DCO SYSTEMS

AC Motor Monitor
Product Datasheet

The AC Motor Monitor Range

AC Motor Monitor (ACM) is available in three models for different usage scenarios. Entry-level models provide for low-cost monitoring of large numbers of single-phase devices, standard models provide sensing for multiple single phase or three-phase devices while enhanced models extend on-board sensing to a range of other capabilities and scenarios. All models can connect to an optional cloud-based platform for sensing incorporating real-time data analysis, data storage, predictive monitoring for equipment performance and automated alerts.

All models include on-board real-time FFT and statistical analysis of the collected motor current(s) data, plus optional motor voltage and vibration data (vibration monitoring and isolated motor voltage sensing are sensing options).

Single Phase (Base) Model

ACM Base

Single phase monitoring with integrated energy harvesting for long-life, maintenance-free operation. Ideal for monitoring on discrete items of electrical equipment and, predictive and preventative maintenance.

1x Clip-on Current Probes (AC – Current Transformer / DC – Hall Effect Sensor)

Non-contact current sensing probes attached to electrical cabling for monitored equipment.

Onboard environmental sensing

Ambient temperature, humidity, and pressure conditions.

Onboard orientation and position sensing

Unit orientation, including movement, shock, and vibration detection.

Multi-Phase (Standard) Model

ACM Standard

Monitoring for multiple single-phase devices or three-phase devices (all phases plus neutral – if present) with integrated energy harvesting for long-life, maintenance-free operation. Ideal for monitoring on more complex and higher power electrical equipment, predictive and preventative maintenance.

4x Clip-on Current Probes (AC – Current Transformer / DC – Hall Effect Sensor)

Non-contact current sensing probes attached to electrical cabling for monitored equipment.

Onboard environmental sensing

Ambient temperature, humidity, and pressure conditions.

Onboard orientation and position sensing

Unit orientation, including movement, shock, and vibration detection.

Multi-Phase and Selected Sensing (Enhanced) Model

ACM Enhanced

Monitoring for multiple single-phase devices or three-phase devices (all phases plus neutral – if present) with integrated energy harvesting for long-life, maintenance-free operation. Ideal for monitoring on more complex and higher power electrical equipment, predictive and preventative maintenance. Extended sensor probe set on this model allows extension of monitoring to additional process equipment and devices.

4x Clip-on Current Probes (AC – Current Transformer / DC – Hall Effect Sensor)

Non-contact current sensing probes attached to electrical cabling for monitored equipment.

1x Optional (Customer Choice) Sensor Set

More current sensing probes, temperature sensors, or any other sensing module from our range. Extended sensing permits monitoring of additional process connected plant and equipment.

Onboard environmental sensing

Ambient temperature, humidity, and pressure conditions.

Onboard orientation and position sensing

Unit orientation, including movement, shock, and vibration detection.

Common Model Specifications

Enclosure Style	Standard: Enclosure style for typical industrial applications (to IP55).	IP: External installations (to IP67).
Dimensions	W 111 x H 56 x D 41mm	W 130 x H 91 x D 63mm
Enclosure Mounting	Screw-fixing | Wall-fixing | Over Insulation Clips | Pipe Stand Off Pipe stand offs support direct mounting of sensor unit to high temperature pipework, with insulation and thermal barrier.	
Enclosure Type	IP54 (Dust Protected + Water Jets) ABS | UL94-V0	IP67 (Dust-tight + Immersion) Polycarbonate | UL 508 | NEMA TYPE 4,4X,6,6P
Enclosure (Options)	Optional alternative enclosures available, including extra-high impact resistance polycarbonate and full metal enclosures.	
Sensing (Options)	ACM sensors support a wide range of sensing capabilities through pluggable sensing modules. A selection of the options available are listed in "Sensor Options" (below). Standard modules may be swapped or added to as required.	
Power (Standard)	1x Electrical Energy Harvesting Cable mounted inductive harvesting unit with energy harvesting and on-board energy storage. Internal harvesting and power system full monitored with power availability, power storage and backup power reporting. Onboard long-life backup battery for status reporting while electrical equipment inactive or isolated.	
Power (Options)	ACM supports a wide range of other power sources through a system of pluggable modules. See a selection of available options listed in "Power Options" (below). Standard modules may be swapped or added to as required.	
Status Indicators	1x Status indicator Unit status, power status and active operation indicators (Red, Green, Yellow colours – steady, pulsed, and flashing statuses). 1x Communications indicator Communications status and TX/RX indicators (Red, Green, Yellow colours – steady, pulsed, and flashing statuses).	
Comms (Standard)	Selectable Mesh Radio (ISM 868/915 MHz) or LoRaWAN (ISM 868/915 MHz) support. Mesh radio requires one (or more) gateway units per site installation[1]. Gateways provide choice of cloud uplink (via Wi-Fi, Ethernet or 3G/4G/5G mobile data uplink[2]). LoRaWAN radio requires LoRaWAN gateway, gateway is customer or DCO Systems provided[3].	
Comms (Options)	DCO sensor units support a wide range of other communications options through a system of pluggable modules. See a selection of available options listed in "Communications Options" (below). Standard modules may be swapped or added to as required.	
Processing	120MHz ARM M4 Processor with Hardware Floating Point and DSP Extensions	
Storage (Standard)	64Kb F-RAM Onboard Non-volatile, high-endurance long term storage. State checkpoints and up to 4-hours data storage in event of network disruption.	
Storage (Options)	Units support pluggable modules to extend on device data storage for storage of ultra-high-resolution data where required (e.g., raw high-speed sensor data prior to its processing for FFT analysis).	
Operational	Temperature: -20°C to 85°C | Relative Humidity: 5% to 100% (condensing)	

[1] DCO provided gateways are extra cost options. Minimum of one gateway per mesh network installation.

[2] 3G/4G/5G Cloud connectivity provided as part of cloud data analytics platform subscription (where taken)

[3] DCO Systems provided LoRaWAN gateway is an extra cost option.

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Sensor Options

The AC motor monitor is built on a modular platform and supports the wide range of physical sensing and integration options available from DCO Systems. We expand capabilities all the time – ask us about your requirement if not listed.

Air Quality and Pollution Monitoring	Volatile Organic Compound (VOC), Carbon Dioxide (CO_2), Ozone (O_3), Nitrogen Oxide (NO_X) and dust/particulate measurement – variants for internal and external monitoring applications.
Level and distance	Ultrasonic, Laser or Microwave distance and/or level sensing.
AC/DC Current, Voltage and Power	Current Transducers, Hall-Effect Sensors, and power monitoring (I + V).
Digital Inputs	Volt-free inputs, logic-level inputs, and pulse counter inputs (pulse counting meter compatible).
Analog Inputs	0-5V, 0-10V, 0-20mA and 4-20mA inputs with isolation support up to 4420 V_{RMS}.
Precision Vibration and Movement	Precision accelerometer sensing for shock detection, movement alerting and vibration analysis.
High-Precision Temperature	RTD probes with grade support to Category A (±0.5°C FS Accuracy, RTD dependent).
Pressure Sensing	Differential, gauge, and absolute pressure sensing for pipework, ducting and air/fluid applications.

Power Options

AC motor monitor models are built on a modular platform and so support the wide range of power options available from DCO Systems. The range includes energy harvesting, fully battery powered, AC and DC power supply options. Power options are adaptable and flexible ask us about your requirement if it is not listed here.

Thermal harvesting	Integrated (on supported enclosures) or externally mounted solar thermoelectric harvesters with energy storage for intermittent and pulse operation (e.g., long range LoRaWAN transmission).
Electromagnetic energy harvesting	Electromagnetic energy harvesting from AC sources by with energy storage supporting intermittent harvesting and pulse power operation.
Fully battery powered operation	Self-contained solution with long-life Lithium-thionyl chloride ($Li\text{-}SOCl_2$) batteries with 10-year lifespan. Options for batteries with 20-year lifetime and extended temperature support.
AC/DC power modules	Direct power input from AC/DC sources from 5-745 VDC and 85-480 VAC. Isolated and non-isolated options depending on input voltage level and isolation requirements.

Communications Options

AC motor monitor models are built on a modular platform supporting a range of communications modules options. Communications options are constantly expanding, ask us about your requirement if it is not listed.

ISM Mesh Network	Mesh network operating in the Industrial, Scientific, and Medical (frequency varies by territory).
LoRaWAN Network	LoRaWAN compatible networking (frequency varies by territory) on public or private LoRaWAN networks.
NB-IoT / LTE-M	Operation on 4G and 5G networks supporting either NB-IoT or LTE-M capabilities.
Thread / Bluetooth Mesh / Wi-Fi	Thread, Bluetooth Mesh and Wi-Fi network support.
EtherCAT	Integration as an EtherCAT device into EtherCAT device networks.
Modbus / Modbus TCP	Integration as a Modbus device into Modbus device networks.

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