

Vibro-Meter

**VM 600:**  
total machinery protection, condition  
and performance monitoring



**MEGGITT**  
smart engineering for  
extreme environments

## Protection, condition and performance monitoring

Power generation, oil and gas production and distribution, petrochemical processing and GT marine propulsion employs high value, critical turbomachinery.

Safety has always been a major issue and protection systems, including vibration parameters, are frequently mandatory.

As owners and shareholders demand more and more value, so the pressure on operators to reduce the cost of running and maintaining their machinery increases.

Condition monitoring can work alongside protection systems, enabling maintenance to be planned and reducing the risk of unscheduled shut-downs. Performance monitoring provides information on efficiency and helps to optimise plant usage and minimise maintenance costs.

While machinery manufacturers will continue to improve their designs, modern instrumentation and information technology will be the most effective short-term tools for optimising plant performance, life and efficiency. Machinery monitoring can also be beneficially retrofitted to older plant.



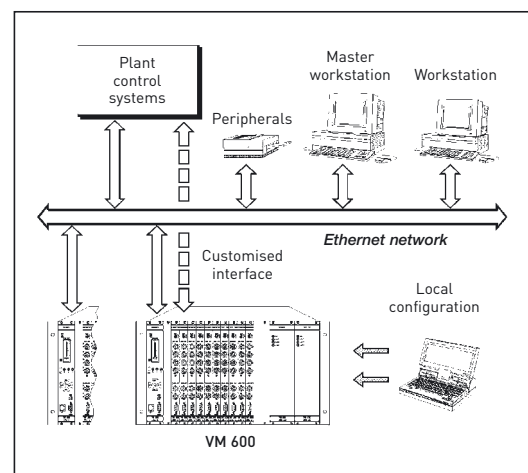
# The VM600 series

The philosophy is simple. One system, modular, scaleable, configurable, using standard operating systems and standard communications. Easy to specify, easy to install, easy to live with, easy to adapt, easy to expand and, not least, easy to pay for.

Traditionally, separate systems have been provided for machinery protection, on-line condition monitoring and machinery performance assessment. Vibro-Meter now introduces a unified concept based on five decades of experience. The VM600 uses the latest digital signal processing technology. Industry standard communications interfaces deliver the most up-to-date, integrated, modular, scaleable solution to all machinery protection, condition and performance monitoring requirements within a single system framework. Only two types of signal processing modules are required: one for protection (MPC 4), and one for condition and performance monitoring data acquisition (CMC 16). Each card can perform the necessary signal processing tasks with input from any appropriate sensor, simplifying specification, installation, training and spares holding.

The new VM 600 can operate as:

- a simple stand-alone machinery protection monitor
- a networked protection monitor integrated into a plant management system
- a condition monitoring data acquisition system, with or separate from the protection system, with appropriate software
- a performance monitoring data acquisition system, using inputs from the protection/condition monitoring channels, plus other data from machinery management systems, with appropriate software



VM600 easy connectivity

Our software is also modular, allowing all stages of functionality from configuration of a simple protection system to a fully integrated condition and performance monitoring system, capable of multiple-site management.

Our experience with many large installations has taught us the importance of open architecture and standard interfaces. The VM 600 may be modified and expanded as needs change, with single-source support from an acknowledged leader in the field.

# VM600 main components

## MPC 4 machinery protection card

- Four signal channels, two speed channels
- Accepts all vibration, dynamic and static inputs from all the usual types of sensors
- Latest DSP technology
- Buffered analogue outputs on front panel for analysers
- One card does all



## CMC 16 condition monitoring card

- 16 channels, up to four configurable as speed or phase reference channels
- Accepts all vibration, dynamic and static inputs from all the usual types of sensors
- Latest DSP technology
- Intelligent data acquisition, automatically adapts to changes
- One card does all



## CPU central processing unit card

- Optional CPU for control of external communications
- Local display
- Modem, serial or network links using standard protocols



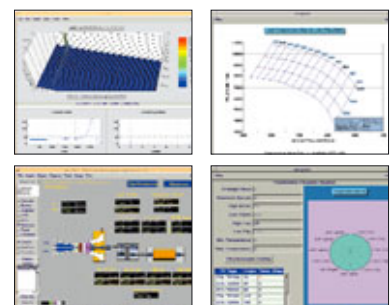
## Rack assembly, 6U high, standard 19" format

- Up to 12 MPC 4 or CMC 16, can be mixed
- Single or dual redundant power supplies
- Screw-terminals for inputs and outputs
- Standard VME architecture
- Flexible analogue signal and relay bus



## Software modules

- MPS 1 Basic protection system configuration
- MPS 2 Adds data storage and trending
- CMS 2 Condition monitoring, powerful and fully featured
- VM 600 Basic performance monitoring
- VM 600 Advanced performance monitoring
- VM 600 Plant usage optimisation (cost control)



### CMC 16 condition monitoring card

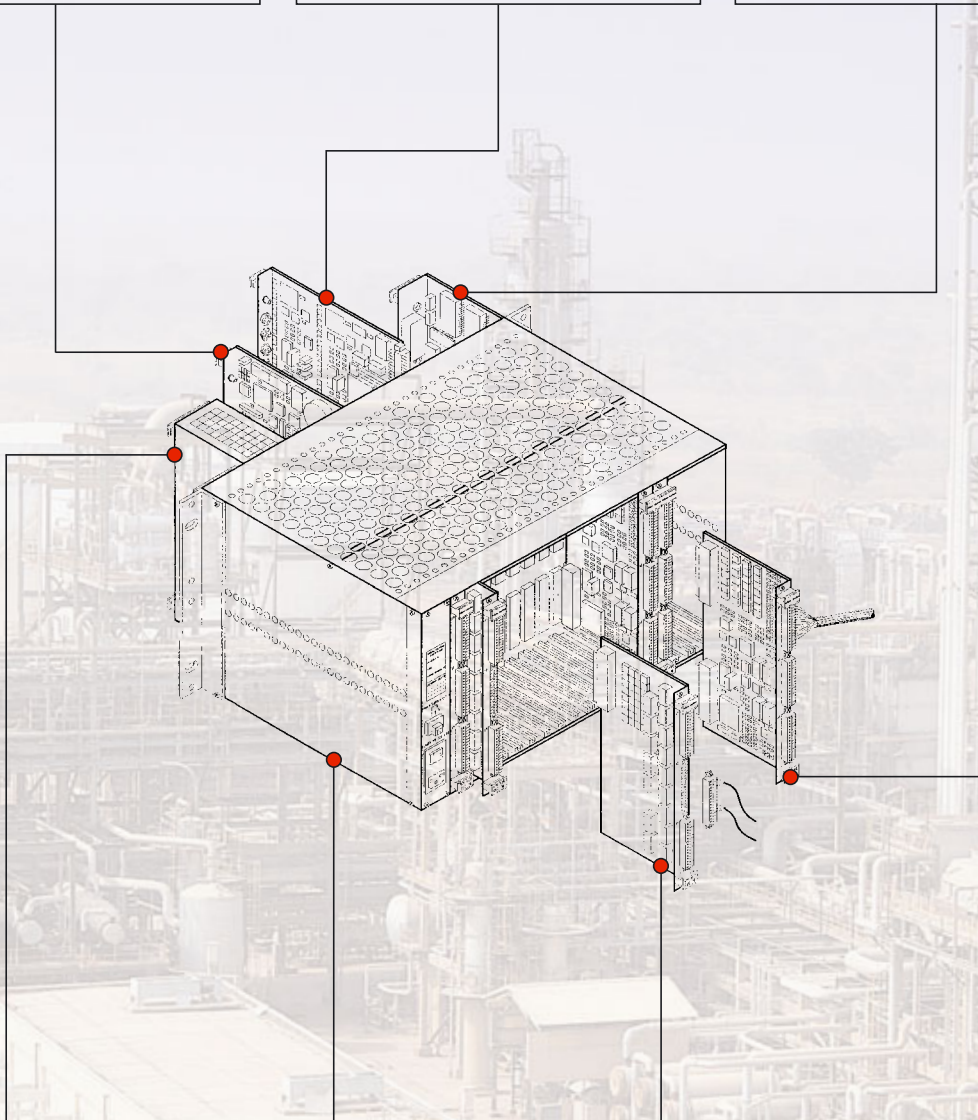
- Intelligent data acquisition, logging by schedule or by exception
- All sensors, all parameters
- Automatic capture of run-up/run-down
- Built in data buffer, no loss of acquisition if host PC or network fails
- High resolution (3,200 lines) FFT processing
- Configurable 10 bands per channel extraction
- Multiple machine monitoring

### MPC 4 machinery protection card

- Continuous on-line protection
- Four dynamic/process inputs
- 2 speed/tacho inputs
- High and low alert and danger alarms, fully programmable
- Accepts and powers all normal sensors
- All machinery parameters, including configurable broad band and tracking filters

### CPU central processor unit card

- Manages rack configuration
- All standard communications - modem, serial, network
- Industry standard protocol support
- Links to local and remote PCs
- Front panel LCD display
- Optional local terminal
- Up to five comms ports so redundant links are possible



### RPS power supply

- All usual AC and DC inputs
- Single or dual redundant
- Status relays
- High performance, high reliability

### rack assembly

- Standard 19" format, cubicle or panel mounting
- 6U and 3U versions
- VME back plane
- Flexible signal and relay communications
- Easy cable and power management
- Robust construction
- Full EMC compliance

### RLC relay output card

- Additional relays to IOC
- 16 relays with change-over contacts
- Driver inverter logic
- High through power
- Low contact resistance
- Low capacitance

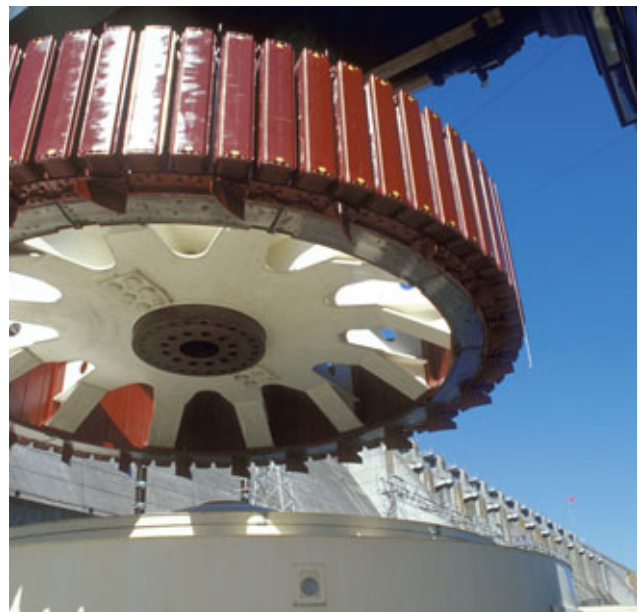
### IOC input/output modules

- IOC 4 for MPC 4 includes four programmable relays
- IOC N for CPU, provides rear access for communication links
- IOC 16 for CMC 16, provides signal conditioning and routing
- Screw terminal connections
- Individual buffered 1:1 outputs on front panel



## VM600 main features and benefits

- Versatile processing cards accept all normal sensors and data inputs, so no need to specify individual input modules. One card fits all
- All monitoring functions (absolute and/or relative vibration, dynamic pressure, displacement, orbit,  $S_{max}$ , position, expansion, etc) available on a single card
- Very flexible communications over Ethernet or serial links using standard protocols
- Accessible over network and modem for remote configuration, interrogation and support
- Optional CPU card for communications
- Local display of levels and status on CPU panel
- Protection functions are totally independent from the CPU, digital lines in the backplane and communication links
- API compliant (with allowance for new technology)
- Flexible relay outputs with comprehensive Boolean voting logic combinations
- Cards are hot-swappable
- Optional dual redundant power supplies and communications links
- One 6U rack accommodates up to 48 protection channels or 192 condition monitoring process inputs, and can be mixed within a rack
- Analogue outputs 0 - 10V or 4 - 20mA DC
- Modular software
- True performance monitoring is offered using refined mathematical modelling for accurate, on-line results
- Financial tools available for machinery running and plant usage optimisation
- One system, one supplier, for all machinery protection and monitoring functions
- Designed, developed and built by Vibro-Meter, with 50 years' experience supplying innovative and reliable instrumentation to the world's best companies





# Vibro-Meter total system capability

## Sensors and signal conditioning

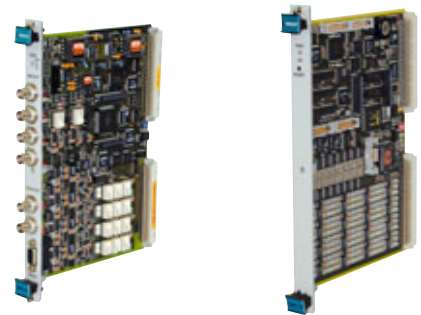
- Full range of industrial piezo-electric accelerometers and dynamic pressure transducers, velocity transducers, proximity probes, speed probes, displacement sensors, air gap sensors, ice detectors. Special expertise in high temperature and harsh environment applications.

## Advice, service and support

- Vibro-Meter offices and representatives are easy to reach worldwide. Staff are trained and qualified to give the best possible advice and support. Comprehensive customer training is available on site or at one of our facilities. An ISDN or modem link enables fast and effective remote support.

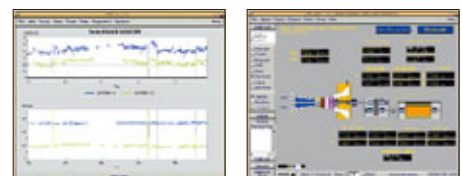
## Protection system

- Fully autonomous protection system for instant detection of machinery problems; accepts inputs from all dynamic and static sensors; one signal processor card for all inputs and all functions; comprehensive relay outputs with voting logic; analogue, DC and digital outputs to other systems.



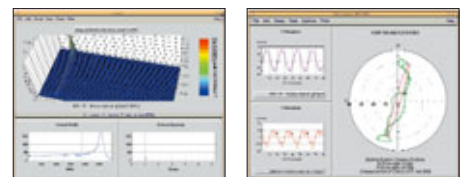
## Condition monitoring

- Intelligent 16 channel data acquisition cards, accepting all dynamic and static inputs and digital inputs via MODBUS® or other standard protocols; data collector interface for off-line acquisition; logging by exception; distributed processing; user-friendly analysis and diagnostic tools; automatic detection and recording of run-up/run-down; multiple site capability; full secure remote access over network, modem or web.



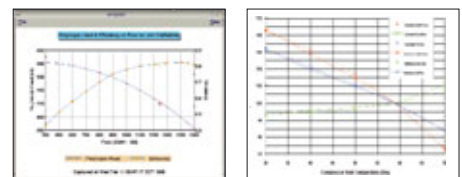
## Basic performance monitoring

- Manual or automatic data entry; simple performance calculations; trending of aero-thermal parameters; limit checking, graphical and tabular outputs.



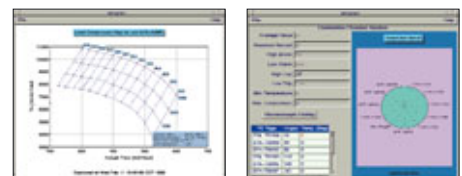
## Advanced performance monitoring

- Automatic data entry; mathematical modelling refined with experience; comparison of actual against expected performance giving a true on-line picture of machinery behaviour and efficiency, providing the best possible information to aid decision-making.



## Maintenance optimisation (cost control)

- Fuel used; emissions; calculation of emission taxes; parts life calculation for hot components; predicted and measured calculation for maintenance actions; plant usage optimisation.



Vibro-Meter, a Meggitt group company, was established in Fribourg, Switzerland in 1952. Since then, it has supplied innovative and reliable instrumentation systems for aerospace, industrial and marine customers worldwide.

The headquarters facility now employs around 400 staff involved in R&D, design, manufacturing, quality, customer support, sales and marketing, finance and administration. Core competences include high temperature sensor technology, signal processing electronics and software for total condition monitoring on land, sea and air.

The industrial and marine division develops and supplies complete machinery monitoring solutions, typically installed on critical turbomachinery in power generation (fossil fuel, nuclear, gas turbine, hydro), petro-chemical, oil and gas, marine propulsion and other industrial applications. Vibro-Meter has extensive experience improving reliability and reducing costs for machinery manufacturers and operators world-wide.

Vibro-Meter is growing to better serve our customers. Recent acquisitions and realignments by Meggitt have added new products, facilities and technologies to our range of capabilities. The former Meggitt Avionics facility at Manchester, New Hampshire USA is now a Vibro-Meter site, making flame detection and monitoring products and fluid debris monitoring systems. In the UK, the former Lodge company is now part of Vibro-Meter, bringing ignition systems for gas turbines and other applications to our industrial product range. Our aim is to offer more complete system solutions, simplifying the supply chain and adding more value.

Vibro-Meter is a Meggitt group company. Headquartered in the UK, Meggitt PLC is an international group of companies operating in North America, Europe and Asia. Known for its specialist extreme environment engineering, Meggitt is a world leader in the aerospace, defence and electronics industries.

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