



# 1 What is the MSX-Box?

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## A breeze of fresh air for your applications

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



The **MSX-Box** PAC system (Programmable Automation Controller) is an efficient measurement and control system which is embedded in an open and flexible software architecture.

With the **MSX-Box** you boost your measurement and control applications because you work with a system which adapts to your needs. Even complex controls can be easily developed with the supplied tools.

Thanks to ADDI-DATA's long-term supply philosophy, you secure your investments in the long run. The **MSX-Box** convinces for series in particular: as the development tools are free of charge, you do not pay for any expensive licences.

The most frequent applications include:

- Measurement, control and regulation tasks
- Machine controls
- Industrial automation processes
- Automatic test devices
- Multichannel data acquisition, data logger
- Motion control

### What is a PAC system?

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

### A complete PAC system consisting of hardware and software

The **MSX-Box** consists predominantly of two elements: the efficient hardware which is based exclusively on standards and the open, free software. Together they form an investment-proof measurement and control system.

#### Core facts on the **MSX-Box**:

- 64-bit MIPS processor
- PCI backplane, without hard disk
- Flexible I/O configuration via PCI measurement boards
- Open and scalable
- Real-time, full machine time for your application only
- Real-time Linux operating system with RTAI expansion
- Web server functions and FTP server
- Communication via Ethernet (TCP/IP)
- Web services (SOAP interface)
- Field bus interfaces (CAN, Profibus slave, Interbus master, RS232/RS485)
- Investment-proof, long-term availability

# 1 What is the **MSX-Box**?

## Hardware: all set to standard

Work with technologies you master: the **MSX-Box** is based exclusively on tried and tested standard components which are available for years:

- Standard Ethernet
- PCI backplane
- 64-bit MIPS processor
- Flexible I/O configuration via PCI measuring cards
- Profibus slave, RS232

## Software: the open source philosophy on Live DVD

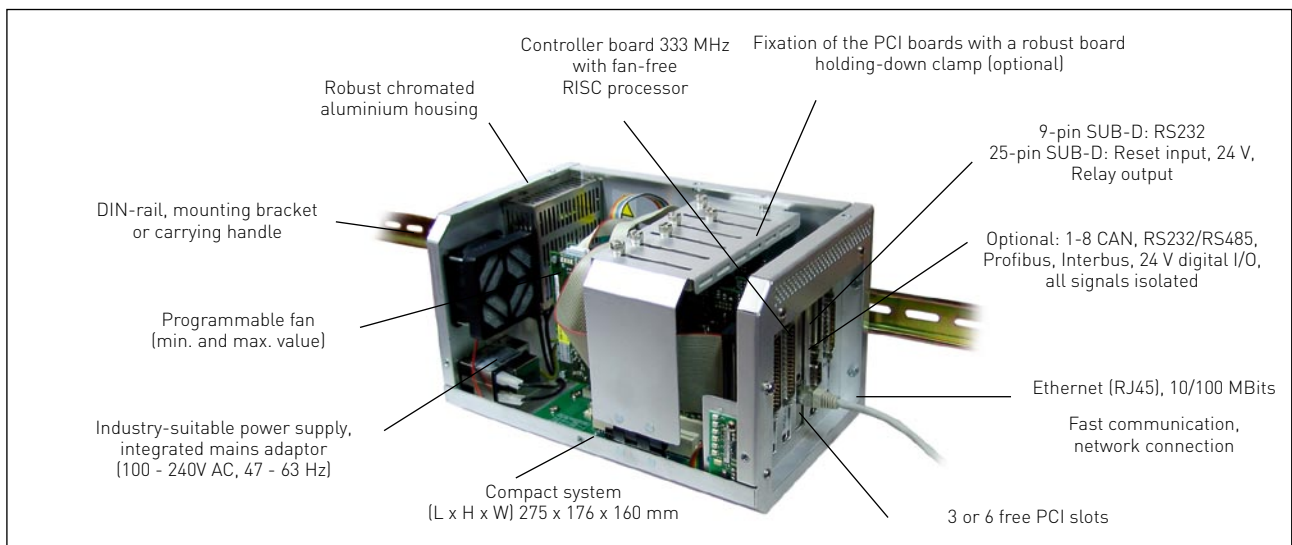
Save costs and time: the open source philosophy runs through the entire software range.

### And these are your benefits:

- You decide whether and when you update the operating system: because you work with the real-time Linux operating system with RTAI expansion. You can also easily solve time-critical tasks.
- You have unrestricted access to the software right down to the kernel source code.  
This means that you can make in-depth adaptations to the measurement system to perfectly optimise it.
- With the web server of the **MSX-Box** it can be reached without an additional program, as most PCs are by standard installed with a browser.  
You can program your own web interface for maintenance purposes.
- All development tools of the **MSX-Box** are licence-free. This means that you save expensive licence fees especially for series.
- The Live DVD includes all development tools which you need to work with the **MSX-Box**. It is based on Knoppix version 5.1.1. As a development environment we have chosen Eclipse, because it has become a standard.

No update obligation,  
no licence fees

Learn more about the development tools and use of the Live DVD in Section 2 "Developing with the **MSX-Box** Live DVD"



**MSX-Box** hardware and software

# 1 What is the **MSX-Box**?

## How do I access the **MSX-Box**?

You have three options of accessing the **MSX-Box**:

- Via serial interface, RS232
- Via standard Ethernet - TCP/IP
- Via the web frontend

Choose the type of access which suits you best

### Access via the serial interface

You can connect the **MSX-Box** with a simple RS232 interface with your computer. This interface is on the controller card of the PAC system and allows accessing a Linux terminal program (such as Tera Term Pro). Via RS232 you can access the boot loader PMON which starts Linux and can therefore parameterise Linux before it is started.

Ideal for developing, configuring and debugging as well as for use without a network.

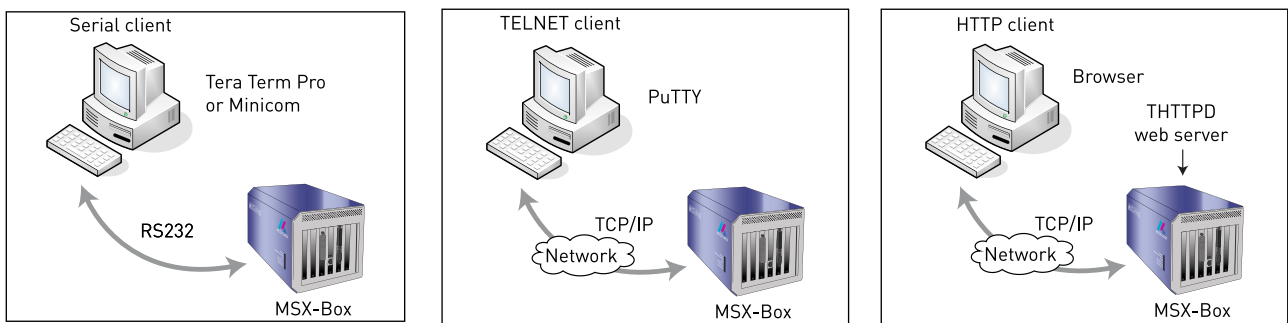
### Access via standard Ethernet – TELNET via TCP/IP

You can also implement monitoring via a TCP/IP-enabled terminal program, such as PuTTY. The benefit is that the **MSX-Box** can be directly integrated into the corporate network.

TELNET, FTP and HTTP accesses are possible for Ethernet communication.

### Access via standard Ethernet – HTTP / web frontend via TCP/IP

The preinstalled THHTTPD web server allows you to save HTML pages on the system. You can also create dynamic websites. These websites are used to display process information or to provide a user interface for controlling tasks.



Accessing options

### Field bus interfaces

Up to 8 CAN, two Interbus-S master and one Profibus slave interfaces fit on the controller card. The CAN interfaces are fitted on the 25-pin SUB-D socket of the controller card and the Interbus-S master and Profibus slave interfaces on the free slot board.

# 1 What is the **MSX-Box**?

## How do I use the **MSX-Box**?

You can use the **MSX-Box** in three different ways. Depending on how specific your application is, you can either use complete templates or program in C.

### Model 1: parameterisation with the web frontend

In this model the **MSX-Box** solves simple measure jobs which do not require any programming. They parameterise the so-called measure jobs with the web frontend. After activation they work independently on the **MSX-Box**.

Program a web frontend for your customers with standard technologies: HTML, CGI, PHP, Java, etc.

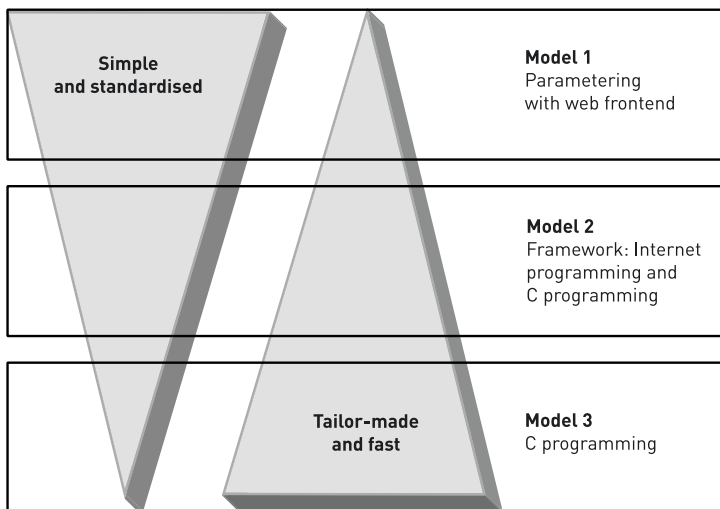
### Model 2: framework for internet and C programming

With the help of the supplied software framework, you can develop your own custom jobs in C.

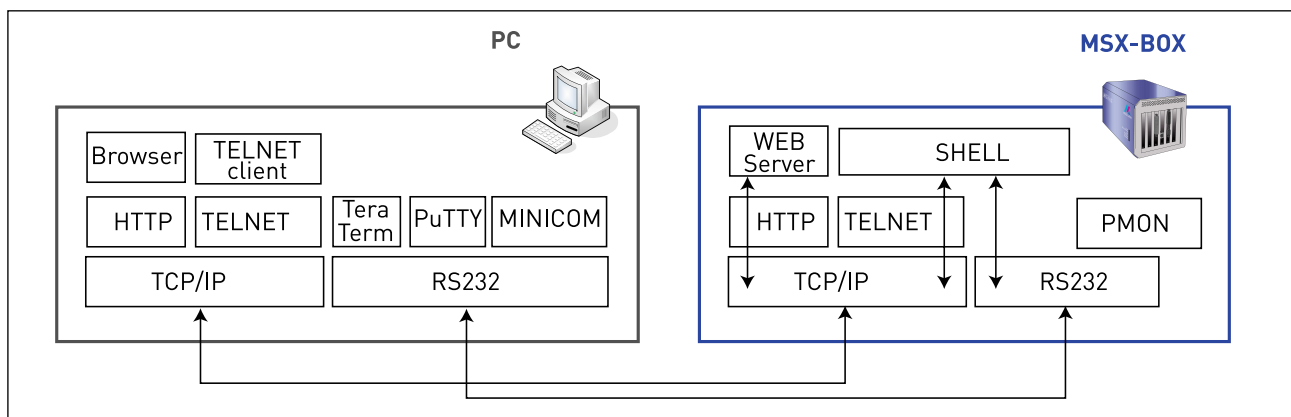
### Model 3: C programming

The open and transparent structure of the **MSX-Box** software allows you to build your complete software application as required: the real-time Linux operating system with RTAI expansion forms the heart of the **MSX-Box** software. The development tools are also accessible right to the source code. Various C development tools were implemented, such as the "MIPSEL-LINUX-GCC" GNU C compiler.

A system which meets all demands: the PAC system **MSX-Box**



Models and tools



**MSX-Box** interfaces

## Flexible, synchronisable inputs and outputs

In the **MSX-Box** you have either 3 or 6 free slots. This means that the amount of PCI boards can be selected depending on the application.

### Administrating scattered I/O

If inputs and outputs of an application are scattered across the corporate network, you can install several **MSX-Boxes** with various IP addresses in order to administrate I/O.

### I/O synchronised

Several **MSX-Boxes** can be synchronised with the MSX-RTSYNC\* synchronisation function.

The synchronisation signal is looped via a differential connection. This function is ideal to record a high amount of signals at the same time across several **MSX-Boxes**.

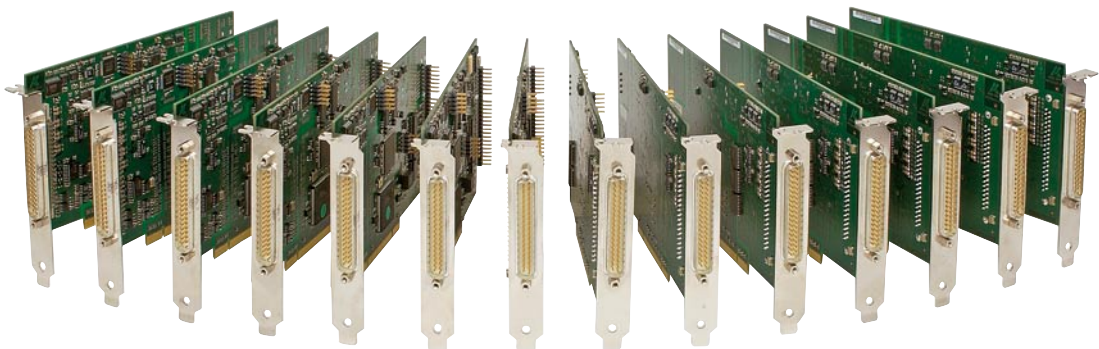
One **MSX-Box** is defined as a master and the others as slaves. The response time between the slave devices is less than 10  $\mu$ s.

\* MSX-RTSYNC: hardware option, can be subsequently implemented like all **MSX-Box** options.

### Broad selection of I/O boards

In order to provide the suitable solution for various measurement and control tasks, ADDI-DATA provides a broad range of stable I/O boards for the PCI bus.

- Digital I/O boards, optically isolated, 24 V, 5 V or TTL
- Analog I/O boards and multifunction boards, optically isolated, 12 to 16-bit
- Noise and vibration measurement board, optically isolated, 24-bit
- Temperature measurement board, optically isolated, 18-bit
- Pressure measurement board, optically isolated, 18-bit
- Length measurement board, optically isolated, 16-bit
- Multifunction counter board, optically isolated
- Motion control for servo and stepper motors
- 1 to 8-fold serial interfaces, optically isolated



With the **MSX-Box** you can use a majority of standard PCI boards

### Not a proprietary system

The **MSX-Box** is an open system. It enables you to use a majority of standard PCI boards: PCI network board, PCI USB board, etc. The only requirement is that these PCI board are supported by Linux and that the driver is available as source code.

## 1 What is the **MSX-Box**?

### Optimised for industrial use

#### Lean design for more efficiency

Computers are increasingly being packed with multimedia tools. These functions do not only use up a lot of memory, but can also hamper crucial, occasionally time-critical computing tasks.

The **MSX-Box**, however, dedicates full machine time to measurement, control and regulation tasks. With its three timers the controller card of the **MSX-Box** can set three pulses up to the microsecond dimension. Combined with the RTAI real-time kernel, these two functions turn the **MSX-Box** into an unbeatable MSR tool for time-critical processes which have to run in a defined clock pulse with a minimum jitter.

#### Intact file system

Activating and deactivating the measurement system on the mains supply can damage the file system. With the **MSX-Box** you are on the right side, because it uses JFFS2 (Journaling Flash File System) technology. This allows you to disconnect the mains supply at any time and the data will remain intact.

#### Efficient protection

The rough, industrial environment requires a reliable protection against everyday faults. ADDI-DATA's PCI boards have proven themselves as regards stability for more than 20 years. The coordinated accessories, such as cables and connection plates, were carefully developed and tested with regard to their protective properties.

#### Long-term deliverability

The controller board is, as all ADDI-DATA products, deliverable for a long period of time. This is in contrast to traditional motherboards which change at short notice and periodically in order to keep up with the fast development of the interested consumer market.

#### The **MSX-Box** comes in two versions:

- **MSX-Box 500** with 5 PCI slots: 2 slots are equipped with controller and Ethernet boards, the three other ones are free for additional PCI short boards.
- **MSX-Box 800** with 8 PCI slots: 2 slots are equipped with controller and Ethernet boards, the six other ones are free for additional PCI short boards.



MSX-Box 800



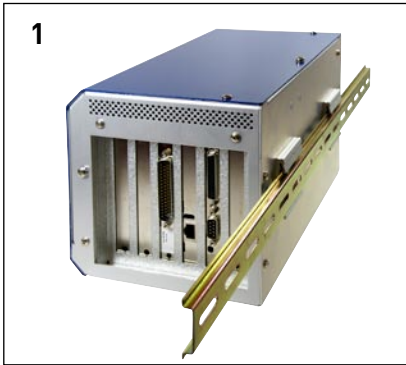
MSX-Box 500

## 1 What is the **MSX-Box**?

### Accessories

#### Mounting options

There are three installation options for the **MSX-Box**: on a top hat rail (1), directly on the wall (2) or with carrier handle (3).



#### Network board

ComboCard offers you the following functions:

- 2 x PCI FireWire IEEE 1394, 1 x internal, 1 x external connection, data transfer rate up to 400 Mbps, supports up to 63 peripheral devices
- 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 socket, 12 V
- Network board PCI 10/100 Mbps, 10Base-T, 100Base-TX, IEEE802.3, 802.3 and protocol, identification of data transfer of 10 Mbps or 100 Mbps, data transfer rate 10 Mbps and 100 Mbps, chipset Realtek RTL8139.

It is also available as GigaLAN network board

#### Board binder

In order to best protect PCI cards in the **MSX-Box** against vibrations, we offer a board binder to fix the boards.

