MEGGITT
smart engineering for
extreme environments

VM600 CMS Software

Condition monitoring system (CMS) software for the VM600 series

FEATURES

» From the Vibro-Meter® product line

» Configuration and operation of VM600 hardware (CMC16 and IOC16T condition monitoring card pairs)

» Automatic data acquisition and storage

» Limit exceedance checking and event logging

» Online or offline data analysis

» Graphical user interface

» Runs on Windows® Server 2003, Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7 operating systems

» ANSI SQL-92 compatible

» Optional modules:
  Air Gap Module for hydro-turbines
  Diagnostics Rule Box
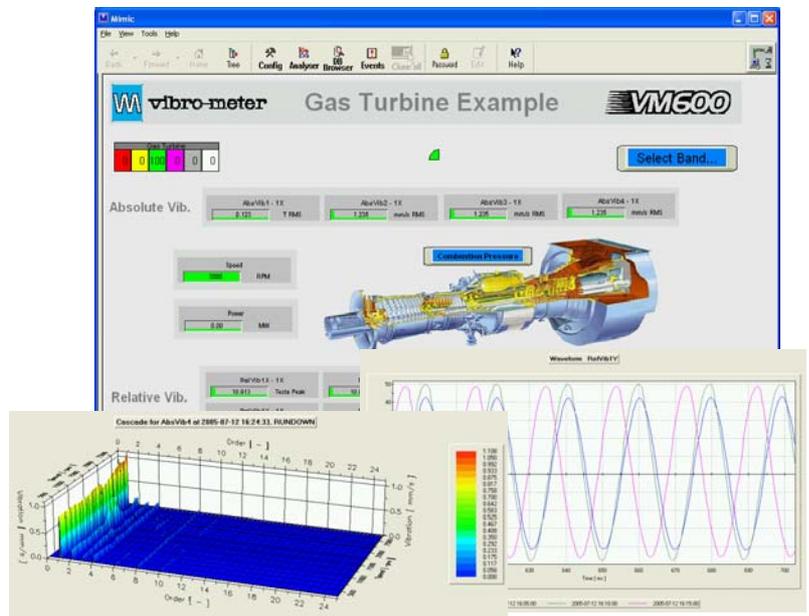
DESCRIPTION

Condition-based maintenance is a predictive methodology that can be used to improve your asset (machinery) effectiveness. It enables you to:

• Improve equipment reliability through the effective prediction of equipment failures

• Minimise downtime through the planning and scheduling of overhauls

• Maximise component life by avoiding critical known conditions

• Utilise condition monitoring techniques to maximise equipment performance.

The VM600 CMS Software from Meggitt Sensing Systems' Vibro-Meter® product line is based on this principle and is dedicated to the support of technicians, operators and engineers, enabling them to identify a problem rapidly, evaluate the situation and determine the appropriate action to take.

The VM600 CMS Software has a truly modular architecture that adapts to your specific needs. It comprises several software modules for use with the VM600 series hardware.

DESCRIPTION *(continued)*

To use the VM600 CMS Software, the system parameters are configured (once) before the data acquisition and signal processing starts. Then the results can be displayed as required, to assist the advanced analysis and diagnosis of the monitored machinery.

The VM600 CMS Software has the ability to automatically adapt to the criticality of the machine status by applying specific data logging scenarios. The background mode is continuous low-resolution data acquisition. The scheduled mode is pre-defined high-resolution acquisition. The transient mode is automatically detected and then transient data are acquired when the speed is out of the "steady" state. Finally, the manual mode is real-time data acquisition initiated by the user.

The VM600 CMS Software takes advantage of the industry standard platforms to allow total adaptability of the system. It runs under Windows Server 2003, Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7 and has a fully graphical interface for ease of use. Moreover, the SQL-based data management server allows you to communicate with any other SQL-based database.

The VM600 CMS Software can run on a single host computer or on a number of systems connected to the VM600 rack by network connections. This lets you decide whether you need to perform the entire configuration, acquisition, data analysis and troubleshooting tasks from one location or distribute

them among several workstations. In a distributed configuration, all specific functions can be performed on dedicated computers by appropriate personnel. This classification also enables remote data collection and/or analysis, and means that configuration and troubleshooting tasks can be performed via remote access if necessary.

For further applications, the VM600 CMS Software provides a suite of standard import/export interfaces, enabling you to transfer data to/from any third-party system. Your installation benefits are thus the full flexibility and scalability of the system, because it enables the correlation of vibration data with other parameters that are already available from other devices, so there is no need to re-measure. The available interfaces are Modbus and OPC (open connectivity) for communication with field devices such as PLDs (programmable logic devices) and DCSs (distributed control systems). The Microsoft® DDE (dynamic data exchange) standard is used to exchange data between the VM600 CMS Software and external devices. Finally, the ODBC (open database connectivity) allows your VM600 CMS database to import data from any ODBC database.

On top of these modules, the Diagnostics Rule Box enables the user to integrate his machinery knowledge within the program rules, set conditions on real-time values, create alarms and alerts, and ultimately generate automatic actions to adequately warn the user if an event occurs.
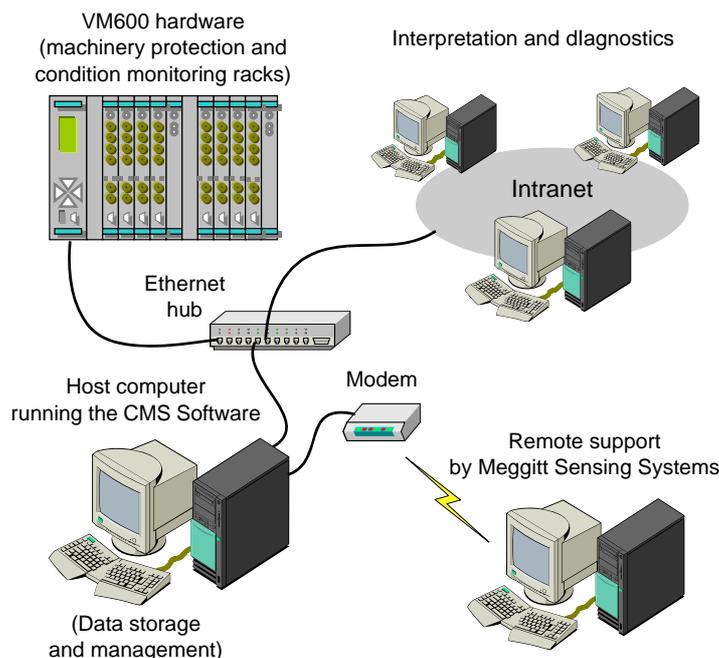

Figure 1: VM600 CMS system architecture – the relationship between the computers running VM600 CMS and the underlying VM600 hardware

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DESCRIPTION *(continued)*

VM600 rack(s)

Configuration and
setup tools

**Configuration
Editor**

**VM600
Administrator**

External systems

**Turbine Control
System etc.**

Communications and
data storage tools

**VMCom
Communications
Handler**

Display and
analysis tools

Mimic

**Data
Analyser**

Data import/export

ODBC

**Keyboard
Interface**

Modbus

DDE

OPC

**Database
Server**

**Database
Browser**

**Event
Viewer**

**Diagnostics
Rule Box**

**Air Gap
Module**

Database

Key: **Standard
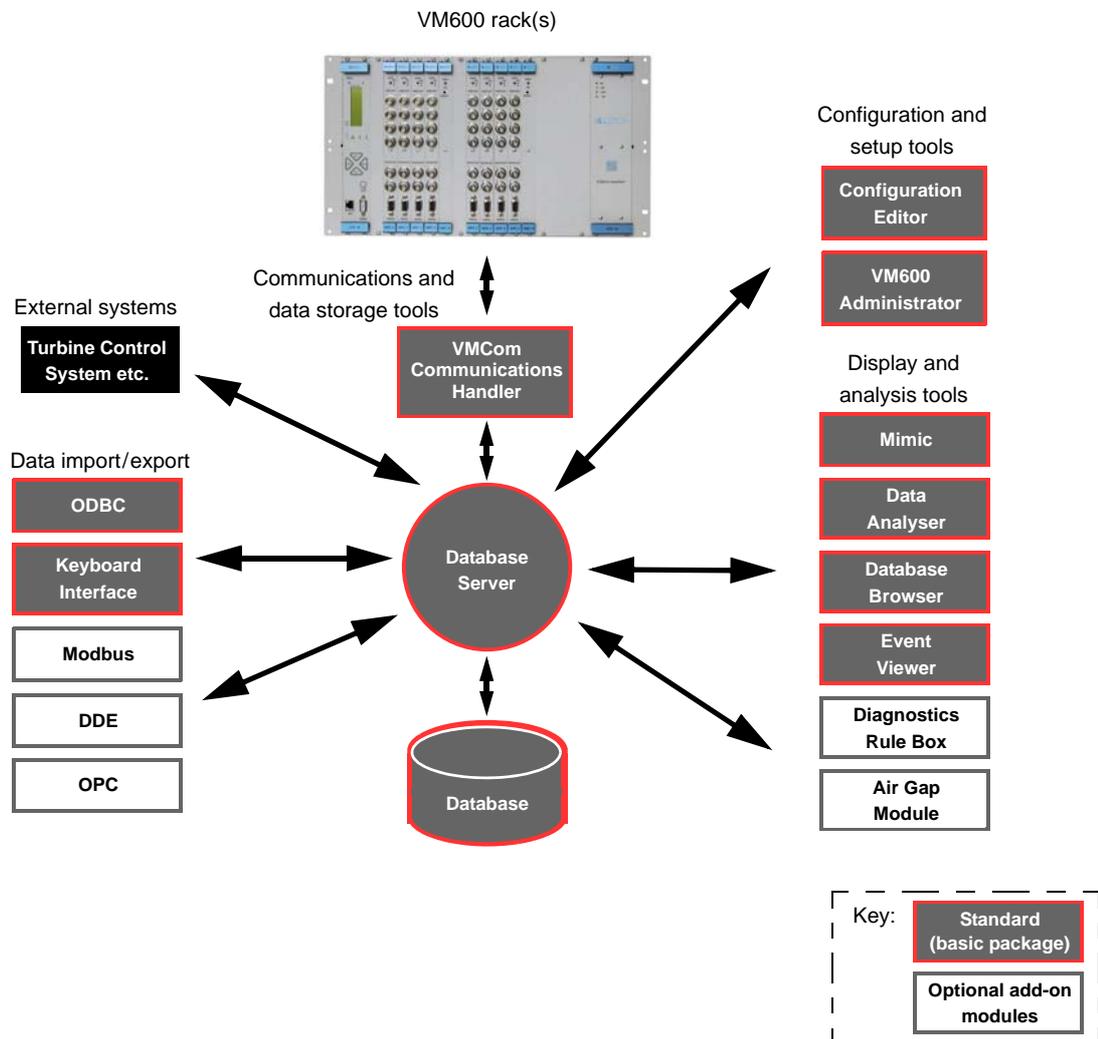(basic package)**

**Optional add-on
modules**

*Figure 2: VM600 CMS Software architecture – the relationship between the VM600 CMS Software application modules,
external interfaces and the underlying VM600 hardware*

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SOFTWARE MODULES

The software application modules that make up the VM600 CMS Software client-server architecture are as shown in Table 1 (below).

VM600 Administrator	The VM600 Administrator program is a portal (window) that provides quick and convenient access to all of the VM600 CMS Software tools, as well as to a number of useful Windows system tools.
Mimic	The Mimic provides the operator with a customised, graphical view of the machinery being monitored by the VM600 CMS Software system. The types of data you can visualise directly from the Mimic are "live" data, that is, current values and current status of both the VM600 hardware and the "offline" systems, as well as user-requested high-resolution data such as waveforms, spectra and orbit plots.
Configuration Editor	The Configuration Editor is used to set up the required configuration of all parameters of the system, including the configuration details of each single output band, machine-specific parameters for data logging or transient data and complete VM600 rack configurations. It stores the system configuration inside the SQL database, from where it can be viewed or changed by users with sufficient access rights. It is also a starting point for the advanced configuration of the database, such as preparing the database to accept "offline" data imported from external systems.
Data Analyser	The Data Analyser is used to display measurement data from the SQL database. It takes data from selected data points defined in the database, applies user- or system-defined filters to the data, and displays the data as a variety of graphs, plots and charts. Typical filters that can be applied to data are time, alarm status, machine status, or a user-configurable filter based on any speed, analog or digital data.
Database Browser	The Database Browser is used to display the content of the SQL database in graphical form. It can display stored datasets, such as events, spectra, waveforms and orbits as intuitive time-line representations, thus providing an effective overview of the measurement data that have been collected. You can then quickly navigate to the dataset of interest using a set of independent criteria (by point, type of data set, time or alarm state).
Event Viewer	The Event Viewer is used to view the events in the SQL database that may have been created automatically by the system or as defined by users. It displays the available events in list form, using colour coded, intuitive icons. The window shows either all events present in the database, or you can choose to set and activate filter criteria in order to limit the displayed events.
VMCom Communications Handler	The VMCom program handles the flow of data between VM600 racks and SQL databases. It communicates with the VM600 CMS hardware and the SQL database. This program can either be launched manually or configured as a system service, for which purpose a special service setup utility is included that allows you to configure, create or delete a Windows service. This is the preferred way of communicating with VM600 hardware for permanent system installations and dedicated on-line condition monitoring applications.

Table 1: VM600 CMS Software application modules

SOFTWARE MODULES *(continued)*

The VM600 CMS Software also includes the advanced post-processing software application modules shown in Table 2 (below), which must be ordered as options (see Ordering information on page 8).

Diagnostics Rule Box (optional)	The Diagnostics Rule Box is a powerful, fully automated, decision support system for operators and machinery experts. Any information in a SQL database, including measurement data and imported "offline" data, can be used to generate complex diagnostics rules. You can also develop templates for standard diagnostics procedures and activate them for any item of machinery.
	This tool is based on the concept of fully customisable rules and scripts:
	• *Rules are composed of three elements:*
	- Input Level: Any number of customisable input criteria, such as exceedance checks, points' status and counters, which are associated with either individual measurement points or groups of measurement points.
	- Logical Level: A freely-configurable assembly of logical combinations of Input Level elements.
	- Action Level: Any number of user-defined actions that are executed based upon results from the Logical Level.
	• *Scripts are assemblies of rules that are ready to be executed according to user-defined parameters. Scripts can contain sequences, loops and branches, and allow you to customise their execution according to the particular needs of the diagnostics rules.*
	• *These three elements are interconnected using a user-friendly and intuitive graphical editor. Simulation tools are provided to allow easy visual verification and testing of the rules, using simple colour-coding techniques.*
	Diagnostics rules are easy to adapt and enhance without affecting normal system operation.
	The Diagnostics Server subsequently runs independently and performs the tasks defined in the Diagnostics Rule Box, working in parallel with the normal data acquisition tasks of the system.
Air Gap Module (optional)	The Air Gap Module (which uses VM600 CMS hardware in a special configuration with post-processing) allows you to monitor the gap between the rotor and stator in large hydro-generator groups, thereby avoiding potentially destructive and costly failures of machinery.
	The main functions of this module are to:
	• *Allow the long-term monitoring of the rotor/stator air-gap*
	• *Measure rotor profile in one or more layers*
	• *Generate alarms and alerts for each sensor installed on the machine*
	• *Continue to process and interpret data in the event of one or more sensors becoming non-operational*
	• *Detect critical deformation of the rotor*
	• *Perform long-term trend measurements*
	• *Calculate the basic values that characterise the position and shape of the rotor and stator.*
	The Air Gap Module can produce a variety of dedicated graphs, in addition to those produced by the standard VM600 CMS Software (see Plots on page 7).

Table 2: VM600 CMS Software advanced post-processing application modules

DATA EXCHANGE INTERFACES

The VM600 CMS Software supports the set of open-standard data interfaces shown in Table 3 (below), some of which must be ordered as options (see Ordering information on page 8).

These interfaces allow the VM600 CMS Software to process "offline" data, that is, data not originally acquired using VM600 hardware but from other third-party systems such as field devices, PLDs and DCSs.

ODBC	The ODBC interface is a module for importing data from databases supporting the ODBC standard.
	It enables data from ODBC data sources to be imported into the SQL database. To export data from the SQL database, no special interface is required, since the SQL database is already ODBC compliant.
Keyboard	The keyboard interface allows you to manually set the values of "offline" data points by entering their values using a keyboard.
DDE (optional)	The DDE interface allows the exchange of data between the VM600 CMS Software and external devices that support the Dynamic Data Exchange (DDE) interface, a Microsoft standard for data exchange between software applications.
	The DDE interface tool allows data to be imported from external DDE data sources into the SQL database, and online values (current values and their current status) to be exported from the SQL database to external devices. The DDE interface can act as client and/or server, depending on the configuration.
OPC (optional)	The OPC interface allows the exchange of data between the VM600 CMS Software and external devices that support the Open Connectivity (OPC) interface, a Microsoft standard for exchange between software applications.
	The OPC interface tool allows data to be imported into the SQL database, and online values (current values and their current status) to be exported from the SQL database to external devices. The OPC interface can act as client and/or server, depending on the configuration.
Modbus (optional)	The Modbus interface, a Modicon standard protocol for data exchange between software applications, allows data to be exchanged between the VM600 CMS Software system and external devices that support the Modbus interface. Both Modbus RTU (for serial connections) and Modbus TCP (for Ethernet connections) are supported.
	The Modbus interface tool imports data from Modbus data sources directly into the VM600 CMS database and exports online values (current values and current status) from the database to external devices. The Modbus interface can act as client and/or server, depending on the configuration.

Table 3: VM600 CMS Software data exchange interfaces

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PLOTS

The VM600 CMS Software supports the plots shown in Table 4 (below).
Note: Different plots are available depending on the mode of acquisition (real-time, historic and transient).

Real-time plots	Historic plots See note 1	Transient plots See note 1
• Bar graph • Trend • Waveform • Spectrum • Orbit • Polar • Long waveform	• Waveform • Spectrum • Orbit • Shaft centerline • Trend • Average trend • Polar • Waterfall • Correlation plot • Long waveform • Rotor shape plot See note 2 • Rotor signature plot See note 2 • Rotor polar plot See note 2 • Pole trend plot See note 2	• Trend • Cascade • Shaft centerline • Bode • Polar • Multi-polar

Notes
1. These plots are stored in the VM600 CMS Software database.
2. These plots are available with the Air Gap Module (advanced post-processing software).

Table 4: VM600 CMS Software plots

SUPPORTED DEVICES

The following devices are supported by the VM600 CMS Software:
• *CMC16 / IOC16T condition monitoring card pair*

HARDWARE REQUIREMENTS

Minimum computer configuration:
• *2.0 GHz multi-core 32-bit (x86) processor*
• *4 GB of system memory*
• *At least 200 MB of available hard disk space for the VM600 CMS Software.*
  At least 250 GB of available hard disk space for database storage (configuration and measurement data).
• *21" 1280x1024 high colour (32-bit) display*
• *Ethernet or Fast Ethernet network card (TCP/IP)*
• *CD/DVD drive*
• *Optional 100 GB (or larger) backup media*

SOFTWARE REQUIREMENTS

Microsoft Windows Server 2003, Windows NT, Windows 2000, Windows XP, Windows Vista or Windows 7
operating system

ORDERING INFORMATION

To order please specify

Type	Designation	Ordering number
CMS	VM600 CMS Software	209-500-600-SSS

Notes
"SSS" represents the software version.
Specify your order options using the format 209-500-600-SSS/Code 1/Code 2/Code 3/Code 4/Code 5/Code 6/Code 7/Code 8, as follows:

Code no.	Feature	Value	Description
1	Language	01	English
2	Hard copies of user manual	00 01 0x	None 1 set x = number of sets
3	System size	00 01 02 03	Undetermined 1 user (single host) 5 concurrent users + server 15 concurrent users + server
4	DB synchronisation	00	None
5	DB server web-enabled	00	None
6	Performance monitoring plug-in	00	None
7	Data exchange interfaces	00 01 02 03 04 05	None Data import and export for DDE (server and client) Data import and export for Modbus (server and client) Data export for OPC (server) Data import for OPC (client) Data import and export for OPC (server and client)
8	Advanced post-processing	00 02 04	None Air Gap Module Diagnostics Rule Box

Meggitt Sensing Systems (Meggitt SA) Software

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The Meggitt Sensing Systems facility in Fribourg, Switzerland was formerly known as Vibro-Meter SA, but is now Meggitt SA. This site produces a wide range of vibration and dynamic pressure sensors capable of operation in extreme environments, leading-edge microwave sensors, electronics monitoring systems and innovative software for aerospace and land-based turbo-machinery.

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