No Limits
MicroMax M-Max Customized Solutions

Standard solutions don't always fit needs, and each industry may have its own special computing requirements. MicroMax supports each client's needs by taking a customized approach to optimize each of its industrial computers. Our M-Max systems are excellent for harsh scenarios such as train or marine use, limited-sheltered outdoor applications in heat and cold, and tough industrial environments with dust, dirt, and other contaminants being a factor. Some of our many designs are shown below.

Our heat-dissipation technology expertise helps us build rugged customizable industrial systems for tough environments. One of our exemplary systems is the highly rugged M-Max 800 EP, a fully sealed system which operates at ambient temperatures of -40 to +55 °C, and is highly resistant to both vibration and shock. The M-Max 800 EP Series' high performance Intel Core i7 CPU (2.1-3.0 GHz) is supported by advanced thermal technology and ruggedized design featuring:

- fanless aluminum enclosure handles harsh environments including extreme temperatures, dust, and humidity
- shock and vibration protection
- compact size allows easier fit to space needs
- patented thermal technology provides efficient and reliable cooling.

MicroMax: Tough Computers for Tough Challenges!

Rugged high performance computer for tough environments. Built with Quad Core i5 CPU and in compliance with MIL-STD-810G and airborne MIL-STD-704F, the **M-Max 871 EP4/MMS** can be mounted on different vehicle types. The lightweight compact sealed case designed according to the VITA 75 footprint with patented fanless heat dissipation, resists contamination and humidity. Providing shock and vibration protection, the M-Max 871 EP4/MMS can operate under extreme temperatures (-40 to +65 °C) while delivering computing power is in the high-end desktop class.

M-Max 871 EP4/MMS

M-Max SW208

M-Max SW208 is a ruggedized 8-Port Gigabit Ethernet Layer 2+ Managed Switch providing reliable operation in tough environments including transportation (ground, rail, air and marine), agriculture, and mining and processing. It accepts a wide power supply voltage input, and is tested and guaranteed over temperature range of -40 to +75°C. Its rugged enclosure is designed according to the VITA 75 footprint. The SW208 has eight 10/100/1000 Mbps copper twisted pair ports. Support for control and management is through web interface, and host processor access through a Command Line Interface (CLI).

The **M-Max 720 PR7** is a high performance battery powered rugged computer system for mission-critical applications. The system is designed to operate in extremely harsh environments and is equipped with: GPS module, 900 MHz Radio modem, 48x Isolated Digital I/O interfaces, four functional LEDs, expanded set of RS-232/485, USB 2.0, VGA and Gigabit Ethernet ports. The computer is based on the ultra-low power 1.46GHz Intel Atom Dual Core E3826 CPU. The M-Max 720 PR7 is designed to operate as a standalone computer or together with the M-Max B00 external Rugged Battery unit.

The system is built with a 24/28V DC electrical power system with a wide input voltage range from 12V DC to 30V DC, the M-Max 720 PR7 is resistant to high voltages, spikes, and surges.

The system's LiFePO4-batteries based UPS provides 10 hours of backup power and supports an online connection to the optional M-Max 800 external Rugged Battery unit. The system provides a smooth switch from the internal to the external battery and back when power is not available. One external battery unit provides additional 10 hours of operation for the system.

Rugged Battery unit M-Max B00 and System unit M-Max 720 PR7

The **M-Max ATR-compliant chassis** is a fully sealed rugged enclosure with passive cooling, providing extreme physical protection for high performance systems. The machine-worked aluminum chassis is especially designed for the most challenging environments. The ATR-compliant enclosure excels in critical applications needing to operate under extreme temperatures, dust and humidity. Providing excellent shock and vibration protection, the completely fanless chassis uses natural convection and conduction cooling. Typical systems housed in this ATR-compliant enclosure deliver IP66 dust and moisture protection, withstand shocks up to 40g and vibration up to 2.5g. The fully sealed enclosure houses up to 8 PC/104 or similar-sized boards. The configurable front panel can be outfitted with variety of customer-defined connectors.
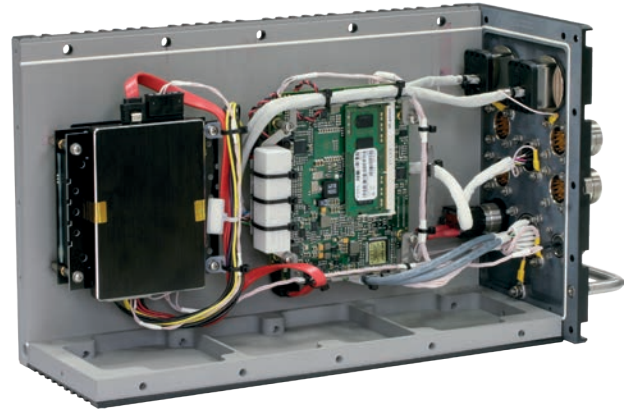
M-Max ATR-chassis

M-Max V75 chassis

The **M-Max V75 chassis**, designed according to the VITA 75 footprint, is a fully sealed rugged enclosure with passive cooling, providing reliable operation in tough environments. Typical systems housed in this enclosure deliver IP66 dust and moisture protection, withstand shocks up to 40g and vibration up to 2.5g. The enclosure houses up to two PC/104 or similar-sized boards. The configurable front panel can be outfitted with variety of customer-defined connectors. The M-Max V75 chassis is tested and guaranteed over temperature range of -40 to +65°C. The embedded power supply complies with MIL-STD-704F specification.

M-Max 820 EP/USO consists of two rugged industrial computers with the highest performance currently available for systems with passive cooling. It is designed to provide reliable operation using '2 out of 2' or redundant architectures in harsh environments for critical applications. The fully-ruggedized rackmount aluminum chassis is fanless and utilizes natural convection and conduction cooling in accordance with MIL-STD-810 specifications.

Providing shock and vibration protection, the M-Max 820 EP/USO can operate under extreme temperatures (-40 to +55 °C), dust and humidity. Delivering excellent performance due to Intel Core i7 CPUs (2.1-3.0 GHz), it also features excellent 2D and 3D graphics capabilities via VGA interface. Data storage options include vibration proof industrial SSDs with RAID functionality (software or hardware option). The computer is used as a part of a safety system at railroad and operate as an optical time-domain reflectometer.

M-Max 820 EP/USO

M-Max 800 EP2/TRN-02 is a high-performance rugged industrial computer for demanding and critical applications requiring performance comparable to high-end desktop systems. The system is IP65 rated and can withstand shocks of up to 40g and vibration of up to 6g. The M-Max 800 EP2/TRN-02 is configured with Intel Core i7 12.8 GHz CPU and Intel HD 4000 video, with hardware video decoding.

M-Max 800 EP2/TRN-02

This compact unit fits in a small space and features operation at an extended temperature range of -40 to +65 °C without any fans or active cooling. It uses MicroMax patented thermal technology to dissipate heat from internal circuit boards. The M-Max 800 EP2/TRN-02 has 5 LAN Gigabit Ethernet, 1 RS-232 and 3 USB 2.0 ports. Data storage options include vibration proof industrial SSDs with RAID functionality (software or hardware option). No competitive units in the high-performance ruggedized computing market offer these features.

M-Max 400/USO

M-Max 400/USO — This computer is designed for on-board and off-the-shelf applications to process fail-safe signaling information based on '2 out of 2' architecture. The M-Max 400/USO is in full compliance with CENELEC SIL4 specifications. It is designed for use on stationary objects of the railway infrastructure at temperatures from -40 to +60 °C. It also has high resistance to vibration and shock loads. To achieve a high level of reliability, the design combines two independent CPUs and solid state drives in one sealed case. Each internal unit has Fast Ethernet, three opto-isolated serial ports (RS-232/422/485), and a two-channel galvanically isolated CAN interface. Reliability is further enhanced by two ultra-capacitor based UPSs which provide the system with 70 seconds of backup power.

The **M-Max 700/ARM mk.7** is another railroad bound system, designed to be a part of Operations Control System as a workstation for the railroad station master (ARM-DSP) and electrical engineer (ARM-SHN). It provides visual control and diagnostics of equipment between stations as well as the ability to enter various control commands from a keyboard and/or manipulator.

Key Features:

- CAN interfaces – 2
- Ethernet interfaces – 1
- RS-232 – 4 (galvanically isolated)
- Power – 9 to 40 V DC

M-Max 700/ARM mk.7

M-Max 700 PR/TTI — This pair of computers is designed for use in a vehicle's data acquisition system. The mobile unit is installed in a vehicle and the land-based unit is given stationary installation. The system has a video capture CVBS, CAN interface, an expanded set of RS-232/422/485 ports, and digital I/O. Each unit has a built in super-capacitor based UPS. The units are built to operate in extremely harsh environments.

M-Max 700 PR/TTI

M-Max 800 EP2/PLT

The **M-Max 800 EP2/PLT** is designed for rapid deployment of customized systems having their own sets of PCI-104 expansion boards and external connectors. The base platform is equipped with an integrated heating system and allows installation of additional heating systems for customer boards. The platform can be equipped with a service board having connectors for all installed interfaces and indicator options, and it supports an optional transparent front panel allowing access to the connectors for visual monitoring of system operation during chamber testing. A light version of the platform, **M-Max 800 EP2/FL**, is developed to house twice more I/O expansion boards (up to 4).

All M-Max 810 series computers are built with a fully-ruggedized ATR-type chassis, designed to use natural convection and conduction cooling in accordance with the arduous MIL-STD-810 standards. Additionally, the 810 series utilizes MicroMax patented heat dissipating technology, enabling fanless reliable operation.

The M-Max 810 series integrates the latest performance-enhancing and power saving COTS technology. Use of a wide variety of COTS components enables these rugged computers to be configured to comply with the most stringent requirements of a wide variety of airborne, marine and ground vehicle applications.

M-Max 810 EP/MMS is a rugged industrial computer with the highest performance currently available for systems with passive cooling. It is designed to provide reliable operation in harsh environments. The fully-ruggedized ATR-type aluminum chassis is fanless and utilizes natural convection and conduction cooling in accordance with MIL-STD-810 standards. The sealed enclosure of the ATR-system is designed specifically for PC/104 form-factor boards.

Providing shock and vibration protection, the M-Max 810 EP/MMS can operate under extreme temperatures (-40 to +55 °C), dust and humidity. Delivering excellent performance due to the Intel Core i7 CPU (2.1-3.0 GHz), it also features excellent 2D and 3D graphics capabilities via VGA and HDMI interfaces. Data storage options include vibration proof industrial SSDs with RAID functionality (software or hardware option).

M-Max 810 EP/MMS

The **Gateway-CAN-MVB2** decodes signals between railroad continuous Automatic Train Control (ATC) systems with CAN interfaces or similar devices and onboard systems utilizing Multifunction Vehicle Bus (MVB). This intelligent Gateway is designed to be used in onboard safety systems installed on locomotives, high speed trains such as Velaro, Desiro and others.

The IP65 rated system, housed in the rugged aluminum enclosure with dual shock and vibration protection, can withstand shocks of up to 6g (60 ms) and vibration of up to 2g. The unit is fanless and operates from -40 to +70 °C.

Key Features:

- MVB interfaces – 2
- CAN interfaces – up to 4
- RS-232 – 2
- Power – 18 to 75 V DC (isolated)
- Fast transient / Surge, and immunity testing – EN 61000-4-4, ±4 kV, Criteria A
- Electrical fast transient and immunity testing – EN 61000-4-5, ±4 kV, Criteria A

Gateway-CAN-MVB2

The **Gateway-AIRBS-CLUB** is designed for installation on locomotives and other railroad vehicles. This device provides an intelligent link between CLUB-U/BLOK and the on-board segment of an ATC system (AIRBS, project ITARUS-ATC). In addition to providing the link between systems, Gateway fulfills functional security requirements, performs initial processing of command packets from ATCS, and generates a stream of data for CLUB-U/BLOK which is then transmitted via CAN interface.

Gateway-AIRBS-CLUB

Key Features:

- Profibus channels – 2
- CAN interfaces – 2
- Power – 18 to 75 V DC (isolated)
- Fast transient / Surge, and immunity testing – EN 61000-4-4, ±4 kV, Criteria A
- Electrical fast transient and immunity testing – EN 61000-4-5, ±4 kV, Criteria A

The **M-Max 400 RC** is a highly reliable compact rugged computer for building all-electric interlocking distributed systems. The system is designed for converting CAN-interface control signals into relay control signals of railroad automation systems. It uses '2 out of 2' architecture for higher reliability of control signals. Two autonomous identical computers inside the system are connected by internal interfaces. Each computer has an independent power input and an internal uninterruptible power supply (UPS) based on ultracapacitors, ensuring up to 40 seconds of operation with the input power cut off. Depending on configuration the system allows to maintain 12 or 24 relays.

M-Max 400 RC

The **M-Max 700/CR mk.6 CAN-Recorder** is designed to collect and record railway automation and remote control data received through a CAN interface. This unit is a part of Electronic Interlocking System.

Key Features:

- Number of CAN networks – 2
- Additional interface – USB
- Power – 9 to 40 V DC

M-Max 700/CR mk.3

The **M-Max 700/AR** is designed for installation on locomotives and other railway vehicles to record signals from a continuous Automatic Train Control (ATC) and Interlocking systems, directly from a sensor (inductive coil) mounted under a pilot of a locomotive, location-bounded by GPS.

The encoding of continuous ATC signals can have pulse-numeric modulation as well as frequency modulation and a phase-difference modulation. Along with the signal, the system automatically records all other harmonics within the operational band. This unit works together with the Interlocking system with Tonal Rail Circuits Type 3 (420 to 780 Hz).

The M-Max 700/AR records the location of any failure/malfunctions of ATC and Interlocking systems as well as enabling prevention of possible future failures by analyzing statistical information kept by the system.

Key Features:

- Number of recording channels – 1 (isolated)
- Continuous recording time – up to 100 hours
- Frequency – 0 to 1 kHz
- Positioning accuracy – 15 m
  (up to 300 km/h speed)
- Information retrieval – automatically
  to an external USB flash drive
- Power – 36 to 72 V DC (isolated)

M-Max 700/AR

The **M-Max 700/AR-15** is designed for installation at railroad stations to record signals from a continuous Automatic Train Control (ATC) and Interlocking systems directly from generating equipment (oscillator).

M-Max 700/AR-15

The encoding of continuous ATC signals can have a pulse-numeric modulation as well as a frequency modulation and a phase-difference modulation. This unit works together with the Interlocking system with Tonal Rail Circuits Type 3 (420 to 780 Hz). Along with the signal, the system automatically records all other harmonics within the operational band.

Key Features:

- Recording channels – 15 (galvanically isolated)
- Recording time – up to 48 hours
- Frequency – 0 to 1 kHz

The **M-Max 700 Performance**, a version of the standard model, has Intel LV Pentium M 738 [1.4 GHz] CPU and 256 DDR333 SDRAM and is IP51 rated.

The computer was designed to be integrated into an existing environment and is equipped with the following options:

- Additional 4 opto-isolated (up to 3 kV) RS-232 ports
- Customer specified connectors for a specialized keyboard, monitor and graphic manipulator
- Special connectors for the onboard power supply

M-Max 700 Performance

The **M-Max 700 ST/GZR** is a rugged transport on-board computer. Evolved from an earlier version, it has been upgraded with:

- Improved energy efficiency. Utilizes a low power AMD Geode LX 800 (500 MHz) and DDR333 SDRAM
- Uninterruptible power supply employing capacitors for its energy storage
- USB screw connectors were installed to match customer specification

M-Max 700 ST/GZR

MicroMax has also supplied a version of the M-Max 700 with a 12-channel GPS-receiver instead of a radio modem.

The **M-Max 700 ST/IFT** system consists of two units – a system unit and a battery unit. The system unit is a standard M-Max 700 with military-type connectors on the front panel. MicroMax modified the I/O subsystem and connectors and integrated two customer supplied PCI boards, which involved extensive engineering work. The UPS subsystem consists of an intelligent charging device which is housed in the system unit and two battery modules housed in the battery unit. The battery unit provides the system with 4 hours of backup power.

M-Max 700 ST/IFT

All models are designed with upgrade capabilities based on mezzanine architecture and other M-Max proprietary design features. Most **M-Max** computers are utilizing MicroMax's patent-pending technology to dissipate excessive heat from computer boards and other electronic devices working at high vibration.

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