Handbücher/Manuals

art of automation

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Manual

VIPA System 200V

PC

Order No.: VIPA HB97E_PC
Rev. 06/29

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Disclaimer of liability

The contents of this manual were verified with respect to the hard- and software.

However, we assume no responsibility for any discrepancies or errors. The information in this manual is verified on a regular basis and any required corrections will be included in subsequent editions.

Suggestions for improvement are always welcome.

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About this manual

This manual describes the System 200V PC 288 CPU that are available from VIPA. In addition to the product summary it contains detailed descriptions of the different modules. You are provided with information on the connection and the utilization of the System 200V PC. Every chapter is concluded with the technical data of the respective module.

Overview

Chapter 1: Basics

This introduction presents the VIPA System 200V as a centralized as well as decentralized automation system.

The chapter also contains general information about the System 200V, i.e. dimensions, installation and operating conditions.

Chapter 2: Assembly and installation guidelines

This chapter provides all the information required for the installation and the hook-up of a controller using the components of the System 200V.

Chapter 3: PC 288 - CPU

This chapter describes the PC-CPU PC 288 and applications in System 200V. The configuration of a PC-based system is described in detail.

The chapter ends with an overview of the BIOS setup and the registers.

Contents

User considerations

Objective and contents

This manual describes the modules that are suitable for use in the System 200V. It contains a description of the construction, project implementation and the technical data.

Target audience

The manual is targeted at users who have a background in automation technology.

Structure of the manual

The manual consists of chapters. Every chapter provides a self-contained description of a specific topic.

Guide to the document

The following guides are available in the manual:

- an overall table of contents at the beginning of the manual
- an overview of the topics for every chapter
- an index at the end of the manual.

Availability

The manual is available in:

- printed form, on paper
- in electronic form as PDF-file (Adobe Acrobat Reader)

Icons Headings

Important passages in the text are highlighted by following icons and headings:

Danger!
Immediate or likely danger.
Personal injury is possible.

Attention!
Damages to property is likely if these warnings are not heeded.

Note!
Supplementary information and useful tips.

Safety information

Applications conforming with specifications

The System 200V is constructed and produced for:

- all VIPA System 200V components
- communication and process control
- general control and automation applications
- industrial applications
- operation within the environmental conditions specified in the technical data
- installation into a cubicle

Danger!

This device is not certified for applications in

- in explosive environments (EX-zone)

Documentation

The manual must be available to all personnel in the

- project design department
- installation department
- commissioning
- operation

The following conditions must be met before using or commissioning the components described in this manual:

- Modification to the process control system should only be carried out when the system has been disconnected from power!
- Installation and modifications only by properly trained personnel
- The national rules and regulations of the respective country must be satisfied (installation, safety, EMC ...)

Disposal

National rules and regulations apply to the disposal of the unit!

Chapter 1 Basics

Overview

The focus of this chapter is on the introduction of the VIPA System 200V. Various options of configuring central and decentral systems are presented in a summary.

The chapter also contains the general specifications of the System 200V, i.e. dimensions, installation and environmental conditions.

Below follows a description of:

- Introduction of the System 200V
- General information, i.e. installation, operational safety and environmental conditions

Content

Safety information for Users

Handling of electrostatically sensitive modules

VIPA modules make use of highly integrated components in MOS-technology. These components are extremely sensitive to over-voltages that can occur during electrostatic discharges.

The following symbol is attached to modules that can be destroyed by electrostatic discharges:

The symbol is located on the module, the module rack or on packing material and it indicates the presence of electrostatic sensitive equipment.

It is possible that electrostatic sensitive equipment is destroyed by energies and voltages that are far less than the human threshold of perception. These voltages can occur where persons do not discharge themselves before handling electrostatically sensitive modules and they can damage components thereby, causing the module to become inoperable or unusable. Modules that have been damaged by electrostatic discharges may fail after a temperature change, mechanical shock or changes in the electrical load.

Only the consequent implementation of protection devices and meticulous attention to the applicable rules and regulations for handling the respective equipment can prevent failures of electrostatically sensitive modules.

Shipping of electrostatically sensitive modules

Modules have to be shipped in the original packing material.

Measurements and alterations on electrostatically sensitive modules

When you are conducting measurements on electrostatically sensitive modules you should take the following precautions:

- Floating instruments must be discharged before use.
- Instruments must be grounded.

Modifying electrostatically sensitive modules you should only use soldering irons with grounded tips.

Attention!

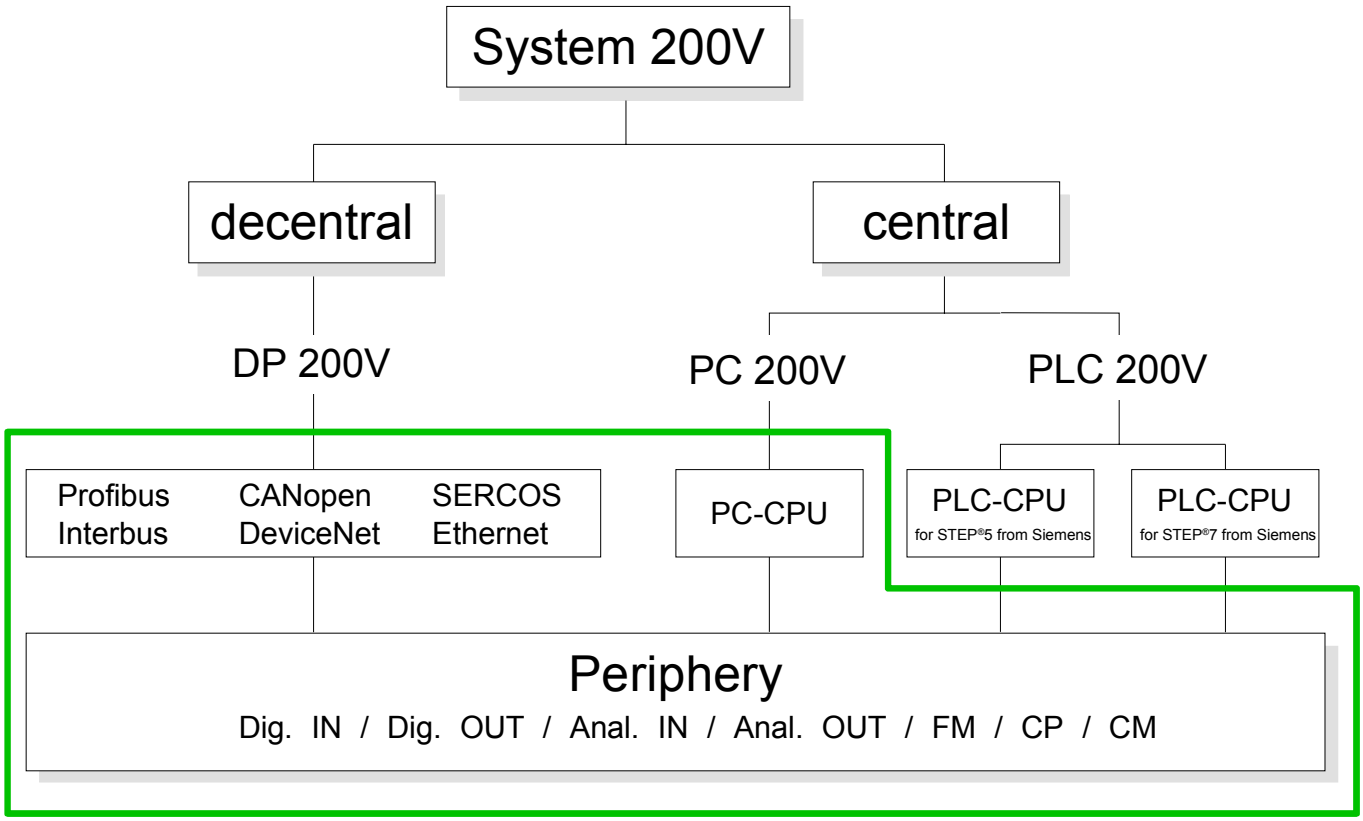
Personnel and instruments should be grounded when working on electrostatically sensitive modules.

Overview

The System 200V

The System 200V is a modular automation system for centralized and decentralized applications requiring low to medium performance specifications. The modules are installed directly on a 35mm DIN rail. Bus connectors inserted into the DIN rail provide the interconnecting bus.

The following figure illustrates the capabilities of the System 200V:



Components

Centralized system

The System 200V series consists of a number of PLC-CPUs. These are programmed in STEP®5 or STEP®7 from Siemens.

CPUs with integrated Ethernet interfaces or additional serial interfaces simplify the integration of the PLC into an existing network or the connection of additional peripheral equipment.

The application program is saved in Flash or an additional plug-in memory module.

The PC based CPU 288 can be used to implement operating/monitoring tasks, control applications or other file processing applications.

The modules are programmed in C++ or Pascal.

The PC 288-CPU provides an active interface to the backplane bus and can therefore be employed as central controller for all peripheral and function modules of the VIPA System 200V.

With the appropriate expansion interface the System 200V can support up to 4 rows.

Decentralized system

In combination with a Profibus DP master and slave the PLC-CPUs or the PC-CPU form the basis for a Profibus-DP network in accordance with DIN 19245-3. The DP network can be configured with WinNCS VIPA configuration tool res. Siemens SIMATIC Manager.

Other fieldbus systems may be connected by means of slaves for Interbus, CANopen, DeviceNet, SERCOS and Ethernet.

Peripheral modules

A large number of peripheral modules are available from VIPA, for example digital as well as analog inputs/outputs, counter functions, displacement sensors, positioners and serial communication modules.

These peripheral modules can be used in centralized as well as decentralized mode.

Integration over GSD File

The functionality of all VIPA system components are available via different GSD-files.

For the Profibus interface is software standardized, we are able to guarantee the full functionality by including a GSD-file using the Siemens SIMATIC Manager.

For every system family there is an own GSD-file. Actual GSD files can be found at ftp.vipa.de/support.

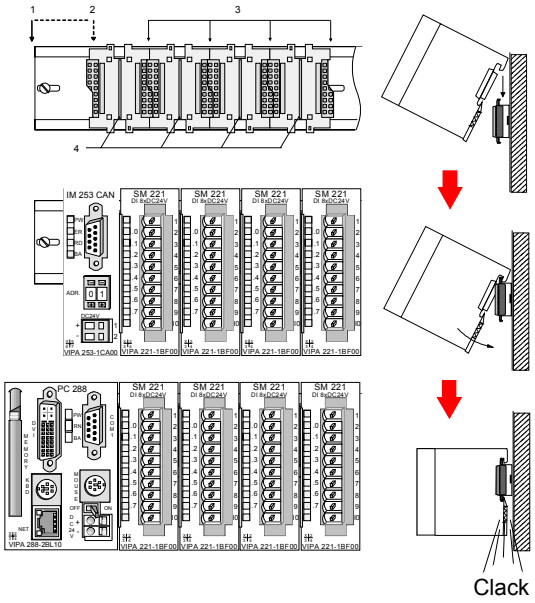
General description System 200V

Structure/ dimensions

- Standard 35mm DIN rail
- Peripheral modules with recessed labelling
- Dimensions of the basic enclosure:
  1tier width: (HxWxD) in mm: 76x25.4x74 in inches: 3x1x3
  2tier width: (HxWxD) in mm: 76x50.8x74 in inches: 3x2x3

Installation

Please note that you can only install header modules, like the CPU, the PC and couplers into plug-in location 1 or 1 and 2 (for double width modules).



[1] Header modules, like PC, CPU, bus couplers (double width)
[2] Header module (single width)
[3] Peripheral module
[4] Guide rails

Note

A maximum of 32 modules can be connected at the back plane bus. Take attention that here the **maximum sum current** of **3.5A** is not exeeded.

Please install modules with a high current consumption directly beside the header module.

Reliability

- Wiring by means of spring pressure connections (CageClamps) at the front-facing connector, core cross-section 0.08...2.5mm^2 or 1.5 mm^2 (18pole plug)
- Complete isolation of the wiring when modules are exchanged
- Every module is isolated from the backplane bus
- ESD/Burst acc. IEC 61000-4-2 / IEC 61000-4-4 (to level 3)
- Shock resistance acc. IEC 60068-2-6 / IEC 60068-2-27 (1G/12G)

Environmental conditions

- Operating temperature: 0 ... +60°C
- Storage temperature: -25 ... +70°C
- Relative humidity: 5 ... 95% without condensation
- Ventilation by means of a fan is not required

Chapter 2 Assembly and installation guidelines

Overview

This chapter contains the information required to assemble and wire a controller consisting of Systems 200V components.

Below follows a description of:

- a general summary of the components
- steps required for the assembly and for wiring
- EMC guidelines for assembling the System 200V

Content

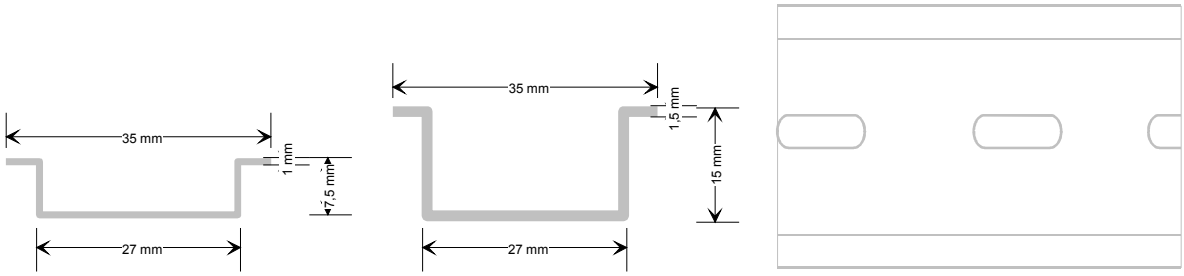
Overview

General

The modules are installed on a carrier rail. A bus connector provides interconnections between the modules. This bus connector links the modules via the backplane bus of the modules and it is placed into the profile rail that carries the modules.

Profile rail

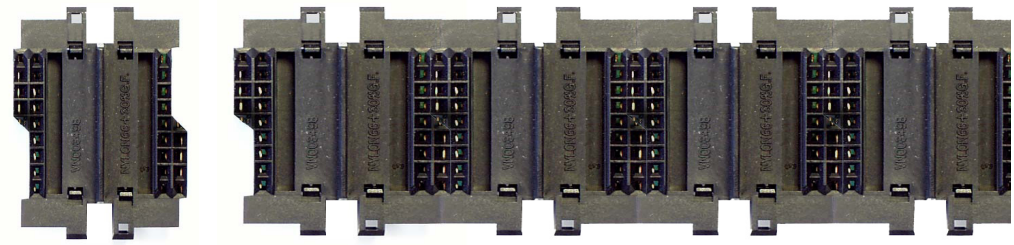
You may use the following standard 35mm profile rail to mount the System 200V modules:



Bus connector

System 200V modules communicate via a backplane bus connector. The backplane bus connector is isolated and available from VIPA in of 1-, 2-, 4- or 8tier width.

The following figure shows a 1tier connector and a 4tier connector bus:

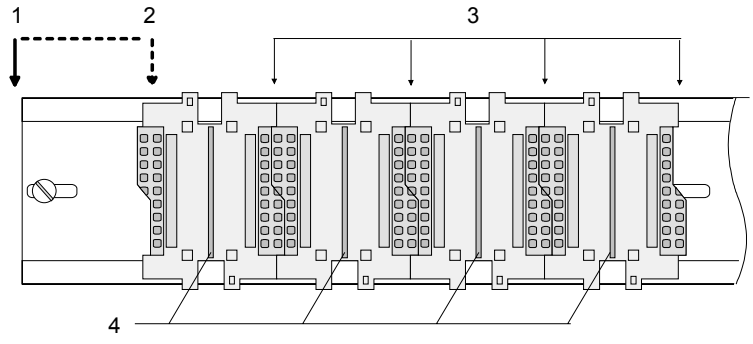


The bus connector is isolated and has to be inserted into the profile rail until it clips in its place and the bus connections protrude from the rail.

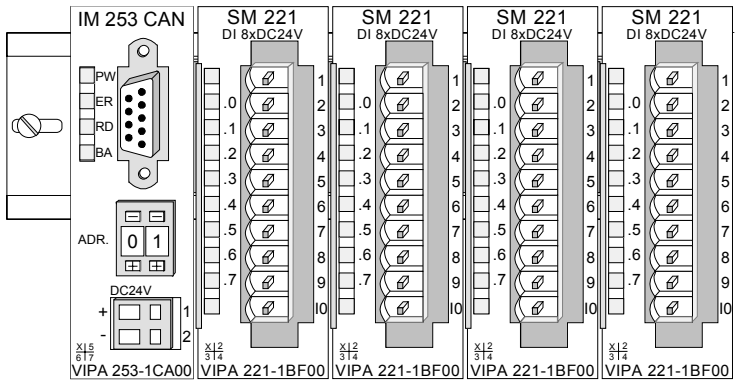
Profile rail installation

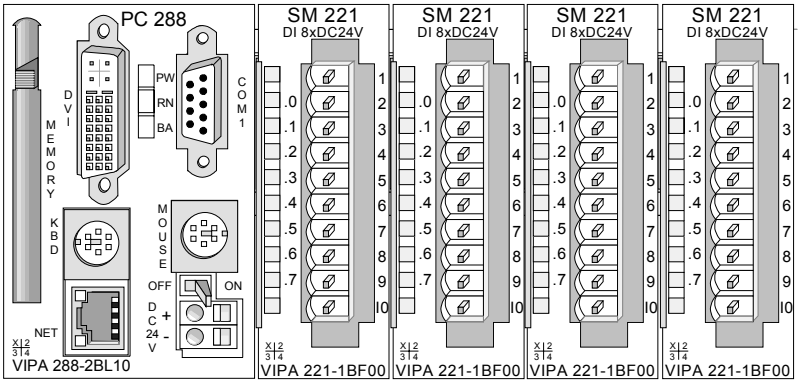
The following figure shows the installation of a 4tier width bus connector in a profile rail and the plug-in locations for the modules.

The different plug-in locations are defined by guide rails.



[1] Header module, like PC, CPU, bus coupler, if double width
[2] Header module (single width)
[3] Peripheral module
[4] Guide rails





Note

A maximum of 32 modules can be connected at the back plane bus.

Take attention that here the **maximum sum current** of **3.5A** is not exceeded.

Assembly regarding the current consumption

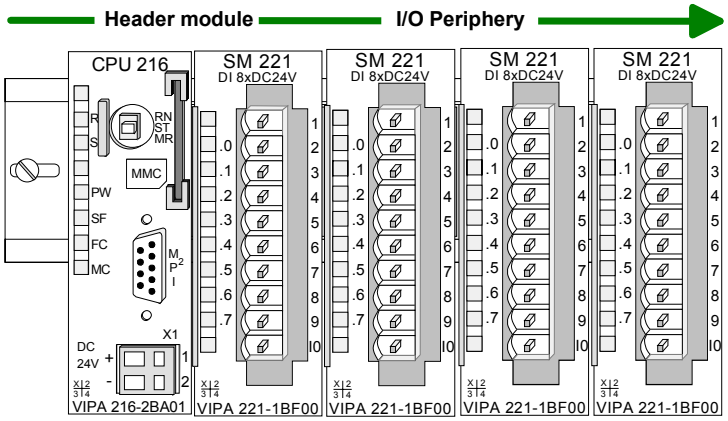
- Use bus connectors as long as possible.
- Sort the modules with a high current consumption right beside the header module. At ftp.vipa.de/manuals/system200v a list of current consumption of every System 200V module can be found.

Assembly horizontal respectively vertical

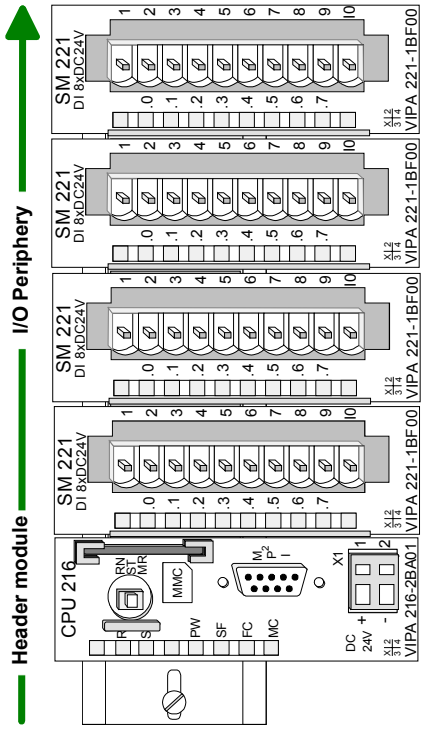
You may install the System 200V as well horizontal as vertical. Please regard the allowed environment temperatures:

- horizontal structure: from 0 to 60°
- vertical structure: from 0 to 40°

The horizontal structure always starts at the left side with a header module (CPU, bus coupler, PC), then you plug-in the peripheral modules beside to the right. You may plug-in maximum 32 peripheral modules.



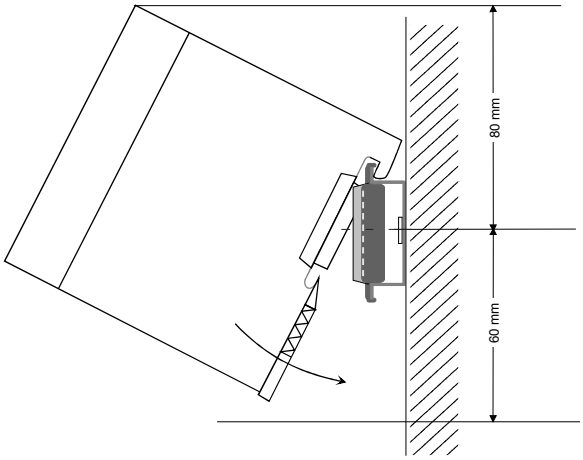
The vertical structure is turned for 90° against the clock.



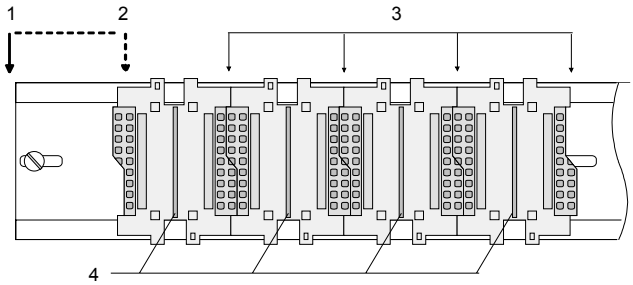
Assembly

Please follow these rules during the assembly!

- Turn off the power supply before you insert or remove any modules!
- Make sure that a clearance of at least 60mm exists above and 80mm below the middle of the bus rail.



- Every row must be completed from left to right and it has to start with a header module (PC, CPU, and bus coupler).



[1] Header module, like PC, CPU, bus coupler, if double width
[2] Header module (single width)
[3] Peripheral module
[4] Guide rails

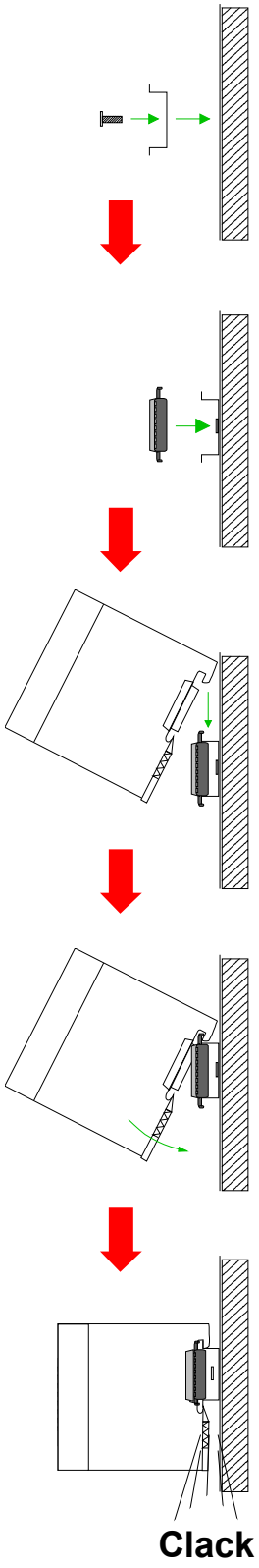
- Modules are to install adjacent to each other. Gaps are not permitted between the modules since this would interrupt the backplane bus.
- A module is only installed properly and connected electrically when it has clicked into place with an audible click.
- Plug-in locations after the last module may remain unoccupied.

Note!

A maximum of 32 modules can be connected at the back plane bus. Take attention that here the maximum **sum current** of **3.5A** is not exceeded.

Assembly procedure

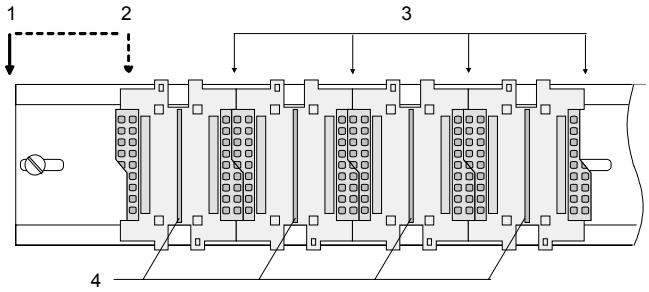
The following sequence represents the assembly procedure as viewed from the side.



- Install the profile rail. Make sure that a clearance of at least 60mm exists above and 80mm below the middle of the bus rail.

- Press the bus connector into the rail until it clips securely into place and the bus-connectors protrude from the profile rail. This provides the basis for the installation of your modules.

- Start at the outer left location with the installation of your header module like CPU, PC or bus coupler and install the peripheral modules to the right of this.



[1] Header module like PC, CPU, bus coupler
[2] Header module when this is a double width or a peripheral module
[3] Peripheral module
[4] Guide rails

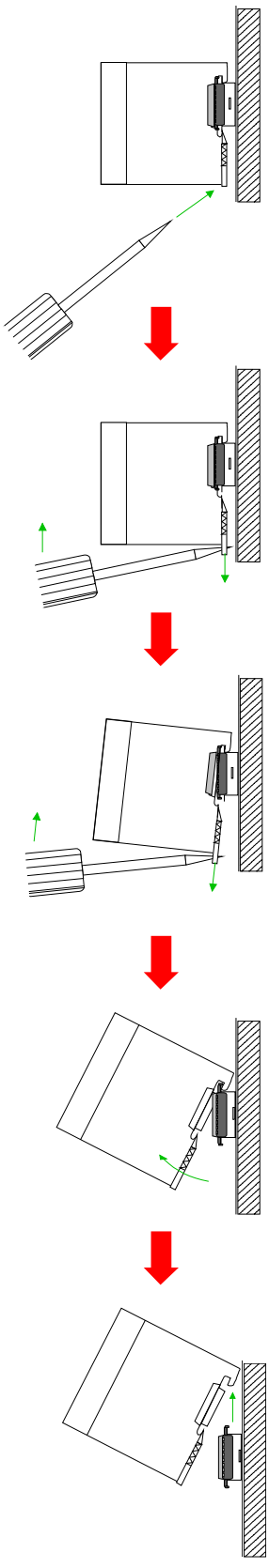
- Insert the module that you are installing into the profile rail at an angle of 45 degrees from the top and rotate the module into place until it clicks into the profile rail with an audible click. The proper connection to the backplane bus can only be guaranteed when the module has properly clicked into place.

Attention!

Power must be turned off before modules are installed or removed!

Removal procedure

The following sequence shows the steps required for the removal of modules in a side view.



- The enclosure of the module has a spring-loaded clip at the bottom by which the module can be removed from the rail.
- Insert a screwdriver into the slot as shown.
- The clip is unlocked by pressing the screwdriver in an upward direction.
- Withdraw the module with a slight rotation to the top.

Attention!

Power must be turned off before modules are installed or removed!

Please remember that the backplane bus is interrupted at the point where the module was removed!

Wiring

Outline

Most peripheral modules are equipped with a 10pole or an 18pole connector. This connector provides the electrical interface for the signaling and supply lines of the modules.

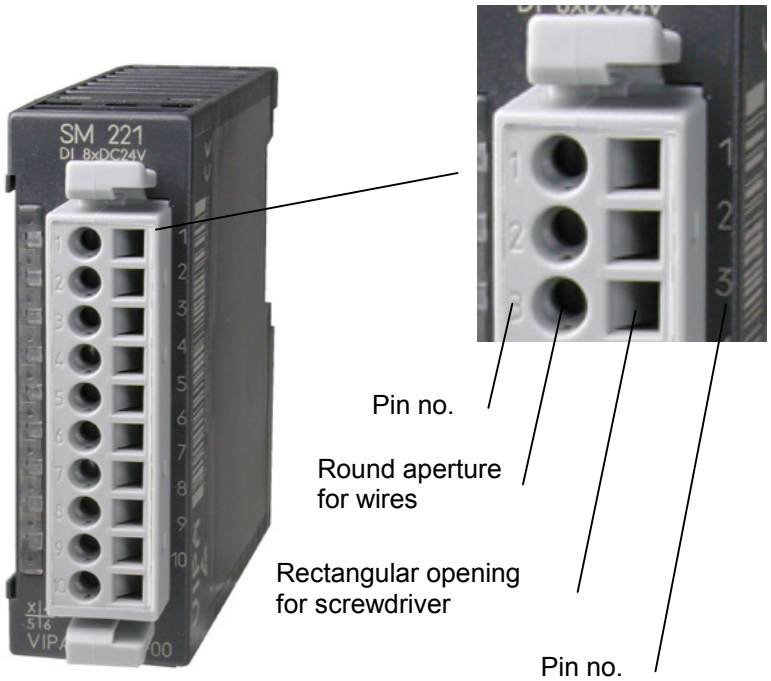
The modules carry spring-clip connectors for the interconnections and wiring.

The spring-clip connector technology simplifies the wiring requirements for signaling and power cables.

In contrast to screw terminal connections, spring-clip wiring is vibration proof. The assignment of the terminals is contained in the description of the respective modules.

You may connect conductors with a diameter from 0.08mm^2 up to 2.5mm^2 (max. 1.5mm^2 for 18pole connectors).

The following figure shows a module with a 10pole connector.

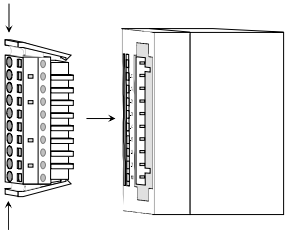


Note!

The spring-clip is destroyed if you insert the screwdriver into the opening for the hook-up wire!

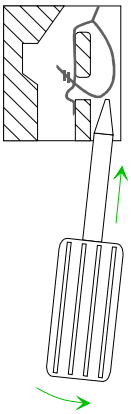
Make sure that you only insert the screwdriver into the square hole of the connector!

Wiring procedure

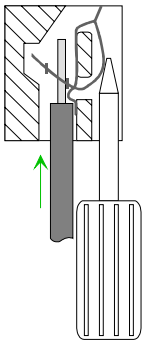


- Install the connector on the module until it locks with an audible click. For this purpose you press the two clips together as shown.
  The connector is now in a permanent position and can easily be wired.

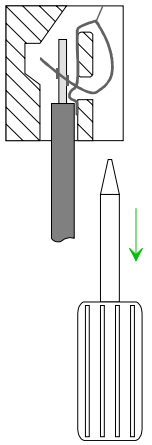
The following section shows the wiring procedure from above.



- Insert a screwdriver at an angel into the square opening as shown.
- Press and hold the screwdriver in the opposite direction to open the contact spring.



- Insert the stripped end of the hook-up wire into the round opening. You can use wires with a diameter of 0.08mm^2 to 2.5mm^2 (1.5mm^2 for 18pole connectors).



- When you remove the screwdriver, the wire is clipped securely.

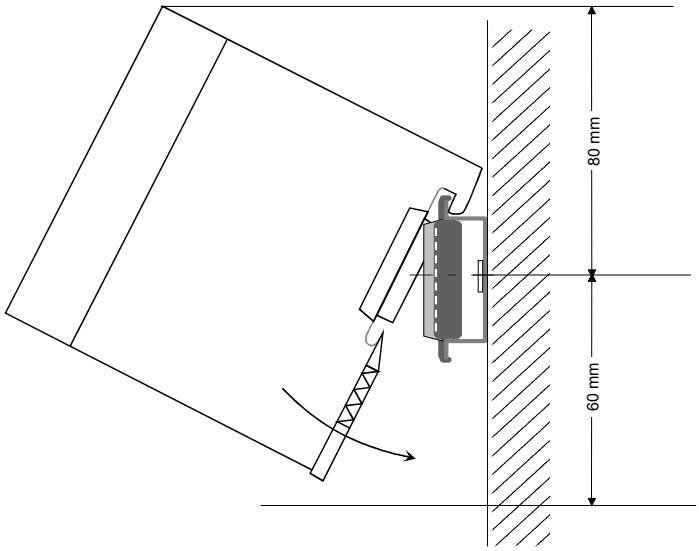
Wire the power supply connections first
followed by the signal cables (inputs and outputs).

Assembly dimensions

Overview Here follow all the important dimensions of the System 200V.

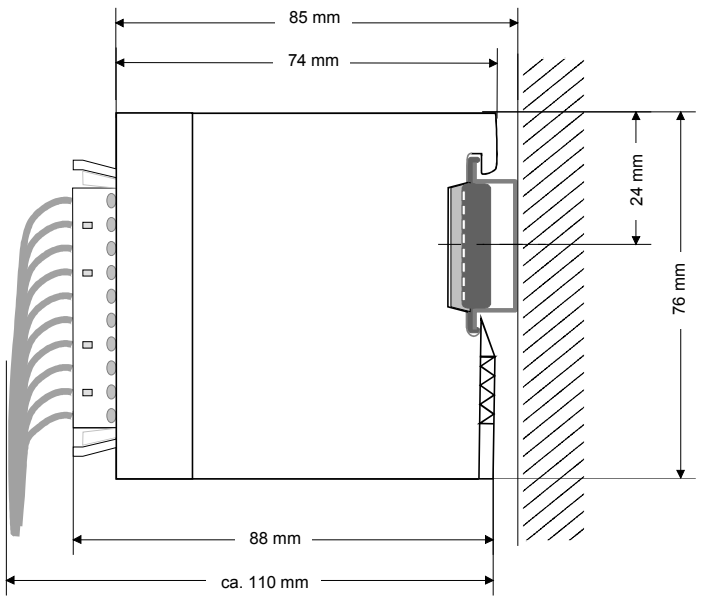
Dimensions Basic enclosure
1tier width (HxWxD) in mm: 76 x 25.4 x 74
2tier width (HxWxD) in mm: 76 x 50.8 x 74

Installation dimensions

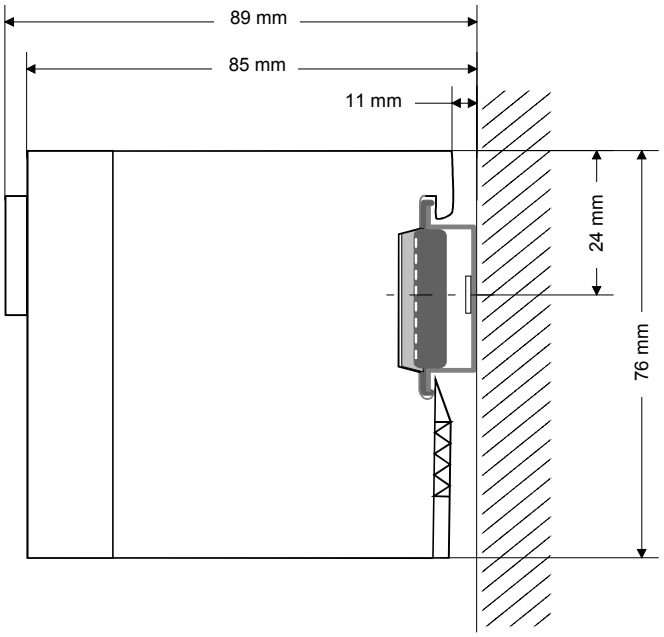


Installed and wired dimensions

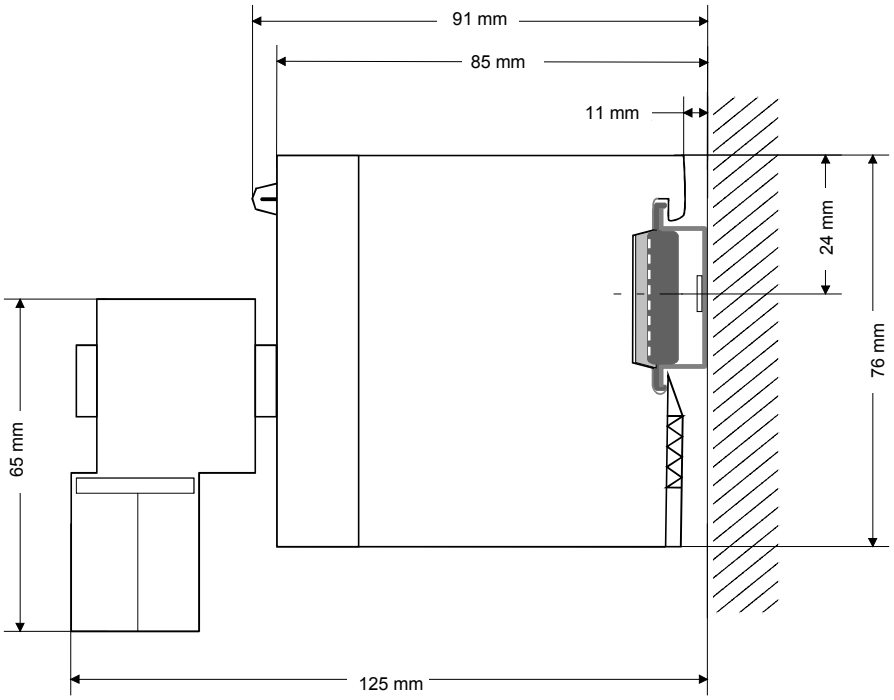
In- / Output modules



Function modules



CPUs here with EasyConn from VIPA



Installation guidelines

General

The installation guidelines contain information on the proper assembly of System 200V. Here we describe possible ways of interference that may disturb the controlling system and how you have to approach shielding and screening issues to ensure the electromagnetic compatibility (EMC).

What is EMC?

The term "electromagnetic compatibility" (EMC) refers to the ability of an electrical device to operate properly in an electromagnetic environment without interference from the environment or without the device causing illegal interference to the environment.

All System 200V components were developed for applications in harsh industrial environments and they comply with EMC requirements to a large degree. In spite of this you should implement an EMC strategy before installing any components which should include any possible source of interference.

Possible sources for disturbances

Electromagnetic interference can enter your system in many different ways:

- Fields
- I/O signal lines
- Bus system
- Power supply
- Protective conductor

Interference is coupled into your system in different ways, depending in the propagation medium (conducted or not) and the distance to the source of the interference.
We differentiate between:

- galvanic coupling
- capacitive coupling
- inductive coupling
- radiated power coupling

The most important rules for ensuring EMC

In many cases, adherence to a set of very elementary rules is sufficient to ensure EMC. For this reason we wish to advise you to heed the following rules when you are installing your controllers.

- During the installation of your components you have to ensure that any inactive metal components are grounded via a proper large-surface earth.
  - Install a central connection between the chassis ground and the earthing/protection system.
  - Interconnect any inactive metal components via low-impedance conductors with a large cross-sectional area.
  - Avoid aluminum components. Aluminum oxidizes easily and is therefore not suitable for grounding purposes.
- Ensure that wiring is routed properly during installation.
  - Divide the cabling into different types of cable. (Heavy current, power supply, signal and data lines).
  - Install heavy current lines and signal or data lines in separate channeling or cabling trusses.
  - Install signaling and data lines as close as possible to any metallic ground surfaces (e.g. frames, metal rails, sheet metal).
- Ensure that the screening of lines is grounded properly.
  - Data lines must be screened.
  - Analog lines must be screened. Where low-amplitude signals are transferred, it may be advisable to connect the screen on one side of the cable only.
  - Attach the screening of cables to the ground rail by means of large surface connectors located as close as possible to the point of entry. Clamp cables mechanically by means of cable clamps.
  - Ensure that the ground rail has a low-impedance connection to the cabinet/cubicle.
  - Use only metallic or metallized covers for the plugs of screened data lines.
- In critical cases you should implement special EMC measures.
  - Connect snubber networks to all inductive loads that are controlled by System 200V modules.
  - Use incandescent lamps for illumination purposes inside cabinets or cubicles, do not use fluorescent lamps.
- Create a single reference potential and ensure that all electrical equipment is grounded wherever possible.
  - Ensure that earthing measures are implemented effectively. The controllers are earthed to provide protection and for functional reasons.
  - Provide a star-shaped connection between the plant, cabinets/cubicles of the System 200V and the earthing/protection system. In this way you avoid ground loops.
  - Where potential differences exist you must install sufficiently large equipotential bonding conductors between the different parts of the plant.

Screening of cables

The screening of cables reduces the influence of electrical, magnetic or electromagnetic fields; we talk of attenuation.

The earthing rail that is connected conductively to the cabinet diverts interfering currents from screen conductors to ground. It is essential that the connection to the protective conductor is of low-impedance as the interfering currents could otherwise become a source of trouble in themselves.

The following should be noted when cables are screened:

- Use cables with braided screens wherever possible.
- The coverage of the screen should exceed 80%.
- Screens should always be grounded at both ends of cables. High frequency interference can only be suppressed by grounding cables on both ends.

  Grounding at one end may become necessary under exceptional circumstances. However, this only provides attenuation to low frequency interference. One-sided earthing may be of advantage where:
  - it is not possible to install equipotential bonding conductors.
  - analog signals (in the mV or µA range) are transferred.
  - foil-type shields (static shields) are used.
- Always use metallic or metallized covers for the plugs on data lines for serial links. Connect the screen of the data line to the cover. Do **not** connect the screen to PIN 1 of the plug!
- In a stationary environment it is recommended that the insulation is stripped from the screened cable interruption-free and to attach the screen to the screening/protective ground rail.
- Connect screening braids by means of metallic cable clamps. These clamps need a good electrical and large surface contact with the screen.
- Attach the screen of a cable to the grounding rail directly where the cable enters the cabinet/cubicle. Continue the screen right up to the System 200V module but do **not** connect the screen to ground at this point!

Please heed the following when you assemble the system!

Where potential differences exist between earthing connections it is possible that an equalizing current could be established where the screen of a cable is connected at both ends.

Remedy: install equipotential bonding conductors

Chapter 3 PC 288 - CPU

Overview

This chapter contains a description of operation of the PC 288 in the System 200V. After a summary and an overview of the system we will introduce you to the configuration of a PC-based system.

The chapter concludes with the technical data.

The following description includes:

- System overview
- Principles
- Construction
- Configuration
- Technical data

Content

System overview

PC 288

The PC 288 is a complete 486DX based PC. It is suitable for central and decentral control applications.

The external storage media is provided by CompactFlash cards or hard disks (IBM Microdrive) with a capacity of up to 1GByte.

Order data PC 288

Type	Order number	Description
PC 288 - CPU	VIPA 288-2BL10	486 PC-LAN; 66MHz
CompactFlash	VIPA 950-1KS00	CompactFlash Type II
HDD	VIPA 950-1KH00	HDD 340MByte, 540MByte or 1GByte IBM Microdrive

Basics

General

The PC 288 provides you with a complete PC-AT in a compact package with the performance of a 486DX processor. MS-DOS 6.22 is pre-installed on the internal 8MB Flash-ROM.

The PC 288 has connectors for a mouse, a keyboard, a display monitor or a TFT-display as well as an RJ45 socket for network connection.

External memory is provided by a CompactFlash card (type II), which is inserted directly into the front of the unit. You may install CompactFlash cards resp. hard disks IBM Microdrive with a memory capacity up to 1GB.

Applications

This PC conforms to System 200V requirements and it can be employed as master in conjunction with System 200V peripherals. You may use this combination to implement the structures that represent machines and plants in stand-alone operation or a Profibus network.

Configuration

Control applications and simple graphic representations may be programmed in C and C++.

Since the source code for the vbus_api application program has been placed in the public domain, it is a simple matter to create control applications.

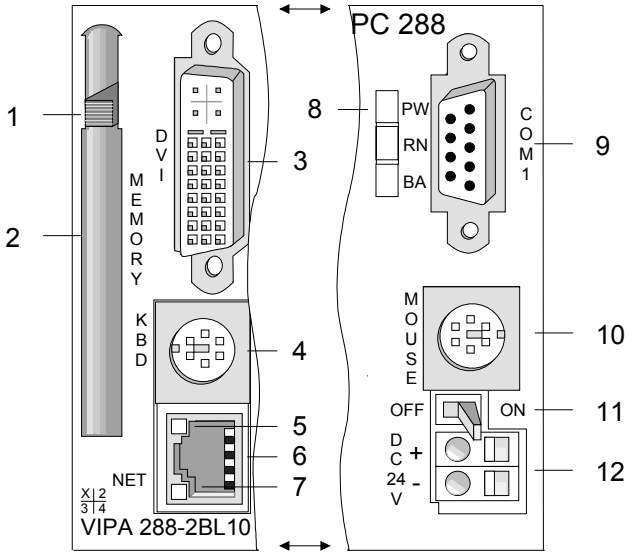
You can also use it to program the drivers for many different operating systems.

Properties

- PC-AT compatible
- STPC INDUSTRIAL 66MHz
- 32MB RAM
- 8MB DiskOnChip®, bootable
- TYPE II slot for CompactFlash™ memory card
- Serial interface COM1
- Connector for an AT-type keyboard and compatible keyboards (foil keyboard, etc.) via a mini-DIN socket
- Mini-DIN socket for a mouse
- Powered by the 24V supply
- Integrated V-Bus controller for the control of System 200V modules
- Integrated Watchdog timer
- DV interface (Digital Visual Interface)
  Connector for a TFT - LCD via PANEL LINK®

PC 288 - CPU - Structure

Front view
PC 288



[1] Eject button for CompactFlash®
[2] CompactFlash socket
[3] DV interface for TFT screen
[4] PS2 socket for keyboard
[5] Ethernet activity indicator LED
[6] RJ45 socket for Ethernet LAN
[7] 100Mbit LAN-LED
[8] Status indicator LEDs
[9] 9pin serial interface
[10] PS2 socket for mouse
[11] ON/OFF power supply lever
[12] Connector for DC 24V power supply

Components

LEDs

The PC 288 is equipped with 3 LEDs that are used as status indicators. These 3 LEDs are on when the power supply is turned on.

The following table shows the purpose and the respective color of these LEDs.

Name	Color	Description
PW	Yellow	Indicates that the PC has been turned on. The PC and the backplane bus (V-Bus) are receiving power.
RN	Green	Is on when the PC status is software RUN and V-Bus communication is active. This LED is not turned on when a V-Bus error occurs.
BA	Red	Is turned on when the output commands have been locked (BASP), i.e. the output modules are not enabled.

ON/OFF lever

The ON/OFF switch controls the power supplied to the circuitry of the PC and to the backplane bus.

Power supply

The PC is provided with an internal power unit. Power is connected by means of two terminals located on the front of the unit. The ON/OFF switch controls the power unit. In position OFF, power is removed from the backplane bus and the circuitry of the PC.

The power supply requires DC 24V. The supply voltage is used to power the circuitry of the PC as well as the various modules that are connected to the PC via the backplane bus with max. 3.5A.

Note!

Verify that the polarity of the power connection is correct!

Socket for CompactFlash

This socket can accommodate a type II CompactFlash® memory card. The PC includes this card into the system as an additional drive.

The CompactFlash® adapter provides compatibility with the "large" PCMCIA type II format to the memory. This means that you may exchange data with any PC via the PCMCIA slot.

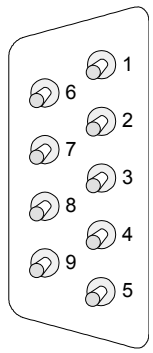
Note!

Never eject or insert the memory card when the PC is turned on!

Sockets and plugs

Serial interface COM 1

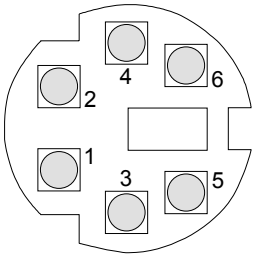
The connector of the serial interface is accessible as COM 1 and it has been designed to cater for a maximum distance of 15m at a communication rate of 38.4kBaud. Data is communicated by means of data, handshaking and control lines.



Pin	RS232	RS422/485
1	DCD-	CTS-
2	RXD	RXD-
3	TXD	TXD+
4	DTR-	TXD-
5	GND	GND
6	DSR-	RXD+
7	RTS-	RTS+
8	CTS-	RTS-
9	RI-	CTS+

PS2 socket KBD/MOUSE

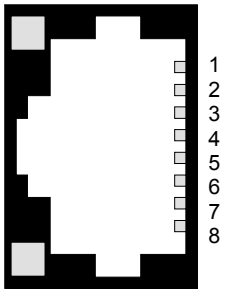
The pin assignment of the two PS2 sockets is identical. Connect your keyboard to the "KBD" socket and your mouse to the "MOUSE" socket.



Pin	Assignment
1	+ KBD-Data (I/O)
2	reserved
3	GND
4	+5V
5	+ KBD-Clock (I/O)
6	reserved

RJ45 socket

The RJ45 socket provides a twisted-pair connection to your Ethernet LAN. The pin assignment and the purpose of the LEDs is as follows:



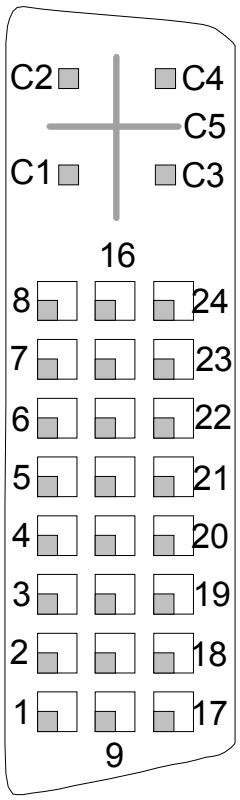
Pin	Signal
1	Transmit +
2	Transmit -
3	Receive +
4	-
5	-
6	Receive -
7	-
8	-

LED	
Ethernet activity (yellow)	On when a active Ethernet connection exists, blinks during data transfers
Rate (green)	Is turned on when 100MBit data transfer is active, else it is off.

DVI socket

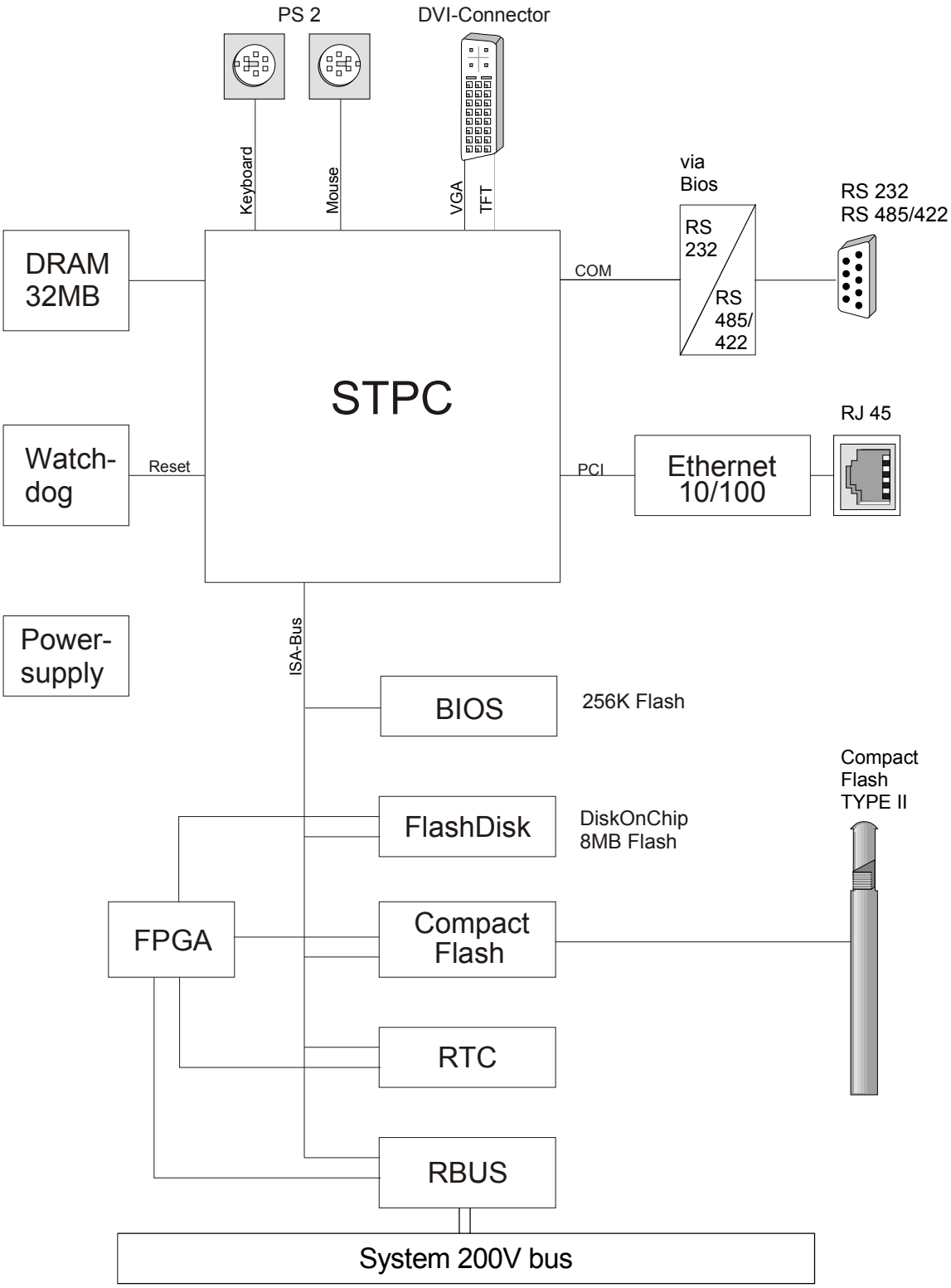
The DVI socket is the interface for analog and digital displays and monitors with a maximum resolution of 1280x1024 pixel.

The pin assignment of the socket is as follows:



Pin	Signal
C1	Analog Red
C2	Analog Green
C3	Analog Blue
C4	Analog Horizontal Sync
C5	Analog RGB Return
1	T.M.D.S Data2-
2	T.M.D.S Data2+
3	T.M.D.S Data2/4 Shield
4	T.M.D.S Data4-
5	T.M.D.S Data4-
6	DDC Clock
7	DDC Data
8	Analog Vertical Sync
9	T.M.D.S Data1-
10	T.M.D.S Data1+
11	T.M.D.S Data1/3 Shield
12	T.M.D.S Data3-
13	T.M.D.S Data3+
14	+5V Power
15	Ground (return for +5V, HSync and VSync)
16	Hot Plug Detect
17	T.M.D.S Data0-
18	T.M.D.S Data0+
19	T.M.D.S Data0/5 Shield
20	T.M.D.S Data5-
21	T.M.D.S Data5+
22	T.M.D.S Clock Shield
23	T.M.D.S Clock+
24	T.M.D.S Clock-

Block diagram The following block diagram shows the logical structure of the PC:



Storage media applications

Overview

The PC 288 has a Flash-ROM based internal drive providing 8MB of space and a type II CompactFlash® slot.

A CompactFlash® adapter provides the compatibility between the CompactFlash® card and the "large" PCMCIA type II format. This can be used to establish a communication link to PCs with a PCMCIA slot.

The physical drives are assigned via the BIOS-SETUP program.

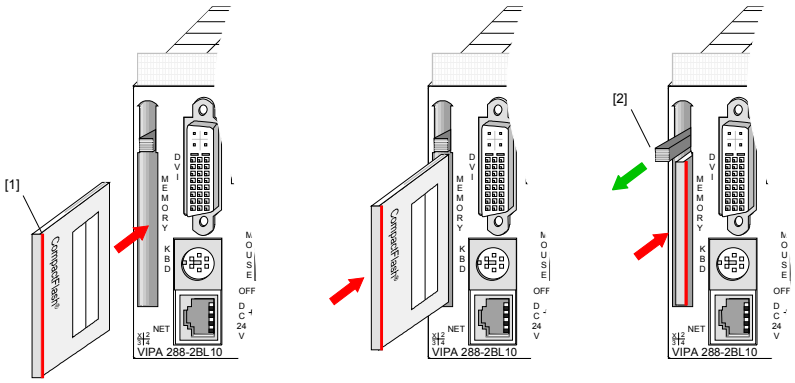
Different settings determine the boot behavior of the PC 288.

Inserting/ejecting a CompactFlash®

Every CompactFlash® memory module has an extraction lip [1]. Make sure that this extraction lip faces to the right.

Insert the memory module into the PC 288 without force until it locks and the eject lever [2] becomes visible.

If you wish to eject the CompactFlash® adapter you press this eject lever.

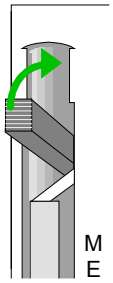


Note!

Never eject or insert the CompactFlash® memory card when the PC is turned on!

The memory card has to be introduced in the setup!

Protection against inadvertent ejection



You may fold the eject lever upwards into the enclosure to protect the unit against inadvertent ejection of the CompactFlash® card.

To eject the memory card you fold the eject lever out of the back to the original position or you can press the lever in the fold-away position using a pointed object, e.g. by means of a screwdriver.

Deployment in the System 200V

Overview

Applications using the PC 288 require C-language programming knowledge. VIPA supplies the PC together with the open source code of the software interface.

Since this code contains a description of all the functions together with examples of the application of the different functions, we do not include further details of these and the V-Bus organization in this manual.

The **vbus_api.c** contains all the functions.

The file **vbus_api.h** contains the respective descriptions.

The file **softsps.c** contains an application example for these functions.

Automatic address allocation

Certain addresses in the PC must be associated with specific peripheral modules so that the installed modules can be accessed.

The PC 288 has a peripheral area (address 0...255)and a process image of the inputs and outputs (0...127 per address) that is similar to the memory organization of a CPU.

During the start-up phase the PC automatically assigns peripheral addresses to the digital input/output modules starting from 0.

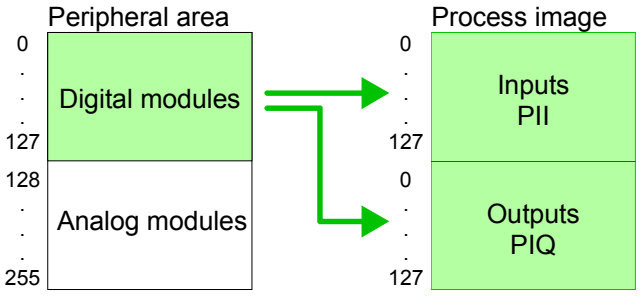
The automatic addressing for analog modules assigns even addresses starting from 128.

Signal status in the process image

The statuses of the signals at the lower addresses (0...127) are also transferred into a special memory area, the *process image*.

The process image is divided into two parts:

- Process image of inputs (PII)
- Process image of outputs (PIQ)



In contrast to the CPU the process image of the PC 288 is not updated automatically. This facility is provided by the functions *vbus_read_pa* and *vbus_write_pa*.

Read and write access

The modules are accessible by means of read or write accesses to the peripheral bytes or the process image.

Note!

Please note that the read and write access to one address can be directed to different modules,

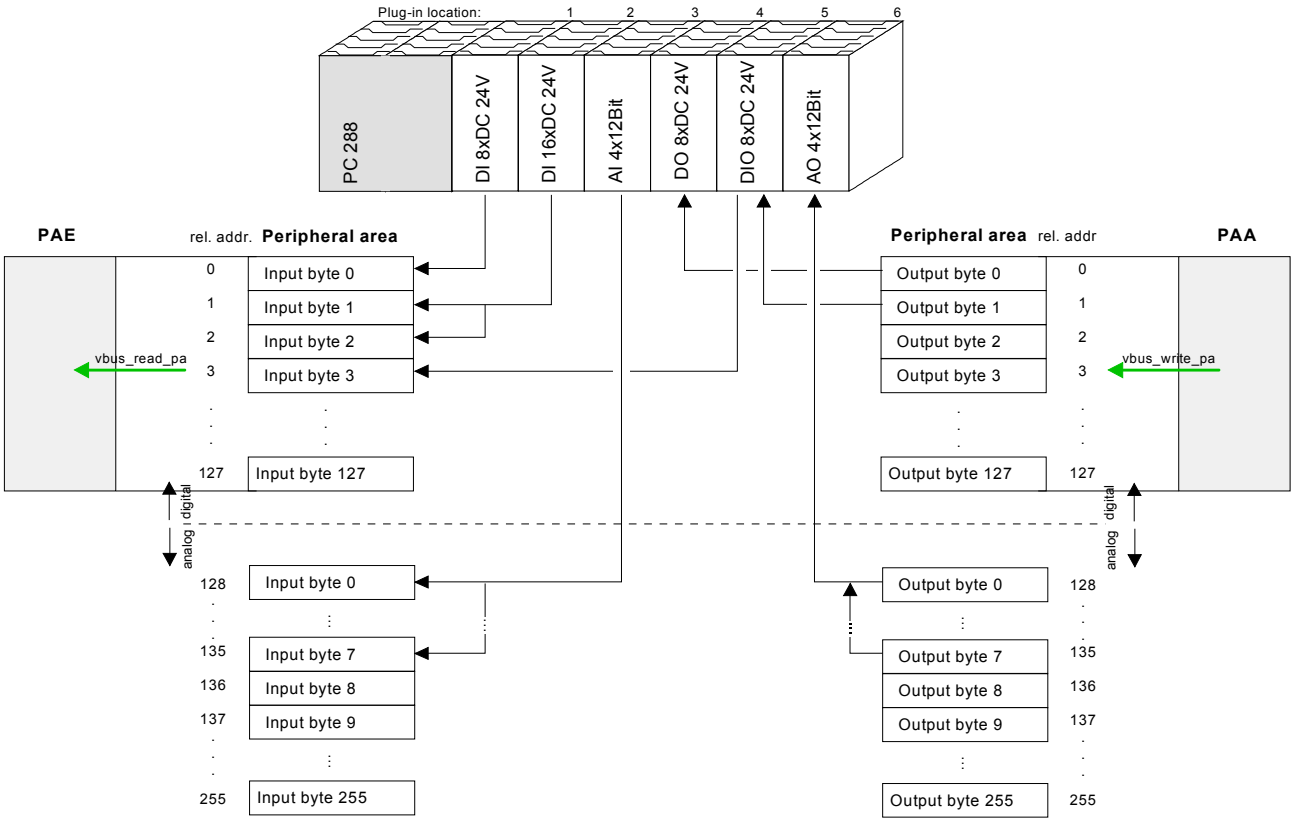
e.g. *vbus_read_pword (128,&w)* reads from the AI at plug-in location 3
vbus_write_pword (128,w) writes to the AO at plug-in location 6

Separate address ranges are assigned to digital and to analog modules during automatic address allocation.

Digital modules: 0...127

Analog modules: 128...255

The following figure explains the process of the automatic address allocation:



Modifying the allocation by means of *set_address_table*

You may use the *set_address_table* function to replace automatically allocated addresses in your program. For this purpose you have to create a custom allocation table and supply this to the *set_address_table* function. In this manner it is possible to locate also analog modules in the process image and digital modules at addresses above 127!

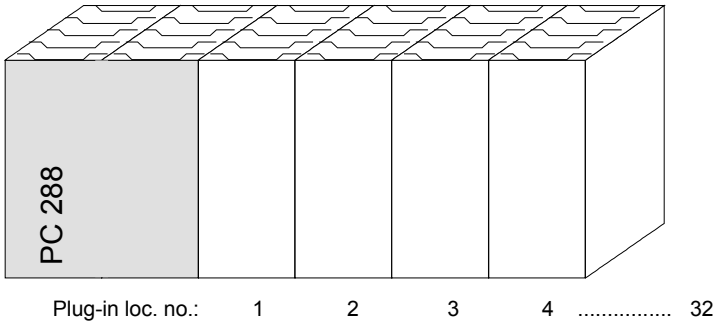
The new allocation is enabled by means of the *vbus_businit* function.

Please refer to the function descriptions in **vbus_api.h**.

Module configuration by means of *vbus_set_param*

System 200V modules, e.g. analog modules, can be configured by means of up to 16Byte of configuration parameters provided by the PC.

This operation is provided by the *vbus_set_param* function. *vbus_set_param* accesses the respective module directly via the plug-in location number (1...32) and saves the parameters in a buffer.



The function *vbus_businit* transfers and activates the new set of parameters.

For more information please refer to the function description contained in **vbus_api.h**.

Note!

Please remember that the delay time of the peripheral modules in the System 200V is app. 2ms unless specified otherwise!

Using the BIOS setup

General

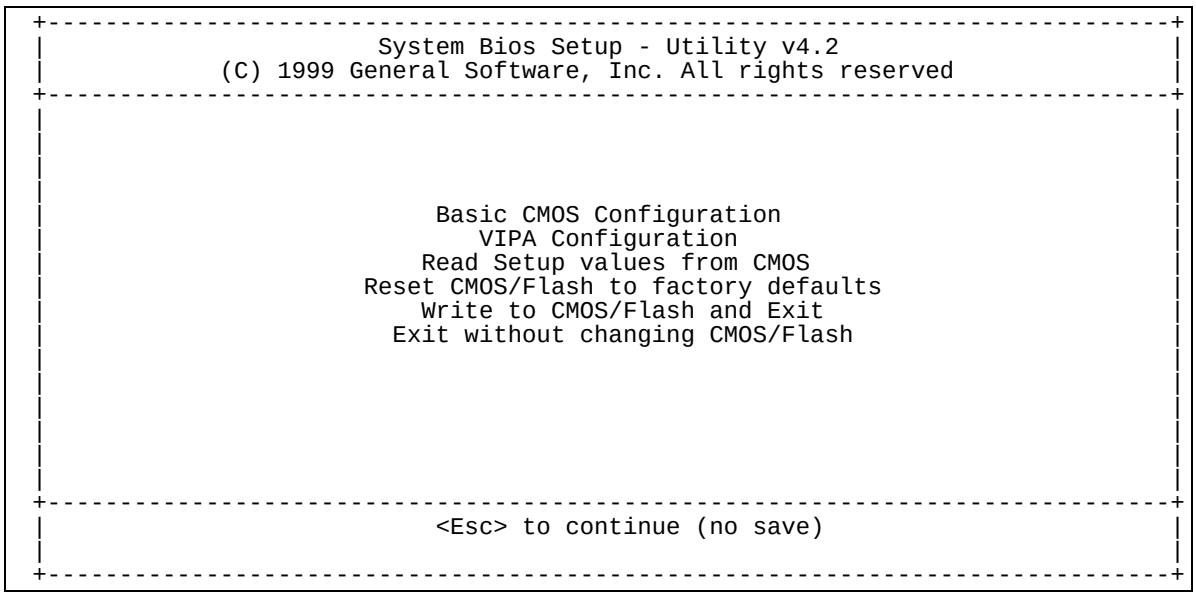
At the start-up of the system, the BIOS version is displayed on the connected monitor. Then the BIOS executes a test of the system components and the memory. At the end of the test the system attempts to boot. Between the start-up and the boot procedure you may access the BIOS setup routine by operating the **[Entf]/[Del]** key.

An appropriate message is displayed on the screen.

Via the setup menu you may configure the hardware of your PC.

BIOS menu

After hitting the [Entf]/[Del] key, the following menu appears:



With the help of the standard cursor keys you may select the single menu options. You activate the selected sub-menu with [Enter].

Via [ESC] you leave the setup without saving your entries.

Control keys in BIOS

Every dialog box that is accessible via the main menu is controlled by means of the following keys:

ESC key

With the [ESC] key the dialog window is closed and you return to the main menu. The altered parameters are stored but not written to the CMOS.

Cursor keys

With the Cursor keys you choose the parameter you want to modify.

PU/PD

With the keys PgUp and PgDn or Bild↑ and Bild↓ or at the numeric block + and - you may alter the value of a parameter.

Note!

Please regard, that at the setup level there has not been loaded a driver for the country specific keyboard yet. Modified setup values are only valid and written into CMOS by confirming your changes explicitly with "Y". To obtain Y, you have to push the Z key.

Basic CMOS Configuration

This sub-menu provides access to the main settings for your system.

The menu is divided into a number of logical units. You can navigate through these by means of the cursor keys.

```
+-------------------------------------------------------------------------+
|                                                                         |
|                 System Bios Setup - Basic CMOS Configuration            |
|            (C) 1999 General Software, Inc. All rights reserved          |
+---------------------------+--------------------+----------------------------+
| DRIVE ASSIGNMENT ORDER:   | Date:>Jan 01, 2000 | Typematic Delay  : 250 ms  |
| Drive A: (None)           | Time: 10 : 03 : 25 | Typematic Rate   : 30 cps  |
| Drive B: (None)           | NumLock:  Disabled | Seek at Boot     : None    |
| Drive C: CompactFlash     +--------------------+ Show "Hit Del"   : Enabled |
| Drive D: (None)           | BOOT ORDER:        | Config Box       : Enabled |
| Drive E: (None)           | Boot 1st: Drive C: | F1 Error Wait    : Enabled |
| Drive F: (None)           | Boot 2nd: (None)   | Parity Checking  : (Unused)|
| Drive G: (None)           | Boot 3rd: (None)   | Memory Test Tick : Enabled |
| Drive H: (None)           | Boot 4th: (None)   | Test Above 1 MB  : Disabled|
| Drive I: (None)           | Boot 5th: (None)   | Long Memory Test : (Unused)|
| Drive J: (None)           | Boot 6th: (None)   | Hexadecimal Case : Upper   |
| Drive K: (None)           +--------------------+-----------------+----------+
| Boot Method: Boot Sector  | IDE DRIVE GEOMETRY:  Sect  Hds  Cyls | Memory   |
+---------------------------+ Ide 0: 2 = AUTOCONFIG, PHYSICAL      |  Base:   |
| FLOPPY DRIVE TYPES:       | Ide 1: Not installed                 |   640KB  |
| Floppy 0: Not installed   | Ide 2: Not installed                 |  Ext:    |
| Floppy 1: Not installed   | Ide 3: Not installed                 |   30MB   |
+---------------------------+--------------------------------------+----------+
|                       U/D/L/R/<CR>/<Tab> to select                      |
|                     or  <PgUp>/<PgDn>/+/+ to modify                     |
+-------------------------------------------------------------------------+
```

Drive Assignment Order and IDE Drive Geometry

This section is used to assign logical drive names to the physical drives.

The VIPA BIOS only provides support for drive "C".

The following settings are valid for "C":

- "None": if you did **not** insert a CompactFlash® card
- "CompactFlash": if you have installed a CompactFlash® card.

Attention!

All the other drives must be assigned to type "None". Any other setting can cause malfunction of the PC.

Please also note that the settings for "Ide 0" in the section *IDE Drive Geometry* must be changed at the same time as the parameters for drive "C". The following settings are valid:

CompactFlash®	DRIVE ASSIGNMENT ORDER \ Drive C:	IDE DRIVE GEOMETRY \ Ide0:
Installed	CompactFlash®	2 = AUTOCONFIG, PHYSICAL
Not installed	None	Not installed

The integrated DiskOnChip® drive (DOC) is configured by means of the "VIPA Configuration" menu.

Floppy drive types

Here you would normally define the settings for the floppy disk drive. Since the PC 288 does not support floppy disk drives you have to select the type "Not installed"! Otherwise you will encounter long-term delays between the system test and the start-up of the system.

Date, Time, NumLock

Here you enter the current date and time.

The "NumLock" parameter defines the status of the [NumLock] key after the system has booted.

Note!

If the real-time clock has stopped it has to be assumed that the backup battery for the CMOS memory is discharged or defective.

Please contact the VIPA Hotline if this battery has still not accepted a charge after one day.

Your CMOS settings are safe even if the battery is empty. You only need to adjust the clock and the date.

Boot order

This parameter is preset to "Drive C" and it defines the boot sequence.

IDE Drive Geometry

This section defines the geometry settings of the IDE drives.

If you are using a CompactFlash® card you have to enter "autoconfig, physical" for this parameter. If you did not install a CompactFlash® card the parameter must be set to "None".

Typematic Rate/Delay

This parameter defines the keyboard interface and specifies the repetition rate for the characters. You should not change this setting.

Seek at Boot

This option specifies which drives should receive a "SEEK" command before booting the system. The default is "NONE" to ensure that the boot procedure is as quick as possible.

Show "Hit Del"

If this option is active the system will display a message to press [Del] to access the setup menu while the system is booting.

Config Box

This parameter specifies whether the configuration settings should be displayed on screen when the system boots.

F1 Error Wait If you activate this menu item, the boot process is stopped when an error is detected. You then may decide what action to take. If you press [F1] the system will continue booting. Press [Del] to gain access to the setup menu.

Parity Checking This menu item is not used.

Memory Test Tick Turn this option on to sound a test click via the PCs speaker when memory is being tested.

Test Above 1MB This parameter determines whether the memory above the 1MB limit will be tested by the memory test or not.

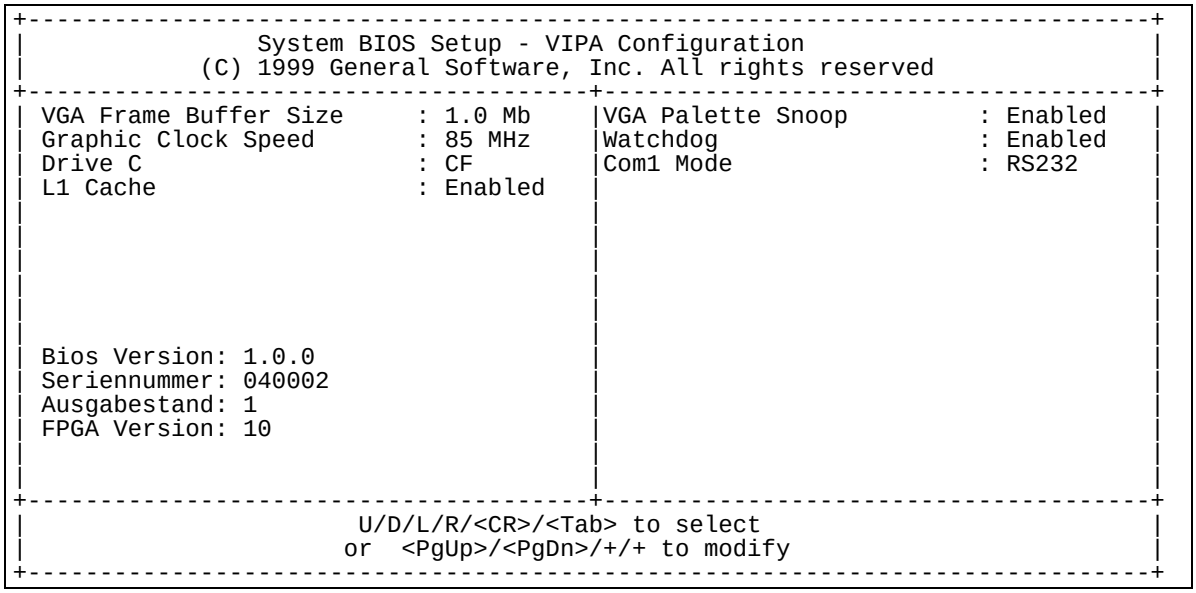
Long Memory Test This menu item is not used.

Hexadecimal Case This menu item determines the display format that the BIOS uses for hexadecimal numbers. You can either choose "UPPER" (capitals) or "LOWER" (lower case).

Memory Base / Ext. This menu item displays the memory configuration below 1MB (Base Memory) and above 1MB (Extended memory). These parameters are purely for information purposes and they cannot be changed.

VIPA Configuration

This sub-menu is used to define the board-specific settings. You may navigate through the menu by means of the cursor keys.



VGA Frame Buffer Size

This parameter determines the amount of memory that is used as graphic memory for the internal graphic controller.

The respective memory area is no longer available as main memory for the processor.

Graphic Clock Speed

This option determines the clock speed used for the internal graphic controller. This option should always be set to "85MHz".

Drive C

This parameters determines the drive from which the operating system is booted:

"CF" CompactFlash® (C:) followed by the internal drive (D:)

"DOC" DiskOnChip® - internal drive (C:) followed by CompactFlash® (D:)

In every case the other drive will be accessible as drive D:.

L1 Cache

This option enables and disables the L1 cache of the processor.

VGA Palette Snoop

This menu item determines whether access to the VGA palette can only occur within the STPC (disabled) or whether it should also be routed to the external PCI bus (enabled).

Watchdog

This option is used to enable or disable a Watchdog that issues an automatic reset after a certain time has elapsed (30s).

If you deactivate the Watchdog in your application program you can ensure that your system has booted without errors. Otherwise the PC is re-booted when the watchdog has expired.

You may define the watchdog time and the watchdog properties in the system register.

Com1 Mode

This parameter determines the physical properties of serial interface COM 1. You may select from:

RS232 RS232 interface

RS422 RS422/485 interface

Version data

The left hand section of the "VIPA Configuration" menu displays hardware specific parameters:

BIOS-Version: The version level of the BIOS

Serial No.: Every PC is provided with a unique serial number. This serial no. is identical to the serial no. located on the enclosure.

Revision level: Identical to the revision level located on the enclosure.

FPGA Version: The version of the FPGA that controls the V-Bus access.

Note!

You should include this information when you request information from the service department of VIPA GmbH to allow us to help you more effectively.

Note!

The following menu items display a query that is to be answered with "Yes" or "No".

Please note that the keyboard uses the US layout for the BIOS setup, i.e. that you have to press the [Z] key on German keyboards to obtain the letter "Y".

Read Setup values from CMOS

This option loads the most recent settings that were saved to CMOS memory.

Reset CMOS/Flash to factory defaults

This option loads the factory default values into CMOS memory.

If you wish to write these values into the CMOS memory you have to use the menu item "Write to CMOS and Exit" to quit from this function.

Write to CMOS/Flash and Exit

This menu item saves the modified settings to CMOS-RAM.

When the settings have been saved the system is re-started automatically which will reload the modified configuration settings.

Note!

This process can require a few seconds since the data is also saved in the EEPROM.

During this time you may **not** turn the system off or issue a manual reset!

Exit without changing CMOS/Flash

When you select this menu item, you quit from the setup menu without saving and activating any settings to CMOS memory or to the EEPROM.

Register description

Address range

The following addresses are occupied by VIPA:

270h - 277h	Watchdog
280h - 28Fh	
280h - 284h	reserved
285h	EEPROM Port
286h - 28Dh	reserved
28Eh	Version
28Fh	Device ID = 84h
290h - 297h	
290h	WD-Timer
291h	RS232/RS422
292h	C165 control register
293h	Enable register
294h - 297h	reserved

Watchdog

(I/O address range **270h-277h**)

The Watchdog is turned off when the system has started or has been reset and it may be enabled under software control.

The Watchdog register is controlled via I/O address 270h and the following parameters:

Watchdog on	Enter 40h into address 270h
Watchdog off	Enter 50h into address 270h
Watchdog trigger	Enter 60h into address 270h and then 70h into address 270h

The Watchdog has to be triggered when the power has been turned on. The triggering time is programmable:

Trigger time

Parameter for triggering time I/O register **290h** R/W (enabled via **293h**)

time = content of register **290h** x 117ms
content = "0" Watchdog turned off

Enable

Write access only I/O-Port **293h** for WD-Timer.

The following sequence enables I/O-register **290h** and **292h** for write access:

WR 293h	03h
WR 293h	06h
WR 293h	03h
WR 293h	01h

The following sequence inhibits I/O-register **290h** and **292h** for write access:

WR 293h	03h
WR 293h	06h
WR 293h	03h
WR 293h	00h

Note!
After a reset write access to **290h** and **292h** is inhibited.

Serial number

The serial number is available to the user via registers **271h** and **272h**.

EEPROM

VIPA will supply you with then relevant details on I/O-Port **285h**.

RS232/RS422

Changing the operating mode of COM1 RS232/RS422 I/O-Port **291h** R/W

	"0"	"1"
Bit 0	RS232	RS422/485
Bit 1	RX enable	TX disable
Bit 2	TX disable	RX enable
Bit 3...7	reserved	

C165 control register

The C165 control registers I/O-Port **292h** R/W (enabled via **293h**) are reserved for the download.

Technical data

PC-CPU PC 288

Electrical data	VIPA 288-2BL10	
Power supply	DC 24V (20.4 ... 28.8) via front from ext. power supply	
Current consumption	max. 1.5A	
Output current backplane bus	max. 3.5A	
Status indicators (LED)	by means of LEDs located on the front	
Connectors / interfaces	2pin	power connector
	Mini-DIN	AT keyboard
	Mini-DIN	mouse
	9pin	COM1: serial interface
	PCMCIA	CompactFlash card Type II
	DVI	interface for display/TFT
	RJ45	twisted pair interface for Ethernet
	ON/Off-switch for power supply	
Battery backup for clock and CMOS	Lithium battery, 30 day backup	
Combination with peripheral modules		
max. no. of modules	32	
max. digital I/Os	32	
max. analog I/Os	16	
Dimensions and weight		
Dimensions (WxHxD) in mm	50.8x76x78	
Weight	170 g	

Appendix

A Index

M.Stich