DATA SHEET

vibro-meter®

VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring modules

AMC10^{Mk2}

CE

IOC10^{Mk2}

KEY FEATURES AND BENEFITS

- VibroSight® compatible hardware from the vibro-meter® product line
- VM600^{Mk2} (second generation) temperature and analog monitoring modules
- 10 measurement channels configurable as temperature or analog inputs
- Compatible with thermocouples, resistance temperature detectors, and other/custom sensors (DC current)
- Cold-junction compensation (CJC) for thermocouples – either internal or external (requiring one measurement channel)
- Diagnostics (built-in self-test (BIST)) provides continuous feedback on the health of the module
- Individually configurable inputs, processing and outputs – with simultaneous data acquisition
- 1 processed output per channel
- Multiple alarms per processed output with configurable limits, hysteresis and time delay
- AND, OR and majority voting logic functions for the combination of alarm and status information
- Discrete outputs: 2 × relays for use by alarms
- Analog outputs: 10 × 4 to 20 mA signals used to provide quasi-static measurements

KEY BENEFITS AND FEATURES *(cont'd)*

- Conforms to API 670
- Direct system Ethernet communications
- Compatible with VM600^{Mk2} system racks (ABE04x) and slimline racks (ABE056)
- Software configurable
- Live insertion and removal of modules (hot-swapping) with automatic reconfiguration
- Front-panel status indicators (LEDs)

APPLICATIONS

- VM600^{Mk2} machinery protection (MPS) and/or condition monitoring (CMS)
- Vibration and/or combustion monitoring
- API 670 applications

DESCRIPTION

Introduction

The VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring modules are designed for operation with the second generation of VM600^{Mk2} rack-based machinery monitoring system, from Parker Meggitt's vibro-meter® product line. A VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} module consists of a processing module and an input/output module that together provide 10 measurement channels of machinery protection and condition monitoring 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 energy industry. 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} modules (available in standard and SIL versions) support both machinery protection and condition monitoring, the XMV16 + XIO16T module supports extended condition monitoring for vibration applications and the XMC16 + XIO16T module supports extended condition monitoring for combustion applications.

In VM600^{Mk2} systems, the AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring module adds machinery protection and condition monitoring support for applications with large numbers of slowly-varying (quasi-static) analog signals, such as temperature and other process variables.

Note: For VM600^{Mk2} MPC4^{Mk2} + IOC4^{Mk2} modules, machinery protection functionality is available by default and condition monitoring functionality is optional. For VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} modules, both machinery protection and condition monitoring functionality are available by default. It is important to note that condition monitoring functionality also depends on the purchased VibroSight® software license.

The RLC16^{Mk2} relay modules (standard and SIL versions) are optional modules used to provide additional relays when the four user-configurable relays per MPC4^{Mk2} + IOC4^{Mk2} module and/or the two user-configurable relays per

DESCRIPTION (*continued*)

AMC10^{Mk2} + IOC10^{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 Parker Meggitt's vibro-meter® product line, and are compatible with the same VibroSight® machinery monitoring software suite.

AMC10^{Mk2} + IOC10^{Mk2} modules and VM600^{Mk2} racks

AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring modules are used as part of a VM600^{Mk2} rack-based monitoring system.

A AMC10^{Mk2} module is always used with an associated IOC10^{Mk2} module as a pair/set of modules and can be used in a VM600^{Mk2} system rack (ABE04x) or a slimline rack (ABE056).

Both the AMC10^{Mk2} and the IOC10^{Mk2} are single-width modules that occupy a single VM600^{Mk2} rack slot (module position). The AMC10^{Mk2} is installed in the front of a VM600^{Mk2} rack and the associated IOC10^{Mk2} is installed in the rear of the rack, in the slot directly behind the AMC10^{Mk2}. Each module connects directly to the rack's backplane using two connectors.

Note: The AMC10^{Mk2} + IOC10^{Mk2} modules are compatible with all VM600^{Mk2} racks (ABE04x system racks and ABE056 slimline racks) and later VM600 racks.

System communications

In a VM600^{Mk2} system (that is, one or more MPC4^{Mk2} + IOC4^{Mk2} modules and any associated RLC16^{Mk2} modules, AMC10^{Mk2} + IOC10^{Mk2} modules, and a optional CPUM^{Mk2} + IOCN^{Mk2} module), the main communications interface is via Ethernet LAN connectors on the front panels of the modules (MPC4^{Mk2} or IOC4^{Mk2}, AMC10^{Mk2} + IOC10^{Mk2,} and IOCN^{Mk2}), which are used for communication with the VibroSight® software running on an external computer.

In a VM600^{Mk2} rack (ABE4x), the VME bus can be used to share information between modules in the rack. For example, a MPC4^{Mk2} or AMC10^{Mk2} module can provide information such as measurement, alarm and/or status data to a CPUM^{Mk2} + IOCN^{Mk2} module which can then share the information via one of its industry standard fieldbuses.

In a VM600^{Mk2} system, RLC16^{Mk2} modules are controlled and operated by a associated MPC4^{Mk2} or AMC10^{Mk2} module, as determined by the system's 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} or AMC10^{Mk2} and RLC16^{Mk2} modules, as required.

Relays

The AMC10^{Mk2} + IOC10^{Mk2} module includes two user-configurable relays (RL1 and RL2) which can be used by a VM600^{Mk2} system to remotely indicate system alarm and/or status information.

In general, VM600^{Mk2} system relays can be configured as normally energized (NE) or normally de-energized (NDE), and latched or not latched, as required by an application.

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

However, AMC10^{Mk2} relays are under the direct control of the module itself (that is, the VM600^{Mk2} system safety-line is not supported by the AMC10^{Mk2} module).

Note: This helps support the "de-energize to trip principle" required in safety-related applications.

DESCRIPTION (*continued*)

Software

The VibroSight® software supports the configuration and operation of VM600^{Mk2} modules, including the storage, display and/or further processing of AMC10^{Mk2} data for analysis. For example, measurements can be logged to a VibroSight Server data repository and/or displayed in the VibroSight Vision software.

More specifically, AMC10^{Mk2} + IOC10^{Mk2} modules are configured using the VibroSight® software. To prioritise machinery protection functionality and help meet stringent cybersecurity and API 670 requirements, the AMC10^{Mk2} + IOC10^{Mk2} module segregates machinery protection (MPS) and condition monitoring (CMS) functionality by 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 (including AMC10^{Mk2} + IOC10^{Mk2} modules).
- VibroSight Capture supports the configuration and operation of condition monitoring system (CMS) functionality for a VM600^{Mk2} system (including AMC10^{Mk2} + IOC10^{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.

The VibroSight Vision plot catalogue includes static plots such as Bar chart, Spider, Table, Trend, Bode, Polar, Correlation and Shaft Centerline, and dynamic plots such as Waveform, Long Waveform, Polar Waveform, Orbit, Corbit, Spectrum and Full Spectrum, Waterfall/Cascade, and Full Waterfall/Cascade.

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.

Refer to the *VibroSight® machinery monitoring system software data sheet* for further information.

VibroSight® / VM600^{Mk2} AMC10^{Mk2} and condition monitoring licensing

In VibroSight® / VM600^{Mk2} AMC10^{Mk2} systems, the AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring module can provide machinery protection system (MPS) functionality and/or condition monitoring system (CMS) functionality, depending on the requirements of the application.

For the VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} module, both machinery protection and condition monitoring functionality are available by default for all versions of the module. Accordingly, AMC10^{Mk2} condition monitoring can be used by any version of the module. (This is because all AMC10^{Mk2} modules have condition monitoring enabled, that is, they are supplied with a CMS license pre-installed.)

Note: AMC10^{Mk2} condition monitoring also requires a VibroSight® software edition / license that supports condition monitoring.

For example, a VibroSight / VM600^{Mk2} AMC10^{Mk2} system consisting of AMC10^{Mk2} + IOC10^{Mk2} modules can initially be installed and used as a MPS only. Then, CMS functionality can be quickly and easily added at any time by upgrading the license for the VibroSight software, as required.

Different versions of the AMC10^{Mk2} + IOC10^{Mk2} module

The AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring module is available in different versions, as follows:

- AMC10^{Mk2} + IOC10^{Mk2} – this is the standard version of the module, suitable for most applications.

The AMC10^{Mk2} + IOC10^{Mk2} (standard) is the original version of the module and supports all features and processing functions.

In addition, some versions of VM600^{Mk2} modules are also available with a conformal coating in order to provide additional environmental protection.

DESCRIPTION (*continued*)

Applications information

As part of a VibroSight® / VM600^{Mk2} system solution, AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring modules are ideal for the protection and/or condition monitoring of critical assets such as gas, steam or hydro turbines and other high-value rotating machines in a wide range of industrial applications.

For further information, contact your local Parker Meggitt representative.

SPECIFICATIONS

Supported sensors

Thermocouple (TC) : Compatible TC types and temperature ranges:
- Type E (NiCr-CuNi): −270 to 1000°C (−454 to 1832°F).
- Type J (Fe-CuNi): −210 to 760°C (−346 to 1400°F), API 670 standard.
- Type K (NiCr-NiAl): −270 to 1372°C (−454 to 2501°F).
- Type T (Cu-CuNi): −270 to 400°C (−454 to +752°F).
- User-defined (user entry of linearizing polynomial functions).

Accuracy: 0.3°C (0.54°F) or 0.3% of measurement range.
Resolution: 0.1°C (0.18°F).

Resistance temperature detector (RTD) : Compatible RTD types and temperature ranges:
- Pt100, 100 Ω at 0°C (32°F), 3-wire and 4-wire platinum RTD (alpha = 0.00385): −200 to 850°C (−328 to 1562°F), API 670 standard.
- Pt100, 100 Ω at 0°C (32°F), 3-wire and 4-wire platinum RTD (alpha = 0.00392): −200 to 700°C (−392 to 1292°F).
- Ni, 120 Ω, 3-wire and 4-wire nickel RTD: −80 to 260°C (−112 to 500°F).
- Cu10, 10 Ω at 25°C (77°F), 3-wire and 4-wire copper RTD: −100 to 260°C (−148 to 500°F).
- User-defined (user entry of linearizing polynomial functions).

Accuracy: 0.3°C (0.54°F) or 0.3% of measurement range, except for Cu10 which is 1°C (1.8°F) or 1% of measurement range.
Resolution: 0.1°C (0.18°F).
Accepted RTD wiring schemes: 2-, 3- and 4-wire for any RTD type.

Analog inputs : Compatible analog / process inputs (DC current):
- Total range: 0 to 25 mA.
- Measurement resistor: 50 Ω.
- Positive input polarity only.
- Protection: Over-current protection (50 mA self-resetting fuse).
  Note: The resistance (sum of measurement resistor and fuse) seen from the input is 100 Ω max., 55 Ω typ.

Accuracy: 0.5% of total range, that is, 125 µA.

Cold-junction compensation (CJC) : Compatible CJC:
- Internal / external compensation (that is, CJC temperature sensor does / does not exist on AMC10^{Mk2} module).
- Internal compensation uses a dedicated Pt1000 temperature sensor / external compensation can use any type of temperature sensor.

Note: External CJC requires that one of the module's ten measurement channels is allocated to a CJC temperature sensor (external).

Note: When a AMC10^{Mk2} + IOC10^{Mk2} module's measurement channel is configured for operation with thermocouple (TC) type sensors, the sensor / channel input does not support line-fault detection of conditions such as an open-circuit.

Measurement inputs

Number of channels : 10 (independent channels)

Inputs (DC current)
- Measurement range : 0 to 25 mA.
  Note: Positive input polarity only.
- Input impedance : 200 Ω ±0.2%
- Measurement accuracy (amplitude) : 0.5% of total range (that is, 125 µA)

Frequency bandwidth : DC to 10 Hz

SPECIFICATIONS *(continued)*

Sensor / measurement chain OK check

Number of levels	: Up to 2 configurable threshold levels (2 DC regions)
OK level range	
• Thermocouple (TC)	: −1.25 to 1.25 V_{DC}
• Resistance temperature detector (RTD)	: 2 to 4000 Ω
• Analog inputs	: 0 to 25 mA. Note: Positive input polarity only.
Operating principle	
• Powered sensors	: Line-fault detection of conditions such as open-circuit or short-circuit
• Unpowered sensors	: Line-fault detection of conditions such as open-circuit

Digital signal processing

Analogue to digital converter (ADC)	: 24 bit
Dynamic range	: ⩾80 dB
Data acquisition	: Fixed frequency
Extracted data (measurements)	: 1 processed output per channel/processing function. See **Processing functions on page 8**.
Extracted data type (measurements)	: Scalar (time-domain measurement)
Measurement types	: DC measurement
Update rate – internal (AMC10^{Mk2} module)	: 20 ms min (time-domain processing). Note: AMC10^{Mk2} + IOC10^{Mk2} measurements, alarms and relays are updated every 20 ms.
Update rate – external (VibroSight Capture condition monitoring data update rate)	: Configurable as 100 ms, 200 ms, 500 ms, 1 s, 2 s or 5 s. Note: 1 s is the default VibroSight Capture condition monitoring update rate.
Update rate – external (VibroSight Capture condition monitoring data logging rule rate)	: Configurable between 100 ms and 99 days
Update rate – external (VibroSight Vision live data display interval)	: Configurable as 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 50 s, …

Machinery protection system (MPS) functionality / processing

Configuration	: Machinery protection configuration stored on the module (IOC10^{Mk2})
MPS functionality / licensing	: Machinery protection (MPS) functionality is available by default

Condition monitoring system (CMS) functionality / processing

Configuration	: Condition monitoring configuration stored on the associated VibroSight Server
CMS functionality / licensing	: Condition monitoring (CMS) functionality is available by default. Note: AMC10^{Mk2} condition monitoring also requires a VibroSight® software edition / license that supports condition monitoring. See Ordering information on page 17 for further information.

Note: For condition monitoring, the update rates are user-configurable.

SPECIFICATIONS *(continued)*

Processing functions

The following configurable signal processing blocks and measurements are supported by the AMC10^{Mk2} + IOC10^{Mk2} module:

Single-channel processing

Temperature:

- Measurement channel – with temperature sensor (TC or RTD)
- 1 quasi-static measurement (temperature).

Position:

- Measurement channel – with position sensor (for example, TQ9xx-based proximity measurement chain)
- 1 quasi-static measurement (position / DC gap).

Custom quasi-static:

- Measurement channel – with other/custom sensor
- 1 quasi-static measurement.

Multi-channel processing

Delta temperature:

- Measurement channels – with temperature sensors (TC or RTD)
- 1 quasi-static measurement (differential temperature (mathematical subtraction)).

Delta position:

- Measurement channels – with position sensors (for example, TQ9xx-based proximity measurement chains)
- 1 quasi-static measurement (differential position / DC gap (mathematical subtraction)).

Delta custom quasi-static:

- Measurement channels – with other/custom sensors
- 1 quasi-static measurement (differential (mathematical subtraction)).

Mathematical function:

- Measurement channels – any sensors
- 1 mathematically calculated measurement (Addition, Subtraction, Average, Minimum or Maximum).

Notes
In general, the AMC10^{Mk2} + IOC10^{Mk2} module supports one processing block (measurement) per input channel.
A maximum of 10 single-channel and 5 multi-channel processing blocks can be configured per module.
For each processing block, there is 1 processed output (data extraction). In addition, the average, minimum and maximum values over a defined period of time are also available.
Multi-channel processing can operate either on two channels in order to calculate/provide deltas (differences) or on two to ten channels in order to calculate/provide mathematical functions such as averages, minimums and maximums.
In general, multi-channel processing requires that channels are configured similarly in order for the results to make sense, for example, temperature measurements versus position measurements.

SPECIFICATIONS *(continued)*

Alarm processing

Alarms	:	Alarm with configurable limits (severity levels), hysteresis and time delay per processed output (data extraction)
Time delay	:	Up to 60 s in steps of 100 ms
Hysteresis	:	Up to 20% of the alarm level (physical quantity)
Severity levels		
• Machinery protection applications	:	Out of range+, Danger+, Alert+, Normal, Alert–, Danger–, Out of range–
• Basic condition monitoring applications	:	Out of range+, Danger+, Alert+, Information+, Normal, Information–, Alert–, Danger–, Out of range–

Alarm combination

Logic functions	:	AND, OR and majority voting logic (1oo2, 2oo2 and 2oo3), with optional inversion of individual inputs
Level 1 (basic) logic functions		
• Number	:	32
• Number of inputs per logic function	:	32
• Configurable inputs	:	Sensor OK checks, measurement alarms (such as Danger+, Alert+, Alert– and Danger–) and/or associated data quality indicators (status bits)
Level 2 (advanced) logic functions		
• Number	:	32
• Number of inputs per logic function	:	32
• Configurable inputs	:	Outputs from level 1 (basic) logic functions. Note: Level 1 (basic) and level 2 (advanced) logic functions can be combined to generate more complex logic function.
Alarm update rate (internal)	:	100 ms max. Note: This is the time required for the AMC10^{Mk2} + IOC10^{Mk2} module to detect and initiate an alarm, including output relay (RL1 and RL2) activation.

Discrete signal interface (DSI) inputs

Control signal		
• Alarm bypass (AB)	:	A closed contact between the DSI AB and RET inputs inhibits the activation of alarms and relays on the AMC10^{Mk2} + IOC10^{Mk2} module
• Alarm reset (AR)	:	A closed contact between the DSI AR and RET inputs resets (clears) the alarms and relays latched by the AMC10^{Mk2} + IOC10^{Mk2} module
Operating principle	:	Detection of an open circuit or a closed circuit on the input

SPECIFICATIONS *(continued)*

Analog outputs

Number of outputs : 10 × 4 to 20 mA signals used to provide quasi-static measurements. That is, one per measurement channel (individually configurable).

Current outputs

- Range : 4 to 20 mA (nominal).
  Two modes of operation are supported, as follows:
  - Mode 1, measured value with quality checks – the analog output is driven in the 4 to 20 mA signal range during normal operation, and the analog output is driven to 2 mA to indicate a problem.
  - Mode 2, measured value without quality checks – the analog output is driven in the 2 to 23 mA signal range.

  Note: Current outputs are 0 mA ± 0.5 mA when disabled.
- Resolution : 10 µA
- Accuracy : ⩽1 % of full scale
- Admissible load on output : ⩽360 Ω.
  Note: Compliance voltage is 24 V min.

Update rate / frequency bandwidth : 100 ms / 10 Hz max.

Short-circuit protection : Yes

Discrete outputs

Relays

- Number : 2 × relays (RL1 and RL2) used to provide alarm and/or status outputs.
  See **Relay characteristics on page 12**.
- Configurable functions : Normally energized (NE) or normally de-energized (NDE).
  Latched or unlatched.
- Configurable inputs : From the sensor OK checks, the measurement alarms (Danger+, Alert+, Alert−, Danger−) and/or the logic functions of the AMC10^{Mk2} module

Communication interfaces

External (Ethernet)

- Number : 1 port / 2 connectors.
  Available on LAN connector of AMC10^{Mk2} or IOC10^{Mk2}.
  See **Connectors on page 15**.

  In practise, either the Ethernet LAN connector on the AMC10^{Mk2} module or on the associated IOC10^{Mk2} module can be used but it is not possible to connect/use both Ethernet connectors at the same time. This means that Ethernet connections can be made either via the front of the VM600^{Mk2}/VM600 rack (using AMC10^{Mk2}) or via the rear of the rack (using IOC10^{Mk2}), on a module by module basis, as required.

  Note: Current default factory settings are Ethernet enabled via the IOC10^{Mk2} (and disabled on the AMC10^{Mk2}).
- Network interface : 10/100BASE-TX
- Data transfer rate : Up to 100 Mbps
- Maximum distances : System Ethernet communications can support distances up to 100 m at 100 Mbps, depending on Ethernet cabling.
  For distances greater than the specified maximum, the Ethernet interface operates at reduced data transfer rates.
- Protocols : TCP/IP (proprietary protocols) for communication with a computer running software such as VibroSight®

SPECIFICATIONS *(continued)*

Internal (VME)

- Bus interface : A24/D16 slave mode

Note: In a VM600^{Mk2} rack (ABE4x), the VME bus can be used to share information between modules in the rack. For example, AMC10^{Mk2} + IOC10^{Mk2} modules can provide information such as measurement, alarm and status data to a CPUM^{Mk2} + IOCN^{Mk2} rack controller module which can then share the information via one of its industry standard fieldbuses. While in the opposite direction, a CPUM^{Mk2} + IOCN^{Mk2} rack controller module can issue alarm bypass (AB) and alarm reset (AR) commands to AMC10^{Mk2} + IOC10^{Mk2} modules in the rack (when modules are Unlocked (maintenance state)).

VM600^{Mk2} module compatibility : In general, standard versions of VM600^{Mk2} modules should be used with other standard VM600^{Mk2} modules (while VM600^{Mk2} SIL modules should be used with other VM600^{Mk2} SIL modules).

For reference, AMC10^{Mk2} + IOC10^{Mk2} modules include benefits and features such as improved channel count, measurement capability, and module diagnostics (BIST) that are not supported by the VM600^{Mk1} AMC8/IOC8T card pair.

Note: In a VM600^{Mk2} system, AMC10^{Mk2} modules automatically configures their relays as normally energized (NE) or normally de-energized (NDE), as per the configuration created using VibroSight Protect, whereas VM600^{Mk1} RLC16 relay cards use jumpers on the card to manually configure the relays as NE or NDE.

System communications

External : System communication interface (Ethernet) for communication with VibroSight® software running on an external computer

Internal – VM600^{Mk2} VME : VME bus interface for communication with controlling/processing modules via rack backplane. For example, with a CPUM^{Mk2} + IOCN^{Mk2} rack controller module.

Internal – VM600^{Mk2} rack buses : Open collector (OC) bus and/or Raw bus to share RLC16^{Mk2} module relays

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 AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring module to RLC16^{Mk2} relay modules in the same rack, if additional relays are required.

External communication links/connections

- Connection to a computer/network : The system communication interface (Ethernet LAN connector on the AMC10^{Mk2} module or on the associated IOC10^{Mk2} module) can be used for connections/communications between a AMC10^{Mk2} + IOC10^{Mk2} module and a computer/network, using standard Ethernet cabling. See **Communication interfaces on page 10** and **Connectors on page 15**.
- VibroSight® software : Used for the configuration of a VM600^{Mk2} system (including AMC10^{Mk2} + IOC10^{Mk2} modules)

SPECIFICATIONS *(continued)*

Configuration

AMC10^{Mk2} + IOC10^{Mk2} module : Software configurable via/over Ethernet, using a computer running the VibroSight® software.

VibroSight Protect is used for the configuration and operation of machinery protection system (MPS) functionality for VM600^{Mk2} systems (including AMC10^{Mk2} + IOC10^{Mk2} modules).
VibroSight Capture is used for the configuration and operation of condition monitoring system (CMS) functionality for VM600^{Mk2} systems (including AMC10^{Mk2} + IOC10^{Mk2} modules).
Refer to the *VibroSight® machinery monitoring system software data sheet* for further information.

The IOC10^{Mk2} includes non-volatile memory that stores a copy of the configuration for the AMC10^{Mk2} + IOC10^{Mk2} module, such that if the AMC10^{Mk2} is replaced (hot-swapped), it is automatically reconfigured using the configuration from the IOC10^{Mk2}.
Jumpers on the IOC10^{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. The jumper information is generated by the VibroSight® software.

Relay characteristics

Number : 2 × user-configurable relays (RL1 and RL2)

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.
See **Connectors on page 15**.

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 Parker Meggitt (Meggitt SA) for more information.

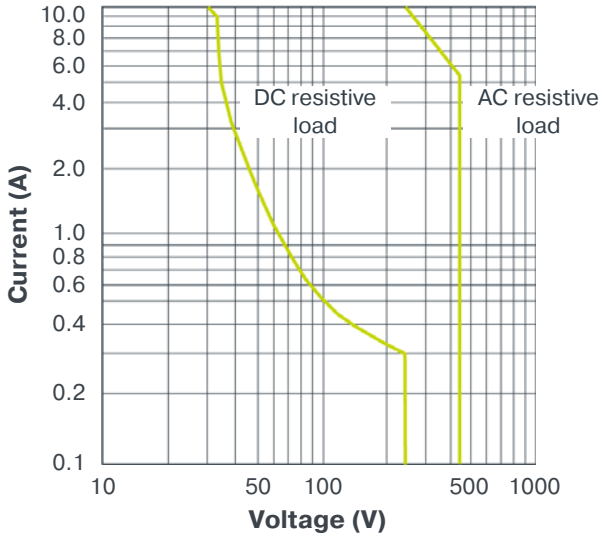
Maximum switching voltage : 240 V_{AC} / 125 V_{DC}

Maximum switching current : 10 A

Safety approved contact rating : 10 A at 240 V_{AC}.
10 A at 30 V_{DC}.

SPECIFICATIONS *(continued)*

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	: $>1 \times 10^7$ operations
Electrical life	: $>1 \times 10^5$ operations (at 8 A, 250 V_{AC})

Note: In general, AMC10^{Mk2} + IOC10^{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 IOC10^{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	
• Operating and storage	: 0 to 95% relative humidity (RH), non-condensing
Altitude	: 2000 m (6560 ft) max.

SPECIFICATIONS *(continued)*

Approvals

Conformity	: European Union (EU) declaration of conformity (CE marking)
Electromagnetic compatibility (EMC)	: EMC compliant (2014/30/EU): 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 versions of modules according to IEC 60255-27

Note: Some certifications are Pending!

Power supply to module (input)

Power source	: VM600^{Mk2} rack power supply
Supply voltages	: +5 V_{DC} and ± 12 V_{DC}
Consumption	
• AMC10^{Mk2}	: < 6 W
• IOC10^{Mk2}	: < 9 W
Total power consumption (AMC10^{Mk2} + IOC10^{Mk2} module)	: < 15 W

Control inputs

AMC10^{Mk2}

• 1	: Reserved
• 2	: The 2 push-button (right) is used to lock/unlock the AMC10^{Mk2} + IOC10^{Mk2} module, that is, to switch between the states of a VM600^{Mk2} system (AMC10^{Mk2} + IOC10^{Mk2} modules and any associated RLC16^{Mk2} modules), as follows: • Locked (safety/secure state) – the VM600^{Mk2} system performs its monitoring and protection functions while ensuring the security of the modules/system and it's configuration. More specifically, the configuration cannot be changed and maintenance activities cannot be performed. • Unlocked (maintenance state) – the VM600^{Mk2} system performs its monitoring and protection functions without ensuring the security of the modules/system and it's configuration. More specifically, the configuration can be changed and maintenance activities can be performed. Note: Physical access to a VM600^{Mk2} system (specifically, the AMC10^{Mk2} module) is required in order to change the state (operating mode) and therefore to be able to change the machinery protection (MPS) functionality for a VM600^{Mk2} system.
• REBOOT	: Simultaneously pushing the 1 and 2 push-buttons (left and right) is used to reset the AMC10^{Mk2} + IOC10^{Mk2} module, resulting in a reboot and power-on self-test (POST)

IOC10^{Mk2}

• DSI signals	: See **Discrete signal interface (DSI) inputs on page 9**

SPECIFICATIONS *(continued)*

Status indicators (LEDs)

AMC10^{Mk2}

- DIAG/STATUS : Multicolour LED used to indicate the status of the AMC10^{Mk2} + IOC10^{Mk2} module, such as normal operation, configuration status or internal hardware or firmware failures
- CH1 to CH10 : Multicolour LEDs used to indicate the status of the measurement channels (CH1 to CH10)
- LOCK : LED used to indicate the state of the AMC10^{Mk2} + IOC10^{Mk2} module (VM600^{Mk2} system): Locked (safety/secure state) or Unlocked (maintenance state)
- LAN : LAN connector link and activity LEDs to indicate the status of the system LAN (Ethernet) communications

IOC10^{Mk2}

- LAN : LAN connector link and activity LEDs to indicate the status of the system LAN (Ethernet) communications

Connectors

AMC10^{Mk2}

- LAN : 8P8C (RJ45) modular jack, female.

  System Ethernet for communication between the AMC10^{Mk2} + IOC10^{Mk2} module and a computer running the VibroSight® software.

IOC10^{Mk2}

- J1 : 20-pin S2L connector (male), compatible with 20-pin B2CF plug-in connectors (female) with PUSH IN spring connections and B2L plug-in connectors (female) with tension clamp spring connections.

  Inputs (analog signals) for the measurement channels (CH1 to CH4).
- J2 : 20-pin S2L connector (male), compatible with 20-pin B2CF plug-in connectors (female) with PUSH IN spring connections and B2L plug-in connectors (female) with tension clamp spring connections.

  Inputs (analog signals) for the measurement channels (CH5 to CH8).
- J3 : 36-pin S2L connector (male), compatible with 36-pin B2CF plug-in connectors (female) with PUSH IN spring connections and B2L plug-in connectors (female) with tension clamp spring connections.

  Inputs (analog signals) for the measurement channels (CH9 to CH10).
  Inputs and ground reference (digital signals) for the DSI control signals (AB and AR).
  Outputs (analog signals) for the analog outputs, corresponding to the measurement channels (CH1 to CH10).
- J4 : 6-pin connector (male), compatible with 6-pin MC/STF plug-in connectors (female) with screw-terminal connections.

  Outputs (contacts) for the user-configurable relays (RL1 and RL2).
- LAN : 8P8C (RJ45) modular jack, female.

  System Ethernet for communication between the AMC10^{Mk2} + IOC10^{Mk2} module and a computer running the VibroSight® software.

SPECIFICATIONS *(continued)*

Notes

The IOC10^{Mk2} module's connectors are removable to simplify installation and mounting.

For the J1 to J3 connectors:

- Clamping range (min. to max.): 0.2 to 1 mm^2 (28 to 18 AWG)
- Tightening torque (min. to max.): 0.15 to 0.2 N•m (0.11 to 0.15 lb-ft).

For the J4 connector:

- Clamping range (min. to max.): 0.14 to 1.5 mm^2 (28 to 16 AWG).
- Tightening torques (min. to max.): 0.2 to 0.25 N•m (0.15 to 0.18 lb-ft) for conductor screws,
  0.2 to 0.3 N•m (0.15 to 0.22 lb-ft) for mounting-flange screws.

The J4 connector provides 1 × COM, 1 × NC and 1 × NO contact per user-configurable relay (RL1 and RL2).

Either the LAN on the AMC10^{Mk2} or on the IOC10^{Mk2} can be used (see **Communication interfaces on page 10**).

Physical

AMC10^{Mk2}

- Height : 6U (262 mm, 10.3 in)
- Width : 20 mm (0.8 in)
- Depth : 187 mm (7.4 in)
- Weight : 0.42 kg (0.93 lb) approx.

IOC10^{Mk2}

- Height : 6U (262 mm, 10.3 in)
- Width : 20 mm (0.8 in)
- Depth : 125 mm (4.9 in)
- Weight : 0.31 kg (0.68 lb) approx.

ORDERING INFORMATION

To order please specify

Type	Designation	Ordering number (PNR)
AMC10^{Mk2}	Different versions of the VM600^{Mk2} AMC10^{Mk2} processing module:	
	– Standard version (with CMS license pre-installed)	600-059
	The AMC10^{Mk2} ordering number PNR 600-059 corresponds to the underlying module version 620-032-100-1xx, where “xx” represents the hardware versions that can be used by a finished product.	
IOC10^{Mk2}	Different versions of the VM600^{Mk2} IOC10^{Mk2} input/output module:	
	– Standard version	600-061
	The IOC10^{Mk2} ordering number PNR 600-061 corresponds to the underlying module version 620-033-100-1xx, where “xx” represents the hardware versions that can be used by a finished product.	

Notes

Machinery protection and condition monitoring

The VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} temperature and analog monitoring module supports both machinery protection and condition monitoring applications as follows: both machinery protection (MPS) and condition monitoring (CMS) functionality are available by default.

Accordingly, AMC10^{Mk2} condition monitoring can be used by:
(1) Ordering a AMC10^{Mk2} module with condition monitoring enabled (that is, PNR 600-059 with a CMS license pre-installed).

For any AMC10^{Mk2} + IOC10^{Mk2} module, the available machinery monitoring functionality is determined by the firmware running on the module. (The VibroSight® System Manager software is used to check/update the firmware(s) running on a module and check the condition monitoring license status of a module, as required.)

It is important to note that AMC10^{Mk2} condition monitoring also requires a VibroSight® software edition/license that supports condition monitoring. Refer to the *VibroSight® machinery monitoring system software data sheet* for further information.

For example, a VibroSight® / VM600^{Mk2} system consisting of AMC10^{Mk2} + IOC10^{Mk2} modules can initially be installed and used as a MPS only. Then, CMS functionality can be quickly and easily added at any time by upgrading the license for the VibroSight® software, as required.

Condition monitoring licensing

Condition monitoring is enabled by default for all AMC10^{Mk2} modules, that is, they are supplied with a CMS license pre-installed (for example, PNR 600-059). Please note that a AMC10^{Mk2} CMS license is tied to the module, by information such as its Serial number (xxxxxxx) and MAC address.

Accordingly, it is not possible (or necessary) to order a AMC10^{Mk2} CMS license separately from a AMC10^{Mk2} module.

Pre-configuration

Pre-configured VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} modules are only available as part of a complete configured system (ordered using the VM600MK2SYS-based ordering number).

Conformal coating

VM600^{Mk2} AMC10^{Mk2} + IOC10^{Mk2} modules are also available with an optional conformal coating (“varnish”) applied in order to provide additional environmental protection against chemicals, dust, moisture, etc. Contact Parker Meggitt (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 modules	: Refer to corresponding data sheet
RLC16^{Mk2}	VM600^{Mk2} relay modules	: Refer to corresponding data sheet
XMx16 + XIO16T	VM600^{Mk2}/VM600 condition monitoring module	: Refer to corresponding data sheet
VibroSight	VibroSight® machinery monitoring system software	: Refer to corresponding data sheet

Parker Hannifin Corporation – usually referred to as just Parker – is a global leader in motion and control technologies, providing precision-engineered solutions for a wide variety of mobile, industrial and aerospace markets. For more than a century the company has been enabling engineering breakthroughs that lead to a better tomorrow.

Parker Meggitt joined the Parker Aerospace Group in September 2022 following the successful acquisition of Meggitt PLC, a world leader in aerospace, defense and energy. This includes the Meggitt facility in Fribourg, Switzerland, operating as the legal entity Meggitt SA (formerly Vibro-Meter SA). Accordingly, the vibro-meter® product line is now owned by Parker.

Sales offices and distributors

Parker has sales offices and distributors all around the world. For information on your local contact, please visit our website.

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