interfaces must pass through a Server. Server also manages the connections, data acquisition, alarms, data logging, licences and verifies system access.

Table 1: VibroSight software modules

SOFTWARE MODULES *(continued)*

[S]	System Manager	VibroSight System Manager is the client application software module that provides the tools to manage the monitoring system hardware. System Manager is used to activate software, upgrade firmware and databases, configure IP addresses and NTP server settings.
[V]	Vision	VibroSight Vision is the state-of-the-art client application software module for the effective monitoring of machinery. It allows the live measurement data being streamed from VM600 XMx16 cards or VibroSmart DMS modules and the historical measurement data stored in VibroSight databases to be displayed. In Vision, a catalogue of plots are available to optimise the visualisation and analysis of measurement data, including waveforms, spectra and orbit plots (see Plots on page 8). The plots are fully customisable and navigation tools such as cursors, scaling and zooming facilitate the interpretation of the data.

Table 1: VibroSight software modules (continued)

BASE AND APPLICATION SPECIFIC PACKAGES

The VibroSight software includes all of the features required for typical machinery vibration monitoring and analysis. In addition, optional application specific packages are available in order to process data optimally for improved data visualisation and analysis in specific industrial areas.

» The hydro air-gap monitoring package is designed for hydroelectric applications.

» The combustion monitoring package is designed for combustion applications and requires that VM600 XMC16 cards are present in the monitoring system.

» The tape recorder data package allows continuous long-duration waveforms to be digitised and recorded.

VibroSight	The standard VibroSight software (base application package) provides full support for vibration analysis and allows the monitoring of rotating machinery in a wide range of industrial applications.
Hydro air-gap monitoring	The hydro air-gap monitoring package allows the air gap between rotor and stator, and the rotor and stator shapes (geometrical data) to be monitored for hydroelectric generators.
Combustion monitoring (VM600 XMC16 cards only)	The combustion monitoring package allows the combustor with the maximum amplitude and frequency components to be determined quickly. It also gives a clear view of the combustion instabilities for each combustion chamber.
Tape recorder data (VM600 XMx16 cards only)	The tape recorder data package records digitised continuous long-duration waveforms from the dynamic input channels of VM600 XMx16 cards to the local hard disk drive of a computer. The data is taken directly from the cards (before processing such as such as FFT, averaging or filtering is applied), resampled and encoded using the industry standard technical data management streaming (TDMS) file format.
Mathematical outputs	The mathematical outputs package allows existing data in a VibroSight system to be combined in order to provide new outputs. It includes a basic mathematics library and an expression editor that are used to configure new outputs to be calculated from existing measurement or system data.

Table 2: VibroSight software application specific packages

EXTERNAL INTERFACES

The VibroSight software supports optional industry standard interfaces with devices that can also process external data, that is, data originally acquired using third-party systems such as control systems and field devices. The following external interfaces are supported.

| Modbus	The Modbus interface, a Modicon standard protocol for data exchange between software applications, allows data to be exchanged between the VibroSight software and external devices that support the Modbus interface. Both Modbus RTU (serial connection) and Modbus TCP (Ethernet connection) are supported. The Modbus interface tool imports data from Modbus data sources directly into the VibroSight database and exports online values (current values and status) from the VibroSight database to external devices. The Modbus interface can act as client and/or server, depending on the configuration.
OPC	The OPC interface, based on open standards to facilitate interoperability, allows the exchange of data between the VibroSight software and external devices that support the OPC (OLE for Process Control) interface. The OPC DA (Data Access) interface tool allows data to be imported into the VibroSight database, and online values (current values and status) to be exported from the VibroSight database to external devices. The OPC DA interface can act as client and/or server, depending on the configuration.
Profibus	Profibus is a standard for industrial field buses defined by PI (Profibus and Profinet) International, an umbrella organisation responsible for both the Profibus and Profinet protocols. It allows the exchange of data between the VibroSight software and external devices that support Profibus DP (decentralised peripherals). The Profibus DP interface uses a dedicated VM600 Profibus interface card and a VM600 CPUM card (in spare slots of the VM600 rack) to support real-time bi-directional data communication in a master-slave (client-server) arrangement. The VM600 rack acts as a Profibus server (slave) device, while internally, Modbus data is exported from the VibroSight database and transmitted to external devices via the CPUM and Profibus interface.

*Table 3: VibroSight software external interfaces*

PLOTS

The following types of plot are included as standard in the VibroSight Vision catalogue of plots:
- *Static plots: Bar Chart, Bode, Correlation, Polar, Shaft Centerline, Table, Trend*
- *Dynamic plots: Orbit, Spectrogram, Spectrum, Full Spectrum, Waterfall/Cascade, Full Waterfall/Cascade, Waveform*
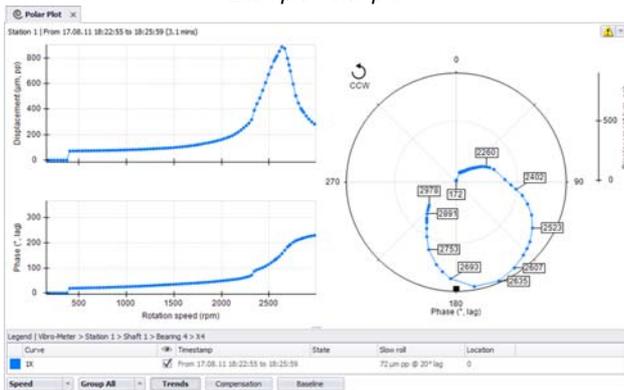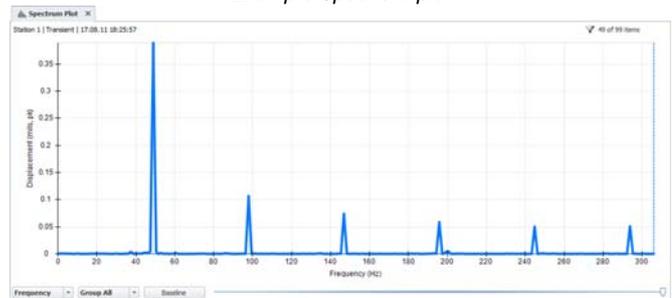
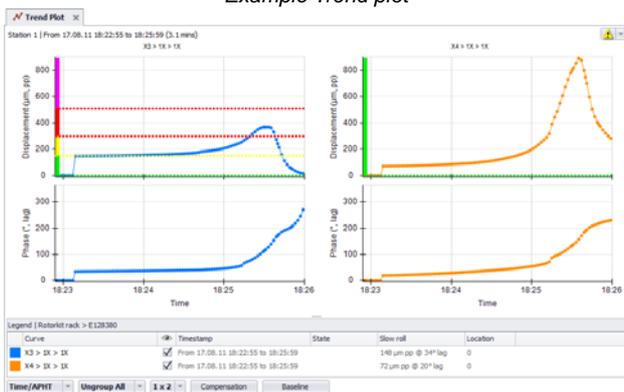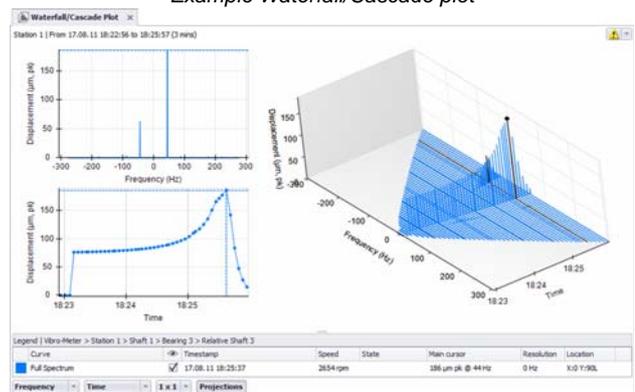*Example Bar Chart plot*
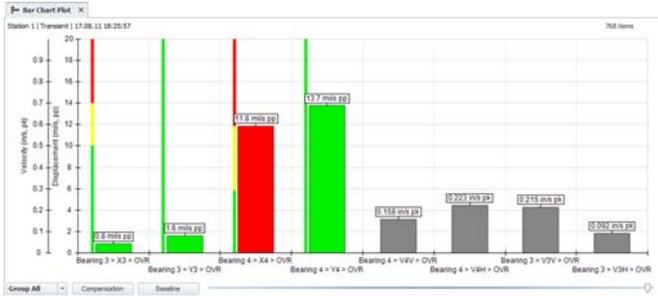
Example Spectrogram plot
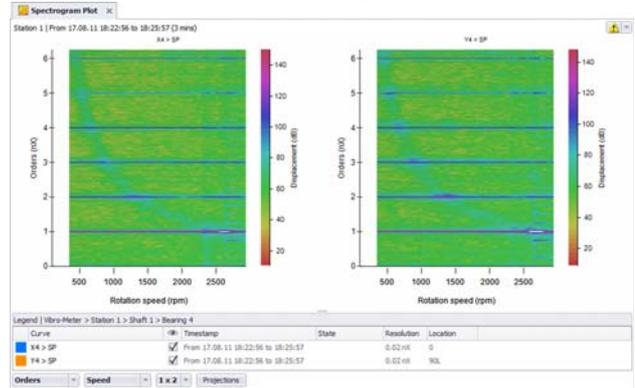
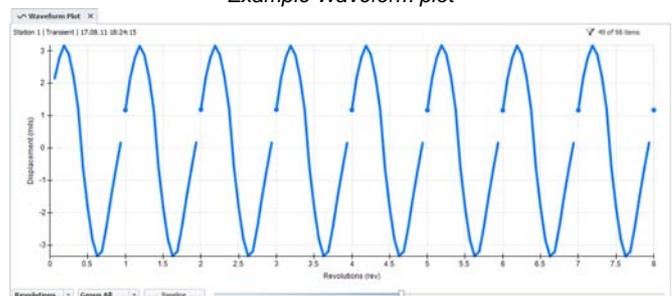*Example Polar plot*

Example Spectrum plot

Example Trend plot

Example Waterfall/Cascade plot

Example Waveform plot

SUPPORTED DEVICES

VM600 XMx16 cards:
- *XMV16 / XIO16T extended monitoring card pair for vibration*
- *XMVS16 / XIO16T extended monitoring card pair for vibration*
- *XMC16 / XIO16T extended monitoring card pair for combustion*

VibroSmart DMS devices:
- *VSV300 vibration monitoring module*
- *VSI010 communications interface module*
- *VSN010 real-time Ethernet switch*

HARDWARE REQUIREMENTS

Minimum computer configuration:
- *2.0 GHz multi-core 32-bit (x86) processor*
- *4 GB of system memory*
- *At least 300 GB of available hard disk space, preferably on a dedicated hard disk drive*
- *24" 1280x1024 high colour (32-bit) display*
- *Gigabit Ethernet network interface adapter (card)*
- *CD/DVD drive*
- *Optional 100 GB (or larger) backup media*
- *32-bit or 64-bit operating system*

In addition to this minimum computer configuration, a 64-bit processor, more memory and a 64-bit operating system are recommended for combustion monitoring applications:
- *3.0 GHz multi-core 64-bit (x86-64) processor*
- *16 GB of system memory*
- *64-bit operating system*

SOFTWARE REQUIREMENTS

Microsoft® Windows 7, Windows XP or Windows Server 2003/2008 operating system (32-bit or 64-bit) with the following prerequisites:
- *Microsoft .NET Framework 4.5 and .NET Framework 2.0 are required for VibroSight version 2.12.0 or later*
  Microsoft .NET Framework 4.5 is required for VibroSight version 2.9.4 or later
  Microsoft .NET Framework 4 (Standalone Installer) is required for VibroSight versions 2.9.2 and 2.9.3
  Microsoft .NET Framework 3.5 SP1 is required for VibroSight version 2.9.1 or earlier.

Note: Since Microsoft .NET Framework 3.5 includes .NET Framework 2.0 and .NET Framework 3.0, installing Microsoft .NET Framework 4.5 and .NET Framework 3.5 SP1 is the recommended solution for most computers.

PRODUCT SUPPORT AND MAINTENANCE

Product support and maintenance is free for the first year and additional years can be purchased (see Ordering information on page 11). The technical support includes:
- *Email and telephone support*
- *Software updates and upgrades*

SOFTWARE EDITIONS

The available VibroSight software editions, with details of the features supported, are as follows:

		VibroSight software edition					
		Live	**Trend**	**Standard**	**Network client**	**Offline**	**VibroSmart Tools** (VibroSmart DMS only)
Feature	Handling of static measurement data (variables), alarms (severity states) and events	✓	✓	✓	✓	✓	✓
	Handling of dynamic measurement data			✓	✓	✓	
	Live measurement data server VibroSight Server for communication with VM600 XMx16 cards or VibroSmart DMS modules	✓	✓	✓			
	Live measurement data display Display of live measurement data from VM600 XMx16 cards or VibroSmart DMS modules	✓	✓	✓	✓		✓
	Historical measurement data logging		✓	✓			
	Historical measurement data display		✓	✓	✓	✓	
	Mimics	✓	✓	✓	✓		
	Bar chart plot and Table plot	✓	✓	✓	✓	✓	
	Trend plot		✓	✓	✓	✓	
	Diagnostic plots Bode, Correlation, Orbit, Polar, Shaft Centreline, Spectrogram, Spectrum and Full Spectrum, Waterfall/ Cascade and Full Waterfall/Cascade, and Waveform			✓	✓	✓	

The **Live** edition is a reduced feature edition capable of handling live data for static measurements, alarms and events only. No dynamic measurement data such as waveforms, spectra or orbits are available and no data logging is possible. All VibroSight software modules (VibroSight Server and the client applications) are included but only Bar Chart and Table plots are available in VibroSight Vision.

The **Trend** edition is a reduced feature edition capable of handling live and historical data for static measurement, alarms and events only. No dynamic measurement data such as waveforms, spectra or orbits are available. A VibroSight Server database can be used for data logging. All VibroSight software modules (VibroSight Server and the client applications) are included, but only Bar Chart, Table and Trend plots are available in VibroSight Vision.

The **Standard** edition is the fully featured edition with full system capabilities. It is capable of handling live and historical data for both static and dynamic measurements. All VibroSight software modules (VibroSight Server and the client applications) are included and the full catalogue of plots is available in VibroSight Vision (see Plots on page 8).

The **Network client** edition is a special edition intended for use on a network client computer in order to access a remote host computer that is running a VibroSight Server. This allows the data visualisation tasks (VibroSight Vision) to be off-loaded from the server computer and also allows multiple users to connect to a VibroSight Server from several client computers at the same time. This edition is capable of handling live and historical data for both static and dynamic measurements from remote server computers. Only the VibroSight software client applications are included and the full catalogue of plots is available in VibroSight Vision (see Plots on page 8).
Note: VibroSight Server is not included in the Network client edition.

The **Offline** edition is a special edition intended for use with offline VibroSight Server database files in order to visualise and analyse historical data only. It is not possible to connect to a running VibroSight Server. This edition is capable of handling historical data for both static and dynamic measurements from local VibroSight Server databases. Only VibroSight Server and the VibroSight Event Viewer, System Manager and Vision client applications are included and the full catalogue of plots is available in VibroSight Vision (see Plots on page 8).
Note: The VibroSight Server included in the Offline edition is limited to opening local VibroSight Server databases.

The **VibroSmart Tools** edition is a special edition intended for use with a VibroSmart DMS only. It is not possible to connect to a VibroSight Server. This edition is capable of handling live data for static measurements directly from VibroSmart DMS modules. No dynamic measurement data such as waveforms, spectra or orbits are available and no data logging is possible. Only the VibroSight Configurator, Scope and System Manager client applications are included.
Note: VibroSight Server is not included in the VibroSmart Tools edition.

Table 4: VibroSight software editions and supported features

MEGGITT

ORDERING INFORMATION

To order please specify

Type	Designation	Ordering number
VibroSight	Total monitoring solution CD	609-004-SSS-SSS/Codes
	Software for the configuration, management and operation of monitoring system hardware (VM600 XMx16 cards or VibroSmart DMS devices).	
Sybase SQL Anywhere	SQL database CD	609-005-SSS-SSS
	Software for database management to be used in conjunction with the VibroSight software (free-of-charge when ordered together with VibroSight). In case of multi-server installation, one CD per server is required.	

"SSS" represents the software version.

Use the codes below to specify order options in the format 609-004-SSS-SSS/Axx-Bxx-Cxx-Dxx-Exx-AAxxx-ABxxx-ACxxx-BAxx-BBxx-BCxx-BDxx. For example, a complete ordering number is 609-004-000-028/A01-B01-C03-D01-AA032.

Code	Feature	Value	Description
A	Order type (see note 2 on page 13)	**01**	**New installation, requiring a VibroSight software version (via CD or FTP) and a new licence key**
		02	Major or minor level (**x.x**.x) software upgrade, requiring a later VibroSight software version (via CD or FTP) and a new licence key
		03	Expansion to support additional channels or tags using the existing VibroSight software version, requiring a new licence key
		04	Demo
B	Language	**01**	**English**
C	Software edition (see Software editions on page 10)	01	Live
		02	Trend
		03	**Standard (server computer installation)**
		04	Network client (client computer installation)
		05	Offline
		06	VibroSmart Tools
D	Support and maintenance	**01**	**1 year**
		02	2 years
		03	3 years
		05	5 years
		10	10 years
E	Optional packages	01	Hydro air-gap monitoring
		02	Combustion monitoring
		03	Tape recorder data
		04	Mathematical outputs

ORDERING INFORMATION *(continued)*

Code	Feature	Value	Description
AA	Number of XMV16 and/or XMVS16 channels (see note 3 on page 13)	**000**	**None**
		004	4 channels
		008	8 channels
		016	16 channels
		032	32 channels
		064	64 channels
		128	128 channels
		256	256 channels
AB	Number of XMC16 channels (see note 3 on page 13)	**000**	**None**
		016	16 channels
		032	32 channels
		048	48 channels
		064	64 channels
AC	Number of VSV300 channels	**000**	**None**
		002	2 channels
		004	4 channels
		008	8 channels
		016	16 channels
		032	32 channels
		064	64 channels
		128	128 channels
		256	256 channels
BA	Number of Modbus server tags	**00**	**None**
		99	Unlimited
BB	Number of OPC server tags	**00**	**None**
		99	Unlimited
BC	Number of Modbus client tags	**00**	**None**
		01	100 tags
		05	500 tags
		10	1000 tags
		25	2500 tags
		50	5000 tags
		99	Unlimited
BD	Number of OPC client tags	**00**	**None**
		01	100 tags
		05	500 tags
		10	1000 tags
		25	2500 tags
		50	5000 tags
		99	Unlimited

ORDERING INFORMATION *(continued)*

Notes

1. **Bold text** in the above table indicates default values.

2. Order type (Axx)
The different order types are typically used as follows:
• Order type A01 is for a new VibroSight installation.
• Order type A02 is for an existing VibroSight installation that requires a major or minor level (**x.x**.x) upgrade to a later version of the VibroSight software.
  In general, a new licence key file is required for upgrades between major and minor version releases (**x.x**.x) and the licence key file remains unchanged between update level releases (x.x.**x**).
• Order type A03 is for an existing VibroSight installation that requires an expansion of the currently installed version of the VibroSight software to support an additional number of channels (XMx16 or VSV300) and/or tags (Modbus and/or OPC).

3. Number of … channels (AAxxx and ABxxx)
The highly configurable nature of the VibroSight software and monitoring system hardware (VM600 XMx16 cards or VibroSmart DMS modules), and the wide variation in machinery monitoring applications makes it impossible to define operating limits for VibroSight that are correct under all circumstances. However, as general guidelines, Meggitt Sensing Systems recommends the following:
• Up to 11 VM600 XMx16 card pairs per instance of a VibroSight Server in typical vibration monitoring applications using both static and dynamic measurement data.
• Up to 32 VM600 XMx16 card pairs per instance of a VibroSight Server in applications using static measurement data only.
For applications that exceed these recommendations, please contact your nearest Meggitt Sensing Systems representative to discuss a suitable VibroSight system architecture.
Refer also to VibroSight application note 006 *VM600 cards per VibroSight Server: recommendations for vibration monitoring applications* for more information.

Meggitt Sensing Systems (Meggitt SA) Software

LICENCE AGREEMENT

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