

## Matrix-500

### ARM-9 based Industrial Linux Computer

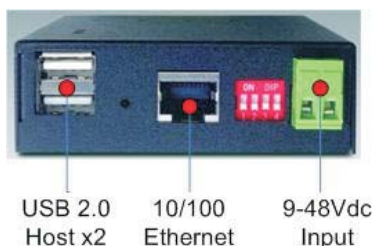


#### Key Features

- Linux 2.6.x ready ARM9-based embedded computing platform
- Built-in web server (boa) for web-based application
- All Flash-based architecture, no fan, no wire and no moving parts inside, ensures 365/24/7 non-stop running
- Up and run, no hardware or software installation is needed
- 32MB SDRAM and 8MB Flash (can be upgrade to up 64MB)
- One 10/100Mbps Ethernet port
- Four high speed TTY (serial ) ports
- Two USB 2.0 host ports for add-on functionality expansion
- One internally mounted SD memory card slot for storage expansion
- GNU C/C++ tool chain for Linux/Windows environment
- DIN-rail mountable

#### Applications

- Web-based remote monitoring and control
- Distributed data acquisition and control
- Front-end data logger/processor

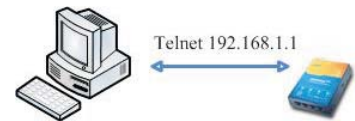


#### Introduction

Matrix-500 is the world's smallest Linux-ready ARM9-based computing platform for embedded headless run-only application. It comes equipped with one Ethernet, four TTY (serial) ports, two USB host and one USB client ports, plus one internal SD memory card slot in an incredible small package measuring only 78x108x25 mm.

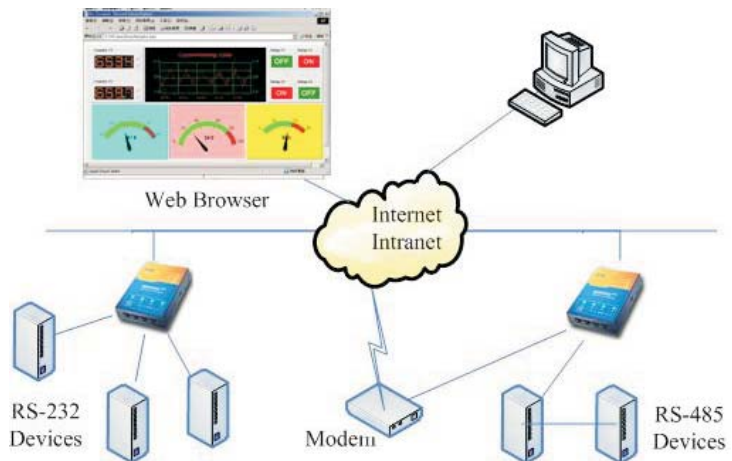
#### 100% Linux, Up and Run, Hassle free

Just power on the Matrix-500, you will get a 100% pure Linux environment in a second. Telnet it and login, then you can operate the Matrix-500 the same way as you do on a normal Linux desktop, such as coping, moving, erasing files and directories etc., or invoking the vi editor to make or change configuration files.



#### Powerful Networking & Communication Capability

Matrix-500 provides one 10/100Mbps Ethernet port for traditional wired networking. Users can add on extra IEEE-802.11b/g wireless networking capability by plugging an USB WiFi adapter into the Matrix-500. Also, Matrix-500 provides four high-speed (up to 230.4Kbps) TTY ports for communication with RS-232/422/485 devices. Port 1 can be configured as RS-232, RS-422 or RS-485. Port 2 features full RS-232 supporting for modem connection. Port 3 and Port 4 support standard RS-232s.



#### 4GB Disk Space for Web-based Remote Monitoring & Control

Matrix-500 features an internally mounted SD memory slot for storage expansion, ranging from 16MB to 4GB. This means Matrix-500 can hold huge amount of data or web pages, which is a must-have feature needed for Web-base remote monitoring & control. Data can be locally processed and stored in the Matrix-500, or can be transferred to another computer on the network or can be examined through web browser anywhere anytime.

#### Open-source GNU Tool Chain for Application Development

It is easy to develop user programs for the Matrix-500. GNU Tool Chain for Windows/Linux environment is provided in Matrix-500's standard package including C/C++ cross-compiler, POSIX standard C/C++ library and source-level debugger.

# Matrix-500 Specification

## Hardware Specifications

- **CPU:** ATMEL AT91RM9200 ARM9 RISC CPU
- **Clock:** 180MHz
- **Memory:**  
SDRAM: 32MB  
Flash: 8/16/32/64MB (8MB as standard)  
EEPROM: 2KB
- **Ethernet Port**  
One port, 10/100 Mbps, RJ45 connector  
1.5KV magnetic isolation
- **Serial Ports**  
Port 1: can be set as RS-232, RS-422, or RS-485  
Port 2,3,4: RS-232  
Connector type: RJ45 connector
- **Serial Port Signals**  
RS-232: RxD, TxD, RTS, CTS, DSR, DTR, DCD, GND  
(for Port 2 only)  
RS-232, RxD, TxD, RTS, CTS, GND  
RS-422: RxD+, RxD-, TxD+, TxD-, GND  
RS-485: Data+, Data-, GND  
Protection: 15KV ESD for all signals
- **Serial Port Parameters**  
Baud Rate: up to 230.4 Kbps  
Parity: None, Even, Odd, Mark, Space  
Data Bits: 5,6,7,8  
Stop Bit: 1, 1.5, 2 bits  
Flow Control: RTS/CTS, XON/XOFF, None
- **USB Host Ports**  
Two ports, USB 2.0 compliant, supports low-speed (1.5Mbps) and full-speed (12Mbps) data rate
- **USB Client Port**  
One port, USB 2.0 compliant, supports full-speed (12Mbps) data rate
- **Mass Storage**  
One SD 1.0 compliant socket inside, supports up to 4GB SD memory card
- **WatchDog Timer:** for kernel use
- **Real Time Clock:** yes
- **Buzzer:** yes
- **Power input:** 9~48VDC
- **Power consumption:** 300mA@12VDC
- **Dimension:** 78 x 108 x 24mm
- **Operation Temperature**  
-10 to 60°C(14 to 140°F), 5 to 95% RH
- **Regulation**  
CE Class A, FCC Class A

## Software Specifications

- **OS:** Linux, kernel 2.6.x
- **Boot Loader:** U-Boot 1.1.2
- **File Systems**  
JFFS2, ETX2/ETX3, VFAT/FAT, NFS
- **Protocol stacks**  
IPv4, ICMP, ARP, DHCP, NTP, TCP, UDP, FTP, Telnet, HTTP, PPP, PPPoE, CHAP, PAP, SMTP, SNMP V1/V3, SSL, SSH 1.0/2.0
- **Utilities**  
bash: shell command  
tinylogin: login and user manager utility  
telnet: Telnet client program  
busybox: Linux utility collection  
ftp: FTP client program
- **Daemon**  
pppd: Dial In/out over serial port & PPPoE  
snmpd: SNMP agent program  
telnetd: Telnet server program  
inetd: TCP server program  
ftpd: FTP server program  
boa: Web server program  
sshd: secured shell server  
iptables: Firewall service manager  
armd: Artila manager daemon
- **Tool Chain for Windows/Linux**  
GCC: C/C++ PC cross compiler  
GLIBC: POSIX Library  
GDB: Source level debugger
- **Standard Device Drivers**  
SD/MMC, UART, Real Time Clock, Buzzer  
Digital I/O, Ethernet, Watchdog Timer
- **USB Host Drivers (could be customized)**  
Flash disk, WiFi (IEEE-802.11b/g), and RS-232 adaptors

## Ordering Information

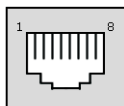
- Maxtrix-500-8/16/32/64  
Matrix-500 with 8/16/32/64MB Flash on board

## Accessories

- Option-100/200/400  
Installation service for 1/2/4GB SD memory card
- WiFi adapter  
USB 802.11b/g USB adapter for Matrix-500
- RS-232-1  
1-port USB-to-232 cable, 30cm

## Pin Assignment (TTY Ports)

PIN	RS-232	RS-422	RS-485
1	DSR	---	---
2	RTS	TxD+	Data+
3	GND	GND	GND
4	Tx	TxD-	Data-
5	Rx	RxD+	---
6	DCD	RxD-	---
7	CTS	---	---
8	DTR	---	---



- \* Connector type: RJ45
- \* Only Port-2 supports full RS-232 signals, other RS-232 ports support Tx, Rx, RTS, CTS, GND
- \* Only Port-1 supports RS-232/422/485, other ports support RS-232 only