

MDB2PC

Manual

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1 Preface

1.1 Definitions and Abbreviations

Item	Description
CP	See Control Protocol (MDB2PC CP)
MDB2PC	The actual MDB2PC device.
ESD	electrostatic discharge
EMC	electromagnetic compatibility
MDB	MDB vending machine protocol according to [mdb] .
PC	Personal computer. For simplicity used in this document to describe any RS 232 devices.
RS232 device	A device that supports the RS232 serial protocol. Usually this is a PC.

Table 1: Definitions and Abbreviations

1.2 References

Ref.	Description	Version / Date
[mdbcp]	MDB2PC Specification Abrantix MDB2PC Control Protocol.pdf	-
[mdb]	NAMA Multi Drop Bus / Internal Communication Protocol MDB / ICP	4.2 / Feb. 2011

Table 2: References

2 Introduction

The MDB2PC is a device that allows connecting any RS232 capable device to an MDB capable vending machine. The MDB2PC understands the MDB 9 bit protocol and tunnels the MDB payload in a proprietary 8 bit protocol that can be understood by the RS232 device (s. [Control Protocol \(MDB2PC CP\)](#)). This allows implementing an MDB master or peripheral application on an RS232 device.

The MDB2PC is available in either a Master or a Slave edition. The Master edition can also be operated in MDB slave mode and the Slave edition can only be operated in MDB slave mode. The MDB slave mode supports MDB cashless peripherals and coin changers as defined in [\[mdb\]](#). Other slave peripherals can be implemented with the MDB2PC, but no support is provided. Please contact Abrantix for further information.

For technical details and the protocol specification, please refer to [\[mdbcp\]](#).

2.1 Product names

We constantly improve the MDB2PC to suit the needs of our clients. These improvements can be firmware or hardware changes. Changes are not actively communicated to clients.

Firmware changes and smaller hardware changes will not lead to a change of the product name.

Bigger hardware changes will lead to the change of the product name. Therefore we added a number in the end of the product name. This number will be increased with each bigger hardware change.

In this document, the term MDB2PC is used for all product versions and editions, and also stands for MDB2PC2 or any other future version.

3 Safety Instructions

While working with the MDB2PC you must follow the rules defined by ESD (electrostatic discharge).

While working with the MDB2PC you must follow the rules defined by EMC (electromagnetic compatibility).

Any manipulation on the MDB2PC is only allowed after you have disconnected the power source (MDB plug) or after you have de-powered the whole vending machine.

It is not allowed to open the MDB2PC. The violation of this rule eliminates any warranty.

Only qualified and trained people are allowed to install and manipulate the MDB2PC.

Protect the MDB2PC from liquids. Never let the MDB2PC get in contact with any liquids.

Never try to connect the MDB2PC with any other electronic devices that are not defined in this document or that are not provided by Abrantix.

After a power down of the MDB2PC, wait at least five second before you re-power the device.

Never try to open the MDB2PC or unscrew the housing. Never try to manipulate the MDB2PC if you are not a qualified and trained person. Violation of this rule can damage or destroy the MDB2PC.

Always call Abrantix in the following cases:

- The MDB2PC got in touch with liquids
- The MDB2PC was dropped and the housing is damaged
- The MDB2PC shows significant changes in its operating behavior.

Please verify that you operate the MDB2PC only under the allowed temperature range (10 degree Celsius to 50 degree Celsius)

Use the MDB2PC only for its [Intended Use](#).

3.1 Warning

The MDB2PC must be installed and operated according to the user manual.

4 Components

Pos.	Name	Description	Size (cm) L * W * H
1	MDB2PC Board	Either the master or the slave edition can be used. The master edition is also available with USB interface instead of a serial interface (beta only). See below.	9.8 * 5.2 * 2.1 approx.
2	MDB2PC Serial Cable	Optional	Length: 105 approx.
2	MDB2PC Housing	Optional	10.8 * 6.6 * 2.2 approx. (Height plus approx. 1 cm for sockets sticking out)

Table 3: MDB2PC components



Figure 1: MDB2PC Master Edition



Figure 2: MDB2PC Slave Edition



Figure 3: MDB2PC Master Edition USB (Beta Only)



Figure 4: MDB2PC Serial Cable



Figure 5: MDB2PC in Housing



Figure 6: MDB2PC USB in Housing

5 Interfaces

Name	Interface
MDB	MDB Interface to the vending machine
MDB (Power)	MDB Interface for power supply (in Master Mode only)
Serial	Interface to connect or a RS232 device
USB	Interface to connect or a USB device (Beto only)

Table 4: Interfaces

5.1 Connection Chart

Please refer to the following drawing to connect the MDB2PC to the vending machine and the RS232 device:

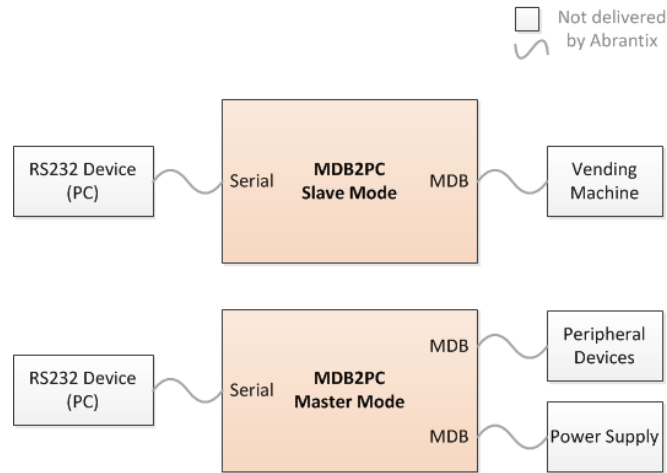
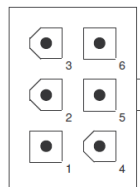


Figure 7: Connection Chart

In slave mode, it does not matter to which MDB plug the power supply and the peripherals are connected. The plugs are interchangeable.

5.2 Socket Layout

5.2.1 MDB



VMC / Bus Connector
Face View
Header
(Pins)

Figure 8: MDB Socket Layout

Pin	Description
1	12 - 38 VDC
2	DC Power Return
3	N/C
4	Master Receive

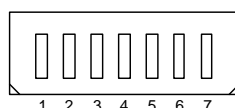
5	Master Transmit
6	Communications Common

Table 5: MDB Socket Pins

Absolute Maximum Voltage = 42.5 VDC (ripple voltage upper limit) (according MDB / ICP Hardware specification).

5.2.2 RS-232

Not available on MDB2PC USB Version.

**Figure 9: RS-232 Socket Layout (P4)**

Pin	Description
1	5 VDC out, max. 0.5 A ¹ . Do not connect any power source to this Pin!
2	RS-232 TX (DCE)
3	RS-232 RX (DCE)
4	N/C (GND)
5	N/C (GND)
6	GND
7	GND

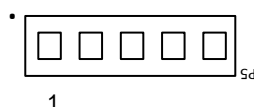
Table 6: RS-232 Socket Pins (P4)

Vendor	Part Number	Description
Molex	51004-0700	Connector Housing
Molex	50011-8000	Crimping Contacts Tin 24-30AWG
Molex	63819-1000	Hand Crimping Tool

Table 7: RS-232 Socket Specification (P4)

5.2.3 Low-Voltage TTL Serial

The MDB2PC LV-TTL I/O Connection Option¹ bypasses the standard RS-232 interface and allows to communicate directly to the MDB2PC Microprocessor.

**Figure 10 Low-Voltage TTL Serial Socket Layout (P5)**

Pin	Description
1	RS-232 Transceiver. In RS-232 Mode over Socket P4 [5.2.2], Pin 1 and Pin 2 must be connected using a Jumper. Remove the jumper for Low-Voltage TTL Serial use. Do not connect anything other to this pin.
2	3.0V LV-TTL RX (DCE)
3	3.0V LV-TTL TX (DCE)
4	GND
5	5 VDC out, max. 0.5 A. Do not connect any power source to this Pin!

Table 8: Low-Voltage TTL Serial Socket Pins (P5)

¹ Only available on MDB2PC Version 2.

5.2.4 USB Virtual COM-Port

Only available on MDB2PC USB Version.

The USB On-The-Go (OTG) Micro-B Receptacle (J5) provides a Virtual COM-Port VCP Interface using a FTDI FT-230x USB to Serial Interface driver. This VCP chipset is supported by all major Operating Systems.

6 Status LEDs

The following status LEDs are provided:

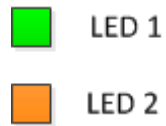


Figure 11: Status LEDs

LED	Status
LED 1	Shows operational state. Continuous blinking (0.5s on, 0.5s off) indicates status OK.
LED 2	Internal use only. (Flash mode)

Table 9: Status LEDs

7 Changing Master / Slave Modes

The MDB2PC Master edition can also be operated as an MDB Slave. The following steps allow changing an MDB2PC Master to a slave or back to a master:

1. Start the SDK GUI
2. Choose tab *MDB Slave and Direct Serial*
3. Select the active COM Port and click *Start*
4. Choose command *MDB Mode = SLAVE*, or *MDB Mode = Master*, respectively
5. Click *Send*
6. You should receive an ACK
7. Now the mode (master or slave) is permanently save in flash memory
8. Change the DIP switches as indicated on the PCB

8 Control Protocol (MDB2PC CP)

The control protocol is a proprietary, serial 8 bit protocol designed by Abrantix. Any device wanting to connect to the MDB over the MDB2PC must implement this protocol. This chapter shall only give a brief overview of the CP. The CP specification can be found in [\[mdbcp\]](#).

The following drawing shows the usage of the control protocol for the different MDB2PC modes.

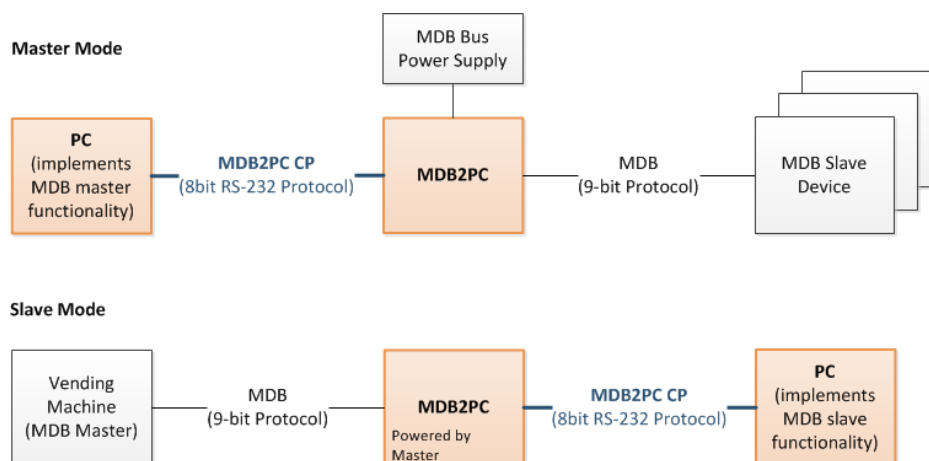


Figure 12: Control Protocol Overview

The CP is an asynchronous, full duplex protocol established between the PC and the MDB2PC. Its main purpose is to frame the payload received from the MDB into an 8 bit format understood by the PC. The MDB payload is not altered by the CP. This way, the PC is free to send and receive any MDB command and the MDB state machine can easily be implemented on the PC.

The CP defines the message framing (simple STX...DLE ETX framing) and the message flow used for communication between the two devices. Also, it defines various control codes that define the nature of a frame being transmitted. The most common control code is DATA [\[mdbcp\]](#), which indicates that the frame contains the unmodified MDB payload. Other control codes are available; these can be used by the PC to obtain information regarding the state of the MDB2PC.

9 SDK

The SDK is a Visual Studio 2010 sample solution written in C#. It shall help to implement applications using the MDB2PC. The SDK is provided as is. Abrantix disclaims any liability for the code.

The code is more a sample than a production implementation, but it shows how simple it is to develop applications for the MDB2PC and shows the general idea on how the [Control Protocol \(MDB2PC CP\)](#) shall be implemented.

It is very likely that certain commands must be tweaked to achieve a stable running application. Also, it shall be remarked that each vending machine model runs its own dialect of MDB. Depending on this dialect, more or less tweaking is necessary.

The SDK consists of the following projects:

Project	Description
Abrantix.MDB2Serial.Common	Common code shared over all projects, such as MDB commands specified in [mdb] .
Abrantix.MDB2Serial.MDBSimulator	The actual master (<i>MasterSimulator.cs</i>) and slave (<i>CashlessDeviceSimulator.cs</i>) sample code. Refer to these files as a first step. The file <i>SerialDriver.cs</i> contains the control protocol implementation [mdbcp] .
Abrantix.MDB2Serial.MDBSimulatorUI	The UI. Use this project as the startup project. When started, the tabs <i>MDB Master Simulator</i> and <i>Cashless Device Simulator</i> are of interest.

Table 10: Description of SDK Source Code Projects