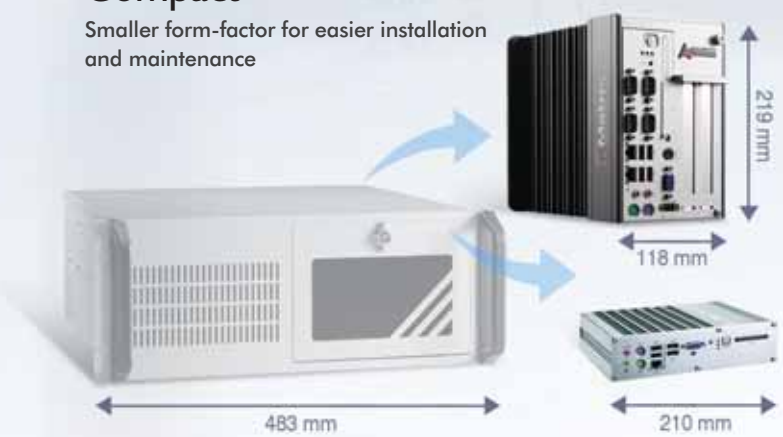
# Matrix
Fanless Rugged I/O Platform

# A Truly Rugged I/O Platform



## Compact

Smaller form-factor for easier installation and maintenance

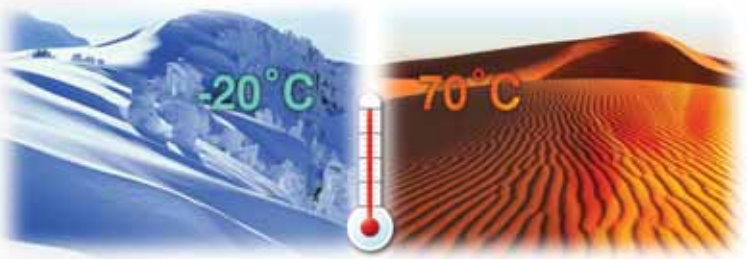



## Fanless

Fanless design significantly extends MTBF to 100,000 hours and minimizes the maintenance cost.


## Rugged

The Matrix is designed to operate in a -20 to 70°C wide temperature range and withstand up to 100 G shock and 5 G vibration, making it ideal for deployment in harsh environments.

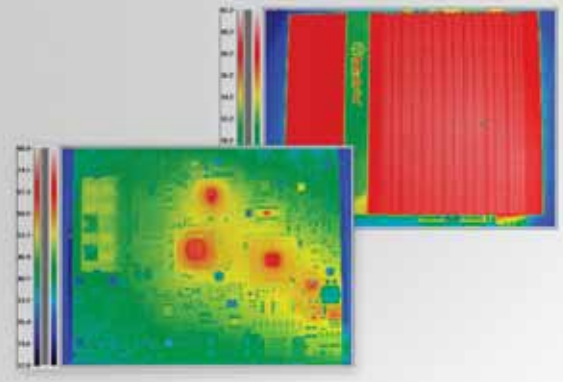



## Application-specific

By integrating ADLINK DAQ, DIO, motion and vision technologies, the Matrix can provide specific I/O functions on-board for your applications.

# Sophisticated Design of the Matrix

## Comprehensive Consideration for Heat Dissipation



Mechanical and electrical engineers worked from the early design stages of the Matrix to ensure the best performance of conductive heat dissipation. All components, such as the CPU, chipset, memory, clock generator, MOSFET, and power choke, etc. generate heat and are thus placed on the top of the PCB and kept at a minimal pitch from the aluminum case. Thus we can provide the shortest path of heat conduction and lowest thermal resistance to guarantee the thermal stability of the Matrix at a 70°C ambient temperature.

## Cable-less and User-friendly Mechanical Structure


The Matrix features an excellent cable-less design. All components and connectors are directly mounted on the PCB via SMT and DIP processes instead of cable connections. The result is an extremely strong and durable mechanical structure suitable for the harshest of environments with 5 Grms vibration and up to 100 G shock and vibration. The Matrix MXC-2000 series—being a configurable controller—also provides a very user-friendly design for system installation. You can open the chassis and install your PCI/PCIe card simply by loosening screw. And, only four screws are used to install or replace the hard disk drive. The mechanical design provides the best reliability, durability and easiest access for installation and maintenance.

## Wide Range and Reliable DC Power Input


We know you may need to deploy the Matrix anywhere. So, we designed the Matrix with wide range DC input to allow it to be powered everywhere. Regardless if there is 12 or 24 volts available at the site, or you have a 19 V laptop adapter handy, you can simply feed the electricity into the MXE-1000 series (6-36 VDC) or MXC-2000 series (9-32 VDC) and it will run. The Matrix is also ideal for use with solar power because of the great tolerance for the variation of solar panel output. The power circuitry of the Matrix was carefully designed with high-quality components (regulators, capacitors, and inductors) to supply reliable power under almost any circumstances.

# Matrix MXE-1000 Series

## Intel® Atom™ Fanless Embedded Controller with Integrated I/O

NEW

## Introduction

ADLINK's MXE-1000 series is an exceptionally rugged embedded controller for operating in harsh environments. Its -20 to 70°C temperature range allows it to operate outdoors in both hot summer days and cold winter nights. The Matrix can also be deployed in factory planes or on vehicles as it can withstand 5 Grms vibration. And, its fanless and cable-less structure ensures extensive durability for long-term usage.

The Matrix MXE-1000 series features the Intel® Atom™ N270 1.6 GHz processor to deliver adequate performance at low-power. The MXE-1000 also integrates versatile generic and special-purpose I/O features to support a wide variety of applications. The on-board Gigabit Ethernet and 1394b ports are designed for connecting cameras for surveillance and image recognition applications, while its COM ports fit requirements in most machine automation and facility management applications.

Combing rugged design and integrated I/O functions, the ADLINK MXE-1000 series offers the most versatile choice for your applications.

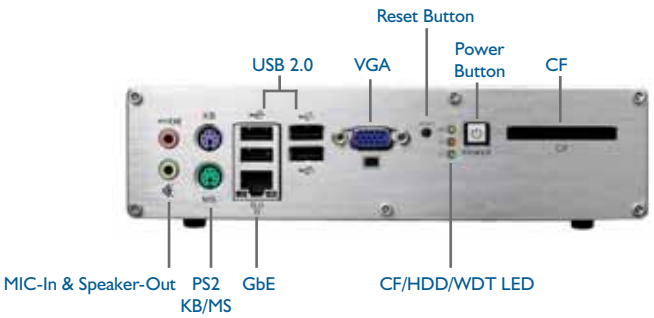
## Features

- Intel® Atom™ N270 1.6 GHz processor + 945GSE chipset
- Rugged, -20°C to 70°C fanless operation
- Built-in 6 VDC to 36 VDC wide-range DC power input
- Up to three 1000/100/10 Mbps Ethernet ports
- Two 1394b FireWire ports (MXE-1020 only)
- Two RS-232 ports and two RS-232/422/485 ports
- One internal PCIe Mini Card socket with an USIM socket
- One external CF socket

## Applications

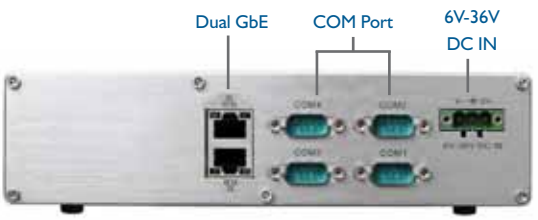
- Intelligent Transportation
- Facility Management
- Environment Monitoring
- Machine Automation
- Video Surveillance/Recognition
- Building Automation


Inside MXE-1000 Series

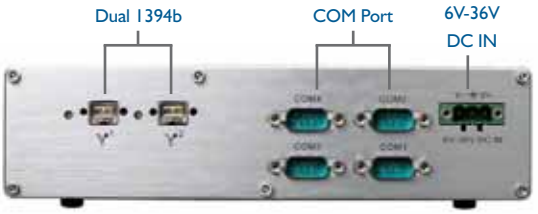



MXE-1000 Series Front Panel


MXE-1005 Back Panel




MXE-1010 Back Panel




MXE-1020 Back Panel

## Specifications

| Model Name | MXE-1005 | MXE-1010 | MXE-1020 |
|---|---|---|---|
| **System Core** | | | |
| Processor | Intel® Atom™ N270 1.6 GHz CPU | | |
| Chipset | Intel® 945GSE Graphic Memory Control Hub<br>Intel® I/O Controller Hub 7 Mobile (ICH7-M) | | |
| Video | Analog CRT, supports QXGA (2048 x 1536) Resolution | | |
| Memory | 1 GB DDR2 533 MHz SODIMM module | | |
| **I/O Interface** | | | |
| Ethernet | 1x GbE port (Realtek® 8111C) | 3x GbE ports (Realtek® 8111C+Intel® 82574) (support teaming function) | 1x GbE port (Realtek® 8111C) |
| 1394b | - | - | 2x 1394b FireWire 800 Ports |
| Serial Port | 2x RS-232/422/485 (jumper selectable, COM1 & COM2)<br>2x RS-232 (COM3 & COM4) | | |
| USB | 4x USB 2.0 Ports | | |
| Mini-PCIe | 1x Internal PCIe Mini Card Socket | | |
| SIM | 1x USIM Socket for 3G Communication (used with 3G Mini-PCIe Module) | | |
| Audio | 1x Mic-in and 1x Speaker-out | | |
| KB/MS | 1x PS/2 Keyboard and 1x PS/2 Mouse | | |
| **Power Supply** | | | |
| DC Input | Built-in 6-36 VDC Wide-range DC input<br>3P Pluggable Connector with Latch (V-, GND, V+) | | |
| AC Input | Optional 40 W External AC-DC Adapter for AC input | | |
| **Storage Device** | | | |
| SATA HDD | On-board SATA Port for 2.5" HDD/SSD Installation | | |
| CompactFlash | 1x Type I CF Socket, Supporting PIO and DMA Modes | | |
| **Mechanical** | | | |
| Dimensions | 210 mm (W) x 170 mm (D) x 53 mm (H) | | |
| Weight | 1.8 kg (3.96 lbs) | | |
| Mounting | VESA 100 Wall Mounting Kit | | |
| **Environmental** | | | |
| Operating Temperature | Standard: -10°C to 60°C<br>Extended option: -20°C to 70°C | | |
| Storage Temperature | -40°C to 85°C (excluding HDD/SSD/CF) | | |
| Humidity | ~95% @ 40°C (non-condensing) | | |
| Vibration | Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ CF or SSD)<br>Operating, 0.7 Grms, 5-500 Hz, 3 Axes (w/ HDD) | | |
| Shock | Operating, 100 Grms, Half-sine 11 ms Duration (w/ CF or SSD) | | |

## Ordering Information

| Model Name | CPU | GbE | 1394b | COM | USB | Memory |
|---|---|---|---|---|---|---|
| MXE-1005 | Intel® Atom™ N270 fanless embedded controller | 1 | | 4 | 4 | 1 GB DDR2 |
| MXE-1010 | Intel® Atom™ N270 fanless embedded controller | 3 | | 4 | 4 | 1 GB DDR2 |
| MXE-1020 | Intel® Atom™ N270 fanless embedded controller | 1 | 2 | 4 | 4 | 1 GB DDR2 |

## Optional Accessories

| | |
|---|---|
| 2 GB DDR2 Upgrade | Upgrade to 2 GB DDR2 Memory |
| 160 GB HDD Option | Factory-installation of 160 GB SATA Hard Disk Drive (0 to 50°C) |
| 32 GB SSD Option | Factory-installation of 32 GB SATA Solid State Disk (0 to 70°C) |
| 8 GB Industrial SSD Option | Factory-installation of 8 GB Industrial-grade SATA Solid State Disk (-40 to 85 °C) |
| 40 W AC Adapter | 40W Industrial-grade AC Adapter (-20 to 70°C) |
| Extended Temperature Option* | Extend the operating temperature of the MXE-1000 series to -20 to 70°C |

*This option guarantees cold boot of the system at -20°C and operation with 100% loading at 70°C

# Matrix MXC-2000 Series

## Intel® Atom™ Fanless Configurable Controller with PCI/PCIe Slots

NEW

### Introduction

ADLINK's MXC-2000 series is an exceptionally rugged controller with configurable PCI and PCIe slots. It is designed to provide a reliable platform for a wide variety of applications by accepting standard PCI and PCIe cards. The Matrix MXC-2000 series can operate in a -20 to 70°C temperature range and withstands 5 Grms vibration. Its fanless and cable-less structure provides additional durability for long-term usage.

The Matrix MXC-2000 series features the Intel® Atom™ N270 1.6 GHz processor to deliver adequate performance at low power. Its PCI and PCIe slots enable the possibility of integrating off-the-shelf PCI/PCIe cards for a configurable application platform. Generic I/O interfaces, such as Gigabit Ethernet, COM, and USB are provided for connecting devices, while VGA+S-Video dual graphic outputs to allow connections to larger displays such as an LCD TV. The Matrix MXC-2000 series also integrates ADLINK in-house DIO design to deliver optional isolated DIO channels for industrial control usage.

ADLINK's Matrix MXC-2000 series is the perfect combination of configurability, reliability, durability, and compactness. With the MXC-2000 series, creating your rugged application system has never been easier.

### Features

- Intel® Atom™ N270 1.6 GHz processor + 945GSE chipset
- Configurable, providing both PCI and PCIe slot options
- Rugged, -20°C to 70°C fanless operation
- Built-in 9 VDC to 32 VDC wide-range DC power input
- Dual 1000/100/10 Mbps Ethernet ports
- Two RS-232 ports and two RS-232/422/485 ports
- Two CF sockets for HDD replacement and hot-swappable data storage
- VGA + S-Video independent dual display outputs
- Optional on-board 16-CH isolated DI and 16-CH isolated DO

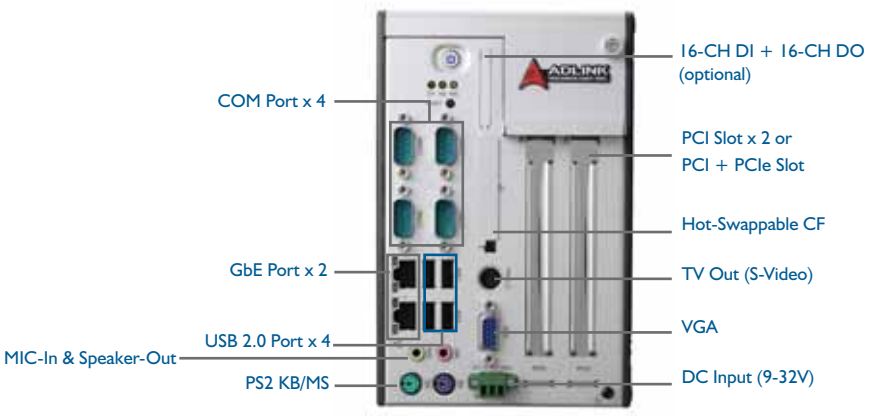
### Applications

- Industrial Automation
- Factory Control
- Test Instrumentation
- Security Surveillance
- Data Acquisition System
- Building Automation

Cable-free!
Trouble-free!

Inside MXC-2000 Series

Easy Installation for HDD and PCI/PCIe Cards




MXC-2000 Series Front Panel

## Specifications

| Model Name | MXC-2002 | MXC-2011 |
|---|---|---|
| **System Core** | | |
| Processor | Intel®Atom™ N270 1.6 GHz CPU | |
| Chipset | Intel® 945GSE Graphic Memory Control Hub<br>Intel® I/O Controller Hub 7 Mobile (ICH7-M) | |
| Video | Analog CRT, Supports QXGA (2048 x 1536) Resolution<br>TV-out, Supports S-Video and Composite Outputs | |
| Memory | 1 GB DDR2 533 MHz SODIMM module | |
| **I/O Interface** | | |
| Expansion Slots | Two PCI slots | One PCI slot and one x1 PCIe slot |
| Ethernet | 2x GbE Ports (Realtek® 8111C) | |
| Serial Port | 2x RS-232/422/485 (jumper selectable, COM1 & COM2)<br>2x RS-232 (COM3 & COM4) | |
| USB | 4x USB 2.0 Ports | |
| Audio | 1x Mic-in and 1x Speaker-out | |
| KB/MS | 1x PS/2 Keyboard and 1x PS/2 Mouse | |
| DIO | Optional 16-CH isolated DI + 16-CH isolated DO | |
| **Power Supply** | | |
| DC Input | Built-in 9-32 V DC Input with Over-voltage Protection<br>3P Pluggable Connector with Latch (GND, V-, V+) | |
| AC Input | Optional 60W external AC-DC adapter for AC input | |
| **Storage Device** | | |
| SATA HDD | On-board SATA Port for 2.5" HDD/SSD Installation | |
| CompactFlash | 2x Type II CF Sockets, Supporting PIO and DMA Modes<br>CF1 (internal) for HDD Replacement<br>CF2 (external) Supports Hot-swapping | |
| **Mechanical** | | |
| Dimensions | 118 mm (W) x 219 mm (D) x 183 mm (H) | |
| Weight | 2.8 kg (6.16 lbs) | |
| Mounting | Wall-mount Kit | |
| **Environmental** | | |
| Operating Temperature | Standard: -10°C to 60°C<br>Extended option: -20°C to 70°C | |
| Storage Temperature | -40°C to 85°C (excluding HDD/SSD/CF) | |
| Humidity | ~95% @ 40°C (non-condensing) | |
| Vibration | Operating, 5 Grms, 5-500 Hz, 3 Axes (w/CF or SSD)<br>Operating, 0.7 Grms, 5-500 Hz, 3 Axes (w/HDD) | |
| Shock | Operating, 50 Grms, Half-sine 11 ms duration (w/CF or SSD) | |

## Ordering Information

| Model Name | Description | PCI | x1 PCIe | GbE | COM | USB | Memory | DIO |
|---|---|---|---|---|---|---|---|---|
| MXC-2002 | Intel® Atom™ N270 fanless configurable controller | 2 | 0 | 2 | 4 | 4 | 1 GB DDR2 | |
| MXC-2002D | Intel® Atom™ N270 fanless configurable controller | 2 | 0 | 2 | 4 | 4 | 1 GB DDR2 | 16 DI+16 DO |
| MXC-2011 | Intel® Atom™ N270 fanless configurable controller | 1 | 1 | 2 | 4 | 4 | 1 GB DDR2 | |
| MXC-2011D | Intel® Atom™ N270 fanless configurable controller | 1 | 1 | 2 | 4 | 4 | 1 GB DDR2 | 16 DI+16 DO |

## Optional Accessories

| | |
|---|---|
| 2 GB DDR2 Upgrade | Upgrade to 2 GB DDR2 Memory |
| 160 GB HDD Option | Factory-installation of 160 GB SATA Hard Disk Drive (0-50°C) |
| 32 GB SSD Option | Factory-installation of 32 GB SATA Solid State Disk (0-70°C) |
| 8 GB Industrial SSD Option | Factory-installation of 8 GB Industrial-grade SATA Solid State Disk (-40 to 85°C) |
| 60 W AC Adapter | 60 W Industrial-grade AC adapter (-20 to 70°C) |
| Extended Temperature Option* | Extend the operating temperature of the MXC-2000 series to -20 to 70°C |

*This option guarantees cold boot of the system at -20°C and operation with 100% loading at 70°C


Compact size: 162 x 150 x 50 mm

## ADLINK DPAC Features

### Compact & Fanless Design

The DPAC is a small (162 x 150 x 50 mm) distributed PC-based controller platform. The DPAC system incorporates a fanless design and optimal heat sink dissipation to ensure the operational reliability and stability.

### High Tolerant Vibration and Shock Capability

Designed for industrial automation applications, the DPAC underwent harsh vibration and shock testing during its design to ensure durability. While in operation, the DPAC can tolerate shocks of up to 100 G and vibrations of up to 5 G.

Programmable digital display and buttons for a flexible design


### Smart UI with Programmable Buttons and a Digital Display

One key feature of a DPAC system is the digital display and programmable button design. Compact computers can be easily found, but finding a PC-based controller platform that is both compact and reliable is another story. ADLINK's DPAC solution meets a wider variety of application requirements than standard compact computers by providing a digital display can be programmed to provide information and buttons that can be assigned to a controller task.

### Function Extension by Distribution

Functional control blocks can be distributed via the fieldbus or serial communication ports depending on the configuration of the DPAC. This greatly reduces the wiring of the entire system whereas compact industrial computers typically require excessive and expensive wiring.

### Flexible Integrated Development Platform

Modules such as digital I/O, AD/DA devices, relay switch controls, thermocouple inputs, and motion controllers can be connected together and communicated to via the fieldbus or serial communication ports. If a fast and time deterministic response is needed, the DPAC provides HSL and Motionnet fieldbuses to achieve such performance requirements. The distributed nature of the DPAC means that all the functional blocks can be installed near the sensors, actuators, servo motors, etc.

### Standard Programming Environment

ADLINK's DPAC supports IEC 61131-3 languages: LD (Ladder Diagram), FBD (Function Block Diagram), ST (Structural Text), IL (Instructional Language), and SFC (Sequential Flow Chart). By using these standard languages, software can be developed for the DPAC easier and quicker than with PC-based controller platforms.

### External GPIO as Trigger Signal

The DPAC is equipped with a 4-CH external GPIO. These GPIO signals can be used as triggers to synchronously control other devices.

Programmable digital display and buttons for a flexible design

Wide DC power input range: 10-30 VDC, 30 W

Four integrated GPIO lines for triggering and receiving external devices

RS-485 auto flow control

External CompactFlash slot for data storage

Dual LAN 10/100 Base-T

Battery backup to protect data

162 mm

Vertical and wallmount designs

Vibrarion tolerance up to 5 G (operational)

Shock tolerance up to 100 G (operational)

USB 2.0 x 2

PS/2 port for keyboard/mouse

## Ordering Information

| Model Name | Description |
|---|---|
| DPAC-10X0-ZN | Intel® Atom™ N270 CPU with 4 COM ports |
| DPAC-30Y0-ZN | Intel® Atom™ N270 CPU with HSL & Motionnet Bus |

| Model Name | Description |
|---|---|
| **Accessories** | |
| General-purpose I/O cable | 1 M length cable with single-end open wire |
| Li battery | CR2032 type battery for data backup protection |
| Industrial-grade CF | 4 GB storage for DPAC external slot |

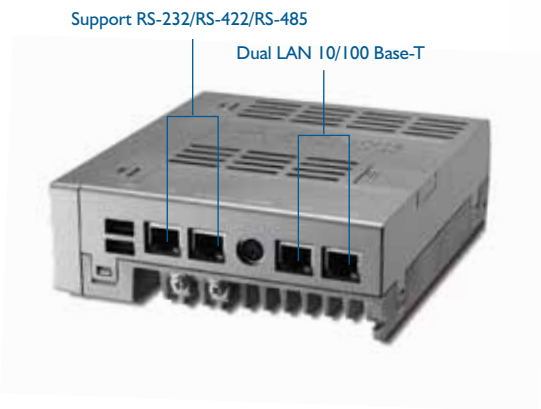
| X | COM2 | COM3 | COM4 |
|---|---|---|---|
| 0 | RS-232 | RS-232 | RS-232 |
| 1 | RS-232 | RS-232 | RS-422 |
| 2 | RS-232 | RS-232 | RS-485 |
| 3 | RS-232 | RS-422 | RS-422 |
| 4 | RS-232 | RS-422 | RS-485 |
| 5 | RS-232 | RS-485 | RS-485 |
| 6 | RS-422 | RS-422 | RS-422 |
| 7 | RS-422 | RS-422 | RS-485 |
| 8 | RS-422 | RS-485 | RS-485 |
| 9 | RS-485 | RS-485 | RS-485 |

| Y | COM2 |
|---|---|
| 0 | RS-485 |
| 1 | RS-422 |
| 2 | RS-232 |

| Z | OS Language Support |
|---|---|
| 1 | Windows XP Embedded (English) |
| 2 | Windows XP Embedded (Traditional Chinese) |
| 3 | Windows XP Embedded (Simplified Chinese) |
| 4 | Windows XP Embedded (Japanese) |
| 5 | Windows XP Embedded (Korean) |

# DPAC-1000 Series

Distributed Programmable Automation Controller with Four COM Ports
(Intel® Atom™ N270 1.6 GHz CPU)

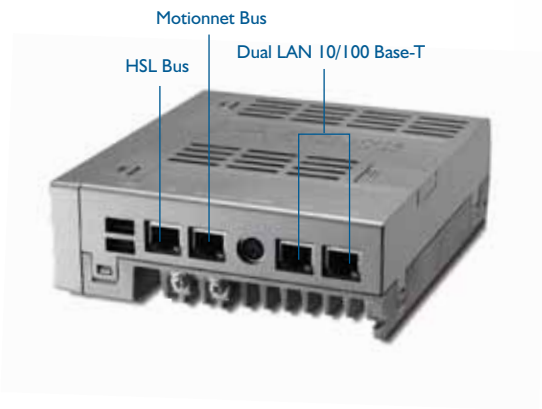



## *Specifications*

| Model Number | | DPAC-1000-1N | DPAC-1000-11 |
|---|---|---|---|
| **System** | CPU | Intel® Atom™ N270, FSB 533, 1.6 GHz | |
| **Hardware** | Cache | 512 KB L2 cache | |
| | System Memory | 1 GB DDR2 SDRAM | |
| | Battery Backup SRAM | 512 KB, battery model: CR2032 (Recommended) | |
| | BIOS | Award BIOS, support PnP, customized by ADLINK | |
| | Programmable Button | 4 (Specifc function can be programmed by users) | |
| | Digital Display | 5 digits, user programmable | |
| | Internal Storage | CompactFlash, 4 GB | |
| | External Storage | CompactFlash Type I, optional | |
| | VGA | CRT: 2048 x 1536 resolution @ 70 Hz (QXGA);<br>LCD: Single or dual channel 18-bit TFT with resolution<br>from 640 x 480 (VGA) up to 1600 x 1200 (UXGA) | |
| | Watchdog Timer | Programmable timer ranges to generate RESET | |
| | GPIO | 4 DI/4 DO onboard (Support one 32-bit counter up to 20 KHz) | |
| | Keyboard/Mouse | Combined PS/2 type mini-DIN connectors | |
| **Communication** | USB | 2 USB ports, rev 2.0 compliant | |
| | Ethernet | Dual LAN, 10/100 Base-T RJ-45 ports | |
| | COM Port | COM1 supports RS-232;<br>COM2 supports RS-232/RS-422/RS-485 with DB-9 connectors (RS-485 with auto data flow control);<br>COM3 and COM4 support RS-232/RS-422/RS-485 with RJ-45 connectors (RS-485 with auto data flow control) | |
| **Environment** | Humidity | 95% @ 60°C | |
| | Operating Temperature | 0 - 60°C @ 5% - 85% RH | |
| | Vibration Protection (In Operation Test) | IEC 68 2-64 (Random 3 axes, 30 min/axis)<br>CompactFlsh: 5 Grms @ 5 - 500Hz | |
| | Shock Protection (In Operation Test) | IEC 68 2-27 CompactFlsh: 100 G @ wall mount, half sine, 11 ms | |
| **General** | Certification | CE/FCC Class A | |
| | Mounting | Wall mounting, vertical placement | |
| | Power Input | 10 $V_{DC}$ - 30 $V_{DC}$, 2.55 A, 30 W with 3-pin connector | |
| | Power Consumption | 30 W (Typical), Isolation | |
| | Dimensions | 162 mm (H) x 150 mm (D) x 50 mm (W) (Vertical placement) | |
| | Embedded OS | Windows® XP Embedded (English Version) | |
| | CoDeSys (SoftPLC) Run Time | No | Yes |

# DPAC-3000 Series

Distributed Programmable Automation Controller with HSL and Motionnet Buses (Intel® Atom™ N270 1.6 GHz CPU)




## Specifications

| Model Number | | DPAC-3000-1N | DPAC-3000-11 |
|---|---|---|---|
| System | CPU | Intel® Atom™ N270, FSB 533, 1.6 GHz | |
| Hardware | Cache | 512 KB L2 cache | |
| | System Memory | 1 GB DDR2 SDRAM | |
| | Battery Backup SRAM | 264 Kb, battery model: CR2032 (Recommended) | |
| | BIOS | Award BIOS, support PnP, customized by ADLINK | |
| | Programmable Button | 4 (Specifc function can be programmed by users) | |
| | Digital Display | 5 digits, user programmable | |
| | Internal Storage | CompactFlash, 4 GB | |
| | External Storage | CompactFlash Type I, optional | |
| | VGA | CRT: 2048 x 1536 resolution @ 70 Hz (QXGA);<br>LCD: Single or dual channel 18-bit TFT with resolution from<br>640 x 480 (VGA) up to 1600 x 1200 (UXGA) | |
| | Watchdog Timer | Programmable timer ranges to generate RESET | |
| | HSL Bus (Distributed I/O) (Step Technica) | One port support 12M/6M/3M bps full duplex | |
| | Motionnet Bus (Distributed Motion) (NPM) | One port support 20M bps (Max.) | |
| | GPIO | 4 DI/4 DO onboard (Support one 32-bit counter up to 20 KHz) | |
| | Keyboard/Mouse | Combined PS/2 type mini-DIN connectors | |
| Communication | USB | 2 USB ports, rev 2.0 compliant | |
| | Ethernet | Dual LAN, 10/100 Base-T RJ-45 ports | |
| | COM Port | COM1 supports RS-232; COM2 supports RS-232/RS-422/RS-485<br>with DB-9 connectors (RS-485 with auto data flow control) | |
| Environment | Humidity | 95% @ 60°C | |
| | Operating Temperature | 0 - 60°C @ 5% - 85% RH | |
| | Vibration Protection (In Operation Test) | IEC 68 2-64 (Random 3 axes, 30 min/axis)<br>CompactFlsh: 5 Grms @ 5 - 500Hz | |
| | Shock Protection (In Operation Test) | IEC 68 2-27<br>CompactFlsh: 100 G @ wall mount, half sine, 11 ms | |
| General | Certification | CE/FCC Class A | |
| | Mounting | Wall mounting, vertical placement | |
| | Power Input | 10 $V_{DC}$ - 30 $V_{DC}$, 2.55 A, 30 W with 3-pin connector | |
| | Power Consumption | 30 W (Typical), Isolation | |
| | Dimensions | 162 mm (H) x 150 mm (D) x 50 mm (W) (Vertical placement) | |
| | Embedded OS | Windows® XP Embedded (English version) | |
| | CoDeSys (SoftPLC) Run Time | No | Yes |