

PAC system MSX-Box®



Like a captain steers his ship with determination, take control of your measurement system.

Rely on an open and transparent PAC system with free development tools: the MSX-Box



- Compact system for non-central measurement and control applications
- Flexible I/O configuration through PCI measurement boards
- Open and scalable
- Real time, full machine time only for your application
- Webserver functions and FTP server

Imagine your own system:

You select only the vital PC components:

- Backplane with PCI slots
- Ethernet PCI board
- RS232 interface
- 256 MB SDRAM
- ...

You add to this:

- A compact and robust housing
- A controller board with RISC processor
- A fast 16 MB Flash memory
- A pre-installed real time operating system RTAI Linux
- A bootable CD with development environment.
- Starting without installation!
- Webserver and FTP functions, IP address
- A standard mains supply unit
- A fan control (temperature sensor on controller board)
- Further PCI boards (I/O measurement boards)
- ...

You have the MSX-Box!

Based on trusted standard components
Compact, ideal for non-central applications
Long-term availability, not proprietary

- Full machine time for your application

PAC system: Programmable Automation Controller

PAC systems are mainly used for industrial measurement and regulation tasks as well as for motion control.
They execute several tasks simultaneously and in a deterministic way.

Core features of a PAC system:

- Compact and robust construction
- Programmable
- Standard Ethernet (TCP/IP)
- CPU board as system controller
- Different I/O modules

Safe investment due to standards

The long-term availability was also a priority when developing the MSX-Box. In this way, you can be sure that the MSX-Box will be available for years for your application.

The MSX-Box consists of hardware and software components and integrates ADDI-DATA measurement boards which have been developed according to the same product philosophy. Also important is the use of RISC technology on the controller board.

The MSX-Box connects

You can use the MSX-Box within or outside your company network. Via Ethernet (TCP/IP), field bus or a RS232 interface you can exchange measurement data with other systems and access boards installed in the MSX-Box from remote computers. Since the MSX-Box fully integrates internet technology you can assign it an IP address. This means that you can access it via the existing company network using a browser.

As an option, the MSX-Box can offer even more optically isolated field bus connection or communication possibilities via Profibus, Interbus, CAN and RS485 or RS232.

Already being used successfully

The MSX-Box is already being used successfully for automation projects and as a control system with remote maintenance.

Possible applications are, e.g.:

- Measurement, control and regulation applications
- Machine control
- Industrial automation processes
- Automatic testing equipment
- Multi-channel data acquisition
- Axis control
- Data logger, etc.

Test the MSX-Box!

To support you in your investment we are offering you the opportunity to test the MSX-Box with the corresponding PCI boards.
Contact us or your local distributor today (see list on www.addi-data.com).

PAC system MSX-Box®

Powerful features

Optimised for industrial use

Many features of the MSX-Box bear witness to the fact that the PAC system has been specially optimised for industrial use:

- No unnecessary multimedia features
- Time-critical processes run to a predefined timetable, with timer and RTAI (real time application interface) kernel
- No delicate components, e.g. hard disk
- Field bus interfaces: CAN, Interbus, Profibus,
- Not a proprietary system: PCI boards from other manufacturers can be used
- Our own controller board for longer availability

Network Time Protocol – synchronisation computer clocks

NTP is an Internet standard for time synchronisation. This enables the clocks on the various computers and servers on your network to be aligned periodically with calibrated central time servers. Measurement and control tasks distributed across multiple MSX-Boxes can be synchronised.

Implementing true real-time applications

Along with NTP, you can use the RTSYNC function at kernel level in the MSX-Box to synchronise multiple MSX-Boxes, and so run distributed applications in real time.

Use of floating points in MSX-Box drivers

The Linux operating system does not generally allow the use of floating point values at kernel level. But in the field of measurement and control, floating-point calculations are very important when you need to process the values captured (FFT) or develop sophisticated controls. That is why ADDI-DATA has developed a floating point function for the MSX-Box, which you can enable or disable as required.

Live DVD

The development environment

On the MSX-Box Live DVD, you will find all the development tools that you need to work with the MSX-Box. You can then create a development environment without additional installation effort.

The resources of your PC system (e.g. hard disk) can only be accessed if previously released.

This working and development environment is based on Knoppix Live DVD (www.knoppix.org), which we have adapted to the needs of measurement and control tasks.



Free Live DVD on request!

Configuring, working and developing

One use of the Live DVD is to configure the interfaces to the MSX-Box. You can also tailor the development environment to your individual preferences and needs.

The Eclipse programming environment, also provided on the Live DVD, is a practical and convenient tool for you to create programs.

Or you can use the program templates to develop “user space” programs as well as kernel modules and real time kernel modules without difficulty.

Debugging

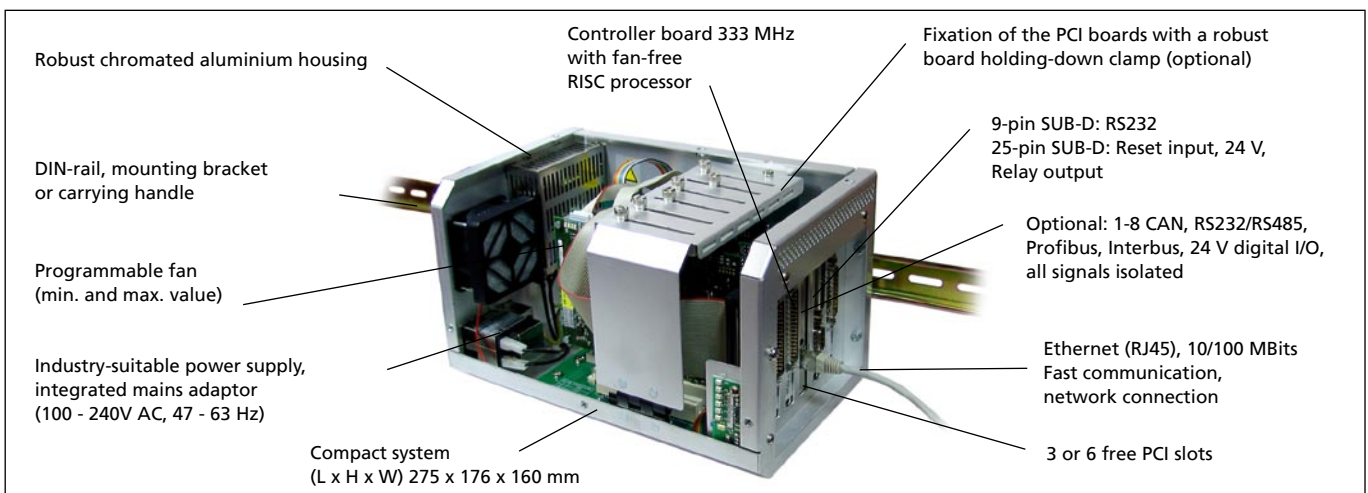
In the testing phase especially, it is important to be able to find system errors or enter settings quickly and easily. With the MSX-Box debugging function, you can trace the progress of your application line by line and so see immediately where any errors originate or where you need to change values. You can even use the debugging tool for the interrupt function at kernel level.

Test it for yourself!

Request your free Live DVD today, with a free loan of an MSX-Box.

When you insert the DVD, you can address the MSX-Box immediately and start to work with it right away.

Just send us an e-mail with your contact details, to: msx-box@addi-data.com



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MSX-Box in practice – example 1

Mobile noise and vibration measurement



Noise and vibration measurement with APCI-3600

The challenge

For automotive manufacturers and suppliers, exact knowledge of the acoustic behaviour of various vehicle components is an essential part of testing and assessment, and numerous acoustic measurements have to be taken during dummy runs on test beds or on real journeys on the road. However, precise conclusions about the effect of noise on the system behaviour of individual components can only be reached when data capture is very precisely synchronised with the process states to be investigated. Ideally, the measuring equipment should directly access the CAN-based communication on the electronic control units, sensors and actuators, in order to use the relevant messages directly as start and stop triggers.

The solution

In combination with the APCI-3600 noise and vibration measurement board, the compact MSX-Box is ideally suited to this task.

- With its CAN interface, the MSX-Box can access the bus system of the vehicle to use its internal communication to generate start and stop events in data capture.
- Because of its real time capability, the MSX-Box ensures that the start and stop commands for the individual measurement processes, passed across the CAN interface, are handled within defined time intervals.
- The MSX-Box is also suited for mobile use in cars or trucks, because it can work with both 12V and 24V DC power supplies.

The strong partner

The power of the APCI-3600 multifunction board for noise and vibration measurement complements the mobility of the MSX-Box. With features like SD RAM, anti-aliasing filter, provision of ICP™ sensors and many additional I/O functions, this PCI board allows you to address the typical tasks related to noise and vibration measurement in a way that traditional audio boards cannot.

MSX-Box in practice

Example 2: Measuring temperature, force, pressure, lengths and positions

Path-dependent force, pressure and length measurements crop up more often in the industrial field as simple measurement tasks. As the processes become faster and faster and more and more precise, the requirements for this kind of system become more demanding, especially in terms of data capture, speed and accuracy.

Capturing, storing and routing sensor data

As the compact MSX-Box is based on a PCI backplane, it shares the ability of traditional IPCs to accept a wide range of PC boards with all kinds of functionality. This enables it to capture data from different sensors: Pt 100/ thermocouples, inductive transducers, microphones, strain gauges etc. There are several ways of saving the captured data: for smaller volumes of data, the onboard RAM is sufficient. For larger volumes, the MSX-Box can be expanded with various storage media such as a USB stick, hard disk etc. The transfer of data to a higher-level system such as an ERP, QM or display application is handled via an Ethernet TCP/IP interface.

Onboard processing with mathematical functions

The MSX-Box gives you the option to process the captured data right away using mathematical functions. This is because the box is fitted with a MIPS micro-controller with integrated FPU (floating point unit).

Controlling axes in parallel with the data capture process

Along with data capture, the MSX-Box can also control axes by means of the APCI-8001 PCI motion control board from ADDI-DATA. As this PCI board is fitted with its own micro-controller, it can control the positioning process independently. The data capture and positioning processes then run completely separately from each other, without interference.



Transducer acquisition with APCI-3701

Motion Control with APCI-8001

Temperature and pressure acquisition with APCI-3200 and APCI-3300

MSX-Box-500

PCI controller board

RISC processor:	64-bit MIPS, no fan
Clock:	333 MHz
Memory:	16 MB flash, 128 MB SDRAM, Option up to 256 MB
Installed OS:	Embedded RTAI Linux
Standard interfaces:	SUB-D 9-pin: 1 x RS232 SUB-D 25-pin: Reset input 24 V; „H“ - active 1 x relay output, free prog., closing contact
Optional:	SUB-D 25-pin.: 1-8 CAN, Master/Slave, isolated 1 x RS232/RS485, isolated additional bracket: 1 x Profibus/Slave, isolated 2 x Interbus/Master, isolated 4 x dig. input, 24 V/10 mA, isolated 3 x dig. output, 24 V/200 mA, isolated
Dimensions:	PCI half-size board

MSX-Box-800

Same as MSX-Box-500, but with 8 PCI slots on the ATX backplane, incl. 6 free slots for PCI I/O boards

Ethernet PCI board (RJ45)

Data transfer rate:	10/100 Mbits
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Mains supply unit

Input voltage:	100 V - 240 V, AC, 47-63 Hz (other voltage on request)
Output voltage:	5 VDC-35 W (max. 6 A)
Protection against:	Short circuit; overload, overvoltage
Connection:	2 m power cable

Extensive software support

Free development tools (GNU Compiler, Cygwin, samples in source code), Knoppix Live DVD development environment

ATX Backplane with 5 PCI slots (MSX-Box-500)

PCI slots:	Total amount: 5
	Reserved: 1 x PCI controller board 1 x PCI Ethernet board
	Free: for 3 additional PCI half-size boards
Compliance:	PCI specification PICMG rev. 2.1.
Housing dimensions:	(L x H x W) 278 x 170 x 165 mm
Weight:	approx. 2 kg (standard MSX-Box system)

ATX backplane with 8 PCI slots (MSX-Box-800)

PCI slots:	Total amount: 8
	Reserved: 1 x PCI controller board 1 x PCI Ethernet board
	Free: for 6 additional PCI half-size boards
Compliance:	PCI specification PICMG rev. 2.1.
Housing dimensions:	(L x H x W) 292 x 170 x 292 mm
Weight:	Approx. 3 kg (standard MSX-Box system)

Housing

Material:	Chromated aluminium, colour RAL 5010 blue „Enzianblau“
Heat dissipation:	Through programmable fan
Temperature range:	0 - 50°C
Temperature monitoring:	Configuration at delivery 5 °C to 45 °C min. and max. value programmable through software The temperature value can be monitored. Resolution: 0.5 °C
Front openings:	For 5 PCI-boards and 1 bracket (MSX-Box-500) For 8 PCI-boards and 3 brackets (MSX-Box-800)
Status display:	5 LEDs, incl. 2 freely programmable

Optional accessories

Board fixation:	Board holding-down clamp
Mounting possibilities:	• DIN rail • Removable mounting bracket • Carrying handle
Cable:	2 m Ethernet patch cable, shielded, RJ45 connector (PC <-> MSX-Box)
Network card:	With additional functions:
MSX-ComboCard:	• 2 x PCI FireWire IEEE 1394, 1 x internal, 1 x ext. connection, data transfer rate up to 400 Mbps, supports up to 63 peripherals • 2 x PCI USB 2.0, 2 external, 1 x internal connection, • 1 x RJ-45 LAN, 10/100 Mbps connection • 1 x 5-pin female connector, 12 V • Network card PCI 10/100 Mbps, 10Base-T, 100Base-TX, IEEE802.3, 802.3 u protocol, data transfer rate 10 Mbps and 100 Mbps, Chipset Realtek RTL8139, • System 32-bit PCI and 64-bit PCI-X • 3.3 V and 5 V voltage
Colours:	Other housing colours (according to RAL scale) and inscriptions (on request)

Ordering information

MSX-Box: PAC system, incl. development tools (GNU compiler) and technical description

Versions

MSX-Box 500: 5 PCI slots (incl. 2 slots reserved for controller and Ethernet board; 3 free PCI slots for half-size boards)

MSX-Box 800: 8 PCI slots (incl. 2 slots reserved for controller and Ethernet board; 6 free PCI slots for half-size boards)

Options

All options can be subsequently implemented

MSX-256MB: Memory extension: optional up to 256 MB

MSX-485/ MSX-232: 1-port serial interface, RS485 or RS232, optically isolated

MSX-Basis: Basic equipment for options MSX-CAN, MSX-Profibus, MSX-IBS and MSX-DIO-IO

MSX-CAN-x: 1/2/4/8 x CAN bus, master/slave, optically isolated

MSX-Profibus: 1 x Profibus, slave

MSX-IBS-1/-2: 1 /- 2 x Interbus-S, master

MSX-DIG-IO: 4 digital inputs and 3 digital outputs, 24 V.

All extensions are isolated and include a ribbon cable with a 9-pin SUB-D male connector with bracket

MSX-RTSYNC: for the synchronisation of several MSX-boxes (with time stamp)

Accessories

MSX-CLAMP-500/-800: Board holding-down clamp for board fixation

MSX-SCREW: Wall mounting

MSX-RAILDIN: DIN rail mounting

MSX-GRIP: Carrying handle

MSX-COMBOCARD: Network card LAN / USB / Firewire connection

MSX-COMBOGIGA: Network card Giga LAN / USB / Firewire connection

MSX-500-PS-12V/-24V: Mains power supply unit 12 V DC or 24 V DC

ST ETH-2: Ethernet patchkabel 2 m, shielded, RJ45, between PC and MSX-Box

MSX-CBLRS232: RS232 cable, 1.5 m – 9-pin.

On request: Other housing colour or inscriptions on the front side