DATA SHEET

vibro–meter®

VM600^{Mk2}
RLC16^{Mk2}
relay module

RLC16^{Mk2}

$C\,E$

KEY FEATURES AND BENEFITS

- VibroSight® compatible hardware from the vibro-meter® product line

- VM600^{Mk2} (second generation) relay module

- 16 user-configurable relays

- VM600^{Mk2} system safety-line to drive all system relays to a safe state

- Relay monitoring and power supply monitoring with module status output

- Epoxy-sealed relays with changeover contacts (SPDT)

- Compatible with VM600^{Mk2} system racks (ABE04x) and slimline racks (ABE056)

- Live insertion and removal of modules (hot-swappable)

- Software configurable

- Controlled by a VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} module
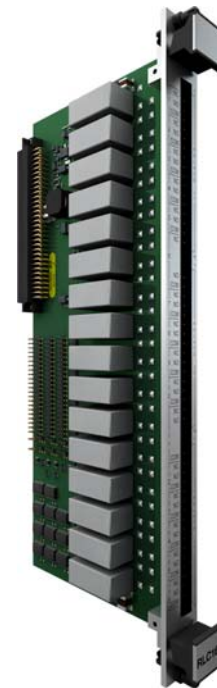
APPLICATIONS

- Additional relays for VM600^{Mk2} systems

- VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} machinery protection

- VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} condition monitoring (available Q3 2021)

- Vibration and/or combustion monitoring

- API 670 applications

03-3662-8100

DESCRIPTION

Introduction

The VM600^{Mk2} RLC16^{Mk2} relay module is designed for operation with the second generation of VM600^{Mk2} rack-based machinery protection system (MPS), from Meggitt's vibro-meter$^®$ product line. The RLC16^{Mk2} is a second generation module that provides 16 additional relays per module in VM600^{Mk2} systems.

VM600^{Mk2} rack-based monitoring systems

The vibro-meter$^®$ VM600^{Mk2} rack-based monitoring system is the evolution of Meggitt's solution for the protection and monitoring of rotating machinery used in the power generation and oil & gas industries. VM600^{Mk2} solutions are recommended when a centralised monitoring system with a medium to large number of measurement points (channels) is required. It is typically used for the monitoring and/or protection of larger machinery such as gas, steam and hydro turbines, and generators, smaller machines such as compressors, fans, motors, pumps and propellers, as well as balance-of-plant (BOP) equipment.

A VM600^{Mk2} system consists of a 19" rack, a rack power supply and one or more monitoring modules. Optionally, relay modules and rack controller and communications interface modules can also be included.

Two types of rack are available: a VM600^{Mk2} system rack (ABE04x, 6U) that can house up to twelve monitoring modules, and a VM600^{Mk2} slimline rack (ABE056, 1U) that can house one monitoring module. The racks are typically mounted in standard 19" rack cabinets or enclosures installed in an equipment room.

Different VM600^{Mk2} monitoring modules are available for machinery protection, condition monitoring and/or combustion monitoring applications. For example, the MPC4^{Mk2} + IOC4^{Mk2} module supports both machinery protection and condition monitoring, the XMV16 + XIO16T module supports extended condition monitoring for vibration and the XMC16 + XIO16T module supports extended condition monitoring for combustion.
Note: For the MPC4^{Mk2} + IOC4^{Mk2} machinery protection and condition monitoring module, the

machinery protection functionality is available by default, while the condition monitoring functionality is optional and depends on the purchased VibroSight$^®$ software license.

The RLC16^{Mk2} relay module is an optional module used to provide additional relays when the four user-configurable relays per MPC4^{Mk2} + IOC4^{Mk2} module are not sufficient for an application.

The CPUM^{Mk2} + IOCN^{Mk2} rack controller and communications interface module is an optional module used to provide additional VM600^{Mk2} system functionality such as fieldbus communications; module data aggregation, processing and sharing; rack and/or fieldbus communications redundancy; front-panel alarm reset (AR); MPS rack (CPUx) security; system event and measurement event logging.

VM600^{Mk2} rack-based monitoring systems complement the VibroSmart$^®$ distributed monitoring systems that are also available from Meggitt's vibro-meter$^®$ product line, and are compatible with the same VibroSight$^®$ machinery monitoring software suite.

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DESCRIPTION *(continued)*

RLC16^{Mk2} module and VM600^{Mk2} racks

The RLC16^{Mk2} relay module is used as part of a VM600^{Mk2} rack-based monitoring system. The RLC16^{Mk2} module can be used in a VM600^{Mk2} system rack (ABE04x) or slimline rack (ABE056) and is always controlled by the associated MPC4^{Mk2} module.

The RLC16^{Mk2} module is a single-width module that occupies a single VM600^{Mk2} rack slot (module position). The RLC16^{Mk2} is installed in the rear of the rack and connects directly to the rack's backplane using two connectors.

Note: The RLC16^{Mk2} module is compatible with all VM600^{Mk2} racks (ABE04x system racks and ABE056 slimline racks) and later VM600 racks.

RLC16^{Mk2} module functionality

The RLC16^{Mk2} module includes sixteen user-configurable relays (RL1 to RL16) that can be used by a VM600^{Mk2} system to remotely indicate system alarm and/or status information.

The relays in a VM600^{Mk2} system (specifically one or more MPC4^{Mk2} + IOC4^{Mk2} modules and any associated RLC16^{Mk2} modules), are driven by control circuitry that supports a VM600^{Mk2} system safety-line, that is, a system-wide control signal that automatically drives all system relays (IOC4^{Mk2} and RLC16^{Mk2}) and analog outputs (IOC4^{Mk2}) to a safe state should a problem be detected. In this way, IOC4^{Mk2} and RLC16^{Mk2} relays configured as normally energised (NE) can always be de-energised in the event of a problem with one of the components of the relay coil control signal.

Note: This supports the "de-energise to trip principle" required in safety-related applications.

System communications

In a VM600^{Mk2} system (one or more MPC4^{Mk2} + IOC4^{Mk2} modules and any associated RLC16^{Mk2} modules), the RLC16^{Mk2} modules are controlled and operated by a MPC4^{Mk2}, as determined by the configuration. The VM600^{Mk2} rack's Open collector (OC) bus and Raw bus are used to exchange control and status information between the MPC4^{Mk2} + IOC4^{Mk2} and RLC16^{Mk2} modules.

Software

A RLC16^{Mk2} module is controlled and operated by the associated MPC4^{Mk2} module, as part of a VM600^{Mk2} system that is software configured using the VibroSight® software.

To prioritise machinery protection functionality and help meet stringent cybersecurity and API 670 requirements, the MPC4^{Mk2} + IOC4^{Mk2} module segregates machinery protection (MPS) and condition monitoring (CMS) functionality by running separate module firmware using separate configurations from different VibroSight configuration software:

• VibroSight Protect supports the configuration and operation of machinery protection system (MPS) functionality for a VM600^{Mk2} system (that is, for MPC4^{Mk2} + IOC4^{Mk2}, RLC16^{Mk2} and CPUM^{Mk2} + IOCN^{Mk2} modules).

• VibroSight Capture supports the configuration and operation of condition monitoring system (CMS) functionality for a VM600^{Mk2} system (that is, for MPC4^{Mk2} + IOC4^{Mk2} modules).

Other VibroSight software modules support operations such as data display and analysis (VibroSight Vision), data logging and post-processing (VibroSight Server) system maintenance (VibroSight System Manager), etc.

More generally for extended condition monitoring system (CMS) applications, the VibroSight software supports the configuration and operation of XMx16 + XIO16T modules for condition monitoring and/or combustion monitoring, including the processing and presentation of measurement data for analysis. VibroSight is also used to configure and manage CPUM^{Mk2} + IOCN^{Mk2} modules.

Note: The VibroSight® software is also from the vibro-meter® product line.

Applications information

As part of a VM600^{Mk2} system, RLC16^{Mk2} relay modules allow additional relay outputs to be easily and efficiently added to machinery monitoring and protection systems in a wide range of industrial applications.

For further information, contact your local Meggitt representative.

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SPECIFICATIONS

Functionality

Relay module	: VM600^{Mk2} relay module with 16 user-configurable SPDT relays
Relay states	: Normally energised (NE) or normally de-energised (NDE). Latched or unlatched. Note: Software configured by the MPC4^{Mk2} module (VM600^{Mk2} system) that the RLC16^{Mk2} module is associated with.
Default relay operation	: Normally energised (NE) during normal operation – characterised by a closed circuit between the COM and NO contacts and an open circuit between the COM and NC contacts. That is, the "de-energise to trip" principle. Normally de-energised (NDE) when activated/driven individually or by the system-wide VM600^{Mk2} system safety-line control signal. Note: Also NDE when not activated/driven by the controlling MPC4^{Mk2} module (VM600^{Mk2} system), for example, during POST, module replacement or when the power supply is off.
Relay control	: Each relay is energised by pulling the relay control signal to ground (GND) and de-energised by releasing its relay coil control signal. The activation of each relay depends on (1) the individual relay control signal (RL1 to RL16), (2) the relay module's power supply status and (3) the system-wide VM600^{Mk2} system safety-line control signal. That is, each relay is controlled by a relay coil control signal which is the logical AND of individual relay control signal, local power supply status and system-wide safety-line control signal. Note: In this way, RLC16^{Mk2} module relays configured as NE can always be de-energised in the event of a problem with one of the components of the relay coil control signal. That is, using the "de-energise to trip principle" required in safety-related applications.
Response time (guaranteed)	: <20 ms (from control signal change to contact changeover)
Relay monitoring	: The RLC16^{Mk2} module monitors the state (coil voltage) of its own local relays for correct operation. That is, it checks that they are consistent with the relay control signals and energised/de-energised as appropriate.
Power supply monitoring	: The RLC16^{Mk2} module monitors its own local power supplies for overvoltage, undervoltage and overcurrent conditions. That is, checks that they are within specification.

Note: For the RLC16^{Mk2} module, the status of the individual relays and power supply monitoring information is combined in a module status information bit that is shared with the controlling MPC4^{Mk2} module (VM600^{Mk2} system).

If the MPC4^{Mk2} module detects a problem in a VM600^{Mk2} system, for example, due to the MPC4^{Mk2} module's diagnostics (BIST) or a RLC16^{Mk2} module's status bit, the MPC4^{Mk2} automatically generates a system-wide VM600^{Mk2} system safety-line control signal that drives all system relays (IOC4^{Mk2} and RLC16^{Mk2}) and analog outputs (IOC4^{Mk2}) to a safe state, that is, all relays in the VM600^{Mk2} system are de-energised.

Reliability	: Integrated relay contact arc-suppression circuitry for improved reliability
Additional VM600 MPS relays	: Up to five RLC16^{Mk2} modules can be controlled by a MPC4^{Mk2} module (VM600^{Mk2} system)

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VM600^{Mk2} module compatibility	: The RLC16^{Mk2} module is compatible with a MPC4^{Mk2} + IOC4^{Mk2} module as part of a VM600^{Mk2} system. The RLC16^{Mk2} module includes benefits and features such as improved relays, VM600^{Mk2} system safety-line functionality and module status monitoring that is not supported by the VM600^{Mk1} RLC16 relay card. Note: In a VM600^{Mk2} system, the MPC4^{Mk2} module automatically configures its relays as normally energized (NE) or normally de-energized (NDE), as per the configuration created using VibroSight Protect, whereas the RLC16 relay card uses jumpers on the card to manually configure the relays as NE or NDE.

System communications

Internal – VM600^{Mk2} rack buses	: Open collector (OC) bus and/or Raw bus to control and monitor RLC16^{Mk2} module relays, and distribute the system-wide safety-line control signal. Raw bus to monitor/share the RLC16^{Mk2} module's status.

Note: Generally, in a VM600^{Mk2} rack (ABE4x), the Raw bus is used to share dynamic input signals between processing modules, the Tacho bus is used to share tachometer (speed) input signals between processing modules, and the Open collector (OC) bus is used by processing modules to drive relay modules, all in the same rack. For example, the Raw bus and the Tacho bus are commonly used to share sensor signals (vibration and speed respectively) between different machinery protection modules and/or condition monitoring modules.

Specifically for a VM600^{Mk2} system in a VM600^{Mk2} rack (ABE4x), the Open collector (OC) bus and/or Raw bus can be used to connect up to 32 outputs from a MPC4^{Mk2} + IOC4^{Mk2} machinery protection and condition monitoring module to RLC16^{Mk2} relay modules in the same rack, if additional relays are required.

Configuration

RLC16^{Mk2} module	: Configured and controlled by the MPC4^{Mk2} module (VM600^{Mk2} system) that the RLC16^{Mk2} module is associated with. Note: Jumpers on the RLC16^{Mk2} module are manually configured to select the VM600^{Mk2} rack's Open collector (OC) bus and/or Raw bus lines that control and monitor the module's relays, and distribute the system-wide VM600^{Mk2} system safety-line control signal. The jumper information is generated by the VibroSight® software.

Relay characteristics

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Number	: 16 × user-configurable relays (RL1 to RL16)
Type	: Single-pole double-throw (SPDT) / 1 Form C, epoxy-sealed or equivalent
Contact arrangement	: 1 × COM, 1 × NC and 1 × NO contact per relay (RL1 to RL16). See **Connectors on page 7**.
Rated load	
• VDE	: 8 A at 250 V$_{AC}$ resistive, 100k cycles
• UL	: 10 A at 250 V$_{AC}$ resistive, 30k cycles. 10 A at 30 V$_{DC}$ resistive, 30k cycles.
Maximum switching power	: 2500 VA / 300 W. Note: If the switching voltage is >30 V$_{DC}$, then special precautions must be taken. Contact Meggitt SA for more information.

SPECIFICATIONS *(continued)*

Maximum switching voltage : 240 V_{AC} / 125 V_{DC}
Maximum switching current : 10 A
Safety approved contact rating : 10 A at 240 V_{AC}.
  10 A at 30 V_{DC}.

Maximum switching capacity curves :
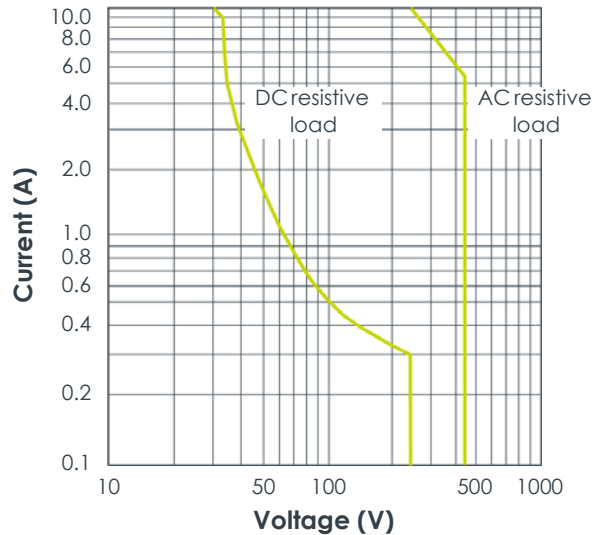
Operate / release time : 7 / 3 ms typ.
Dielectric strength
• Between open contacts : 1000 $V_{AC\ (RMS)}$
• Between contact and coil : 5000 $V_{AC\ (RMS)}$
Insulation resistance : 1000 MΩ min. (at 500 V_{DC}, 50% relative humidity (RH))
Mechanical life : >1 × 10^7 operations
Electrical life : >1 × 10^5 operations (at 8 A, 250 V_{AC})

Note: In general, RLC16^{Mk2} module relays are limited to 240 V_{AC} max. in accordance with the EN 61010 electrical safety standard.

⚠ **When used in a VM600^{Mk2} slimline rack (ABE056) with a DC power supply, the relay contacts on a RLC16^{Mk2} module have a maximum switching voltage of 70 V_{DC} / 33 $V_{AC\ (RMS)}$ (46.7 $V_{AC\ (PEAK)}$).**

Environmental

Temperature
• Operating : −20 to 65°C (−4 to 149°F)
• Storage : −40 to 85°C (−40 to 185°F)
Humidity : 0 to 95% relative humidity (RH), non-condensing
Altitude : 2000 m (6560 ft) max.
  Note: Reduced air density affects cooling ability.

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Approvals

Conformity	: European Union (EU) declaration of conformity (CE marking)
Electromagnetic compatibility	: EN 61000-6-2:2005. EN 61000-6-4:2007 + A1:2011.
Electrical safety	: EN 61010-1:2010. CAN/CSA-C22.2 No. 61010-1.
Environmental management	: RoHS compliant (2011/65/EU)
Insulation coordination for measuring relays and protection equipment	: Separate circuits according to IEC 60255-27

Note: Some certifications and approvals for the VM600^{Mk2} RLC16^{Mk2} module are pending.

Power supply to module (input)

Power source	: VM600^{Mk2} rack power supply
Supply voltages	: 5 V$_{DC}$
Total power consumption (RLC16^{Mk2} module)	: < 4 W

Connectors

J1	: 16-pin connector (male), compatible with 16-pin MC/STF plug-in connectors (female) with screw-terminal connections. Outputs (contacts) for relays RL1 to RL6.
J2	: 16-pin connector (male), compatible with 16-pin MC/STF plug-in connectors (female) with screw-terminal connections. Outputs (contacts) for relays RL6 to RL11.
J3	: 16-pin connector (male), compatible with 16-pin MC/STF plug-in connectors (female) with screw-terminal connections. Outputs (contacts) for relays RL11 to RL16.

Notes
The connectors are removable to simplify installation and mounting.
There is 1 × COM, 1 × NC and 1 × NO contact available per user-configurable relay (RL1 to RL16).

Physical

Height	: 6U (262 mm, 10.3 in)
Width	: 20 mm (0.8 in)
Depth	: 125 mm (4.9 in)
Weight	: 0.32 kg (0.71 lb) approx.

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ORDERING INFORMATION

To order please specify

Type	Designation	Ordering number (PNR)
RLC16^{Mk2}	Different versions of the VM600^{Mk2} RLC16^{Mk2} relay module:	
	– Standard version	600-045

The RLC16^{Mk2} ordering number PNR 600-045 corresponds to the underlying module version 620-026-100-1Hh, where "Hh" represents the hardware versions ("H" increments are for major modifications that can affect product interchangeability, "h" increments are for minor modifications that have no effect on interchangeability).

Notes

Conformal coating

Versions of the VM600^{Mk2} RLC16^{Mk2} relay module are available with an optional conformal coating ("varnish") applied to the circuitry of the modules in order to provide additional environmental protection against chemicals, dust, moisture and temperature extremes. Contact Meggitt SA for further information.

RELATED PRODUCTS

ABE04x	VM600^{Mk2}/VM600 system racks	: Refer to corresponding data sheet
ABE056	VM600^{Mk2}/VM600 slimline rack	: Refer to corresponding data sheet
CPUM^{Mk2} + IOCN^{Mk2}	VM600^{Mk2} rack controller and communications interface module	: Refer to corresponding data sheet
MPC4^{Mk2} + IOC4^{Mk2}	VM600^{Mk2} machinery protection and condition monitoring module	: Refer to corresponding data sheet
XMx16 + XIO16T	VM600^{Mk2}/VM600 condition monitoring modules	: Refer to corresponding data sheet
VibroSight	VibroSight$^{®}$ machinery monitoring system software	: Refer to corresponding data sheet

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The Energy & Equipment division includes the Energy Sensing and Controls product group that specialises in sensing and monitoring solutions for a broad range of energy infrastructure, and control valves for industrial gas turbines, primarily for the Power Generation, Oil & Gas and Services markets. Energy & Equipment is headquartered in Switzerland (Meggitt SA) and incorporates the vibro-meter® product line, which has over 65 years of sensor and systems expertise and is trusted by original equipment manufacturers (OEMs) globally.

Sales offices

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