

Manual

CPP Pentium

Order no.: HB77E

Rev. 00/09

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About this manual

This manual describes utilisation and application of CPP-modules CP5-BG71, CP5-BG72, CP5-BG73, CP5-BG74 manufactured by VIPA GmbH.

The CPP-module is based on an Intel Pentium-processor and it can be used in any programmable controller (PLC-115U ... PLC-155U).

Outline

Chapter 1: Principles

This introduction presents recommendations for handling electrostatically sensitive modules and information on applications for the CPP-module. Here you will also find facts about the construction and the operating principle of the CPP as well as a description of special non-standard components used in the CPP.

Chapter 2: Hardware description

This chapter starts with a description of the different versions of the CP586 as well as the respective special features. These modules differ in the number of interfaces, the size of main memory and mass storage devices, the number of AT-Bus slots and in the required installation width. This summary is followed by a description of the hardware configuration that has to be performed before the module is installed in the PLC.

The chapter concludes with a summary of the installation options in the PLC and the pin assignment of the different interfaces.

Chapter 3: BIOS and system programming

This chapter contains a general description of the system structure. The description starts off with the different BIOS-Setup programs. It continues with lists of the different interrupts, DMA-channels and I/O-addressing ranges.

The chapter concludes with a description of the PLC-interface and the respective LCA-version.

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User considerations

Purpose and contents

This manual contains a description of the CPP-modules CP5-BG71, CP5-BG72, CP5-BG73, CP5-BG74, their construction, project design and application.

The CPP-module is based upon an Intel Pentium-processor and it can be installed in any programmable logic controller (PLC-115U ... PLC-155U).

Target audience

The manual is intended for users with a basic knowledge of automation technology and PLC programming

Structure of the manual

The manual is divided into three chapters. Each chapter contains a comprehensive description of a specific topic in no more than 35 pages.

Guide to the document

The following guides are available in the manual:

- a complete table of contents at the beginning of the manual
- a summary of the topics at the beginning of each chapter
- cross-reference index at the end of the manual

Availability

The manual is available as follows:

- in printed form
- as an electronic document in a PDF-file (Adobe Acrobat Reader)

Icons and announcements

The following icons and announcements indicate important sections of text:

**Danger!**

Immediate or implied danger.
Personnel may be endangered.

**Attention!**

Material may be damaged if these are not observed.

**Note!**

Additional information and useful tips.

Safety information

Appropriate utilisation

CPP-modules were constructed and manufactured for

- visualisation and process control
- general control and automation applications
- industrial applications
- operation within the environmental limitations specified in the technical data
- installation in a fully enclosed, RF-proof metallic enclosure



Danger!

This device is not certified for applications in an

- explosive environment (EX-zone)

Documentation

Manual must be available to all staff members concerned with

- Project design
- Installation
- Commissioning
- Operation



The following must be noted and understood before the components described in this manual are commissioned or placed into operation:

- Modifications to the automation system must never be carried out when the system is connected to the supply!
- Connections and modifications should only be carried out by fully qualified electrical technicians
- The national rules and regulations that are in force in the respective country must be satisfied (installation, safety, EMV ...)

Disposal

You must adhere to the applicable national rules and regulations when disposing of the module!

Part 1 Principles

Outline

This introduction presents recommendations for handling electrostatically sensitive modules and information on the utilisation and applications for the CPP-module.

Below follows a description of:

- Safety information for users
- Typical applications
- Performance characteristics
- Special components (summarised)
- Scope of supply and hardware versions

Contents

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Module overview

Type	Order number	Description
CPP M	VIPA CP5-BG71	Pentium with COM1, COM2, COM3, COM 4
CPP ML	VIPA CP5-BG73	Pentium with COM1, COM2 and 16 Bit ISA-Bus
CPP L	VIPA CP5-BG74	Pentium with COM1, COM2, COM3, COM4, 16 Bit ISA-Bus and Thin Ethernet via RJ45

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.



Electrostatically sensitive module!

This 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 electrostatically sensitive equipment.

Background

It is possible that electrostatically 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.

Behaviour of damaged modules

Modules that have been damaged by electrostatic discharge are usually not detected immediately. The respective failure can only become apparent after a period of operation.

Components damaged by electrostatic discharges can fail after a temperature change, mechanical shock or changes in the electrical load.

Precautions

Only the consistent implementation of protective 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 must be shipped in the original packing material. You can provide additional protection by wrapping the modules in conductive bags before they are shipped. Conductive material is manufactured from antistatic foil or metallized plastic containers.

**Attention!**

The CP-module carries a battery to sustain the real-time clock. You must make sure that the conductive packing material does not come into contact with or short out the battery connections.

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.

You should only use soldering irons with grounded tips when you are making modifications on electrostatically sensitive modules.

**Attention!**

People, tools and instruments should be grounded when working on electrostatically sensitive modules.

Applications

Applications for the CPP module in a programmable logic controller exist in many fields. Some of these include:

visualisation, processing of the output of transducers and data acquisition
network servers

process control and administration systems.

Other applications also include various processing tasks in conjunction with standard software for the respective type of operation. The following aspects are of importance for applications utilising the CPP:

- Direct hardware interface to the back plane bus by means of a standard-CP-interface with 16 page frames. This provides the basis for a high communication speed with respect to the CPU.
- The link between CPU and CPP is provided by the communication software that provides facilities for MS-DOS programmers without SPS experience as well as SPS programmers without MS-DOS experience.
- The CPP consists of a Pentium-based PC-AT compatible processor.

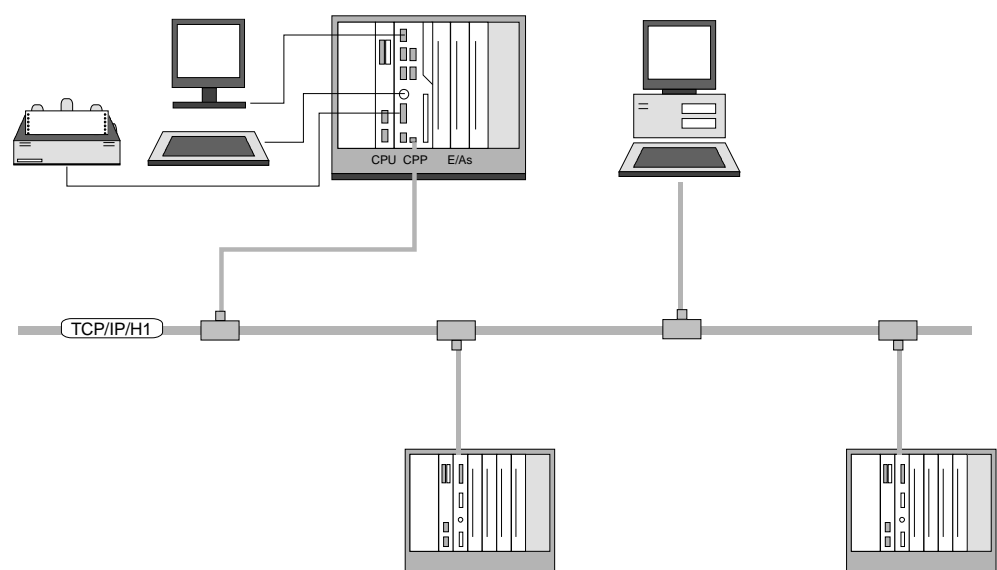


Attention!

The module must only be installed in racks with forced air ventilation!

Sample application

- CPP as console with logging printer for control and monitoring purposes
- CPP in conjunction with the CPU 928 as a universal programmable controller



Performance characteristics

CPP-module

- Complete industrial-grade PC
- Socket 7 Pentium CPU
- Connectors for monitor, keyboard and mouse
- Ext. CD-ROM interface via parallel interface
- Socket for short AT-type boards
- Real-time clock with backup battery

Communications

- Ethernet interface (standard)
- CP page frame interface 16kByte Dual Port RAM for the CPU
- Serial interface (may be configured by means of hybrid modules)
- Parallel printer interface (bi-directional)

Quality

- Branded high-quality drives rated for industrial applications
- EMC tested (level 3)
- High-reliability plugs and sockets
- Every CPP-module is subjected to extensive tests

Custom features

- Customer specific main memory size
- Customer specific type of serial interface
- Customer specific operating system
- Scalable power
- Communication drivers for major SCADA systems

Special components

Dual-Port-RAM	<p>The PC is connected directly to the back plane bus via a Dual-Port-RAM. On the AG side the Dual-Port-RAM is available as a standard-CP-interface with 16 page frames.</p> <p>Data communications can be controlled by means of handler modules that also create a complete cycle-synchronous image of inputs, outputs, flags, timers and counters on the PC. Data communications is element oriented.</p>
Interface configuration modules	<p>The type of serial interface (two or four may be installed) can be configured by means of plug-in modules. The following is the standard configuration: COM1 and COM3 as RS232C-interface, COM2 as 20mA-interface and COM4 as RS422/485-interface.</p>
Keyboard extension	<p>This module contains special circuitry is capable of driving a keyboard via a cable of up to 250m in length.</p>
VGA-operation with industrial RGB-monitors	<p>In addition to the standard-VGA-signal the module is provided with an optional RGB-signal that may be used to connect monitors at a distance of up to 250m.</p>
Battery backup	<p>CPP data is maintained by means of a battery located in the PLC. The module also has a lithium-accumulator that is capable of preventing loss of data for up to 6 month if the module is disconnected from the supply.</p>
Ethernet interface	<p>Every CPP-module is equipped with an Ethernet interface and an AUI socket. Here you can connect your Ethernet network.</p> <p>The CP5-BG74 also has an additional twisted pair connector (RJ45) for standard UTP network cable.</p>

Scope of supply and hardware versions

Basic version

- Pentium processor
- 512 KB Second Level Cache
- 32 ... 256 MB main memory
- Keyboard interface
- VGA-adapter with 2 MB SG-RAM
- 1 parallel interface (LPT1)
- Diskette drive
- Hard disk interface
- 16K Dual-Port-RAM as a CP-interface for the PLC
- Ethernet interface
- CPU functions
- I/O functionality
- Real-time accelerator

CPP M-version

Basic version is provided with the following additional interfaces:

- RS232C (COM1)
- 20mA (COM2)
- RS232C (COM3)
- RS422/485 (COM4)

Order no.: VIPA CP5-BG71

CPP ML-version

Basic version is provided with the following additional interfaces:

- RS232C (COM1)
- 20mA (COM2)

as well as one slot for short 16-Bit ISA-Bus cards

Order no.: VIPA CP5-BG73

CPP L-version

Basic version is provided with the following additional interfaces:

- RS232C (COM1)
- 20mA (COM2)
- RS232C (COM3)
- RS422/485 (COM4)

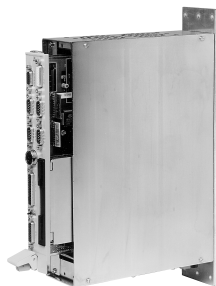
one slot for a short 16-Bit ISA-Bus card

as well as an RJ45 socket for twisted pair cable (UTP)

Order no.: VIPA CP5-BG74

Accessories

Stand-alone enclosure



Enclosure complete with 24V-supply for stand-alone operation of the CPP
 24V DC supply voltage
 Power supply: 5V, 10A
 24V, 1.5A
 Order no.: VIPA OP67

Hybrid modules for COM1 - COM4



Plug-in hybrid-modules are available to configure the physical interfaces as required.

Depending on the position these hybrid-modules have the following order number:

Description	Order no.			
Interface	COM1	COM2	COM3	COM4
RS232C	standard	OP21	standard	OP41
20mA	OP12	standard	OP32	OP42
20mA isolated	OP15	OP25	OP35	OP45
RS422/485	OP13	OP23	OP33	standard
RS422/485 isolated	OP14	OP24	OP34	OP44

Keyboard extension 250m



Max. distance 250m
 24V DC power supply
 100mA current consumption (typ.)
 Communications: RS422 via screened twisted pair cable

Description	Order no.:
Basic keyboard extension circuit	VIPA OP68
Basic keyboard extension circuit (desk-top version)	VIPA OP68
Keyboard cable, per meter length + assembly	VIPA KB69n



Note!

Always state the length of the required extension cable when ordering!

Part 2 Hardware description

Summary

This chapter contains a description of the different versions of the Pentium PC-card.

The following information is provided:

- Components of the modules
- Operating and indicator elements
- Connections
- Jumper and switches
- Expansion options

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Module overview

Type	Order number	Description
CPP M	VIPA CP5-BG71	Pentium with COM1, COM2, COM3, COM 4
CPP ML	VIPA CP5-BG73	Pentium with COM1, COM2 and 16 Bit ISA-Bus
CPP L	VIPA CP5-BG74	Pentium with COM1, COM2, COM3, COM4, 16 Bit ISA-Bus and Thin Ethernet via RJ45

Construction of the CPP



Components of the module

The module is equipped with a PC-AT586 compatible processor including:

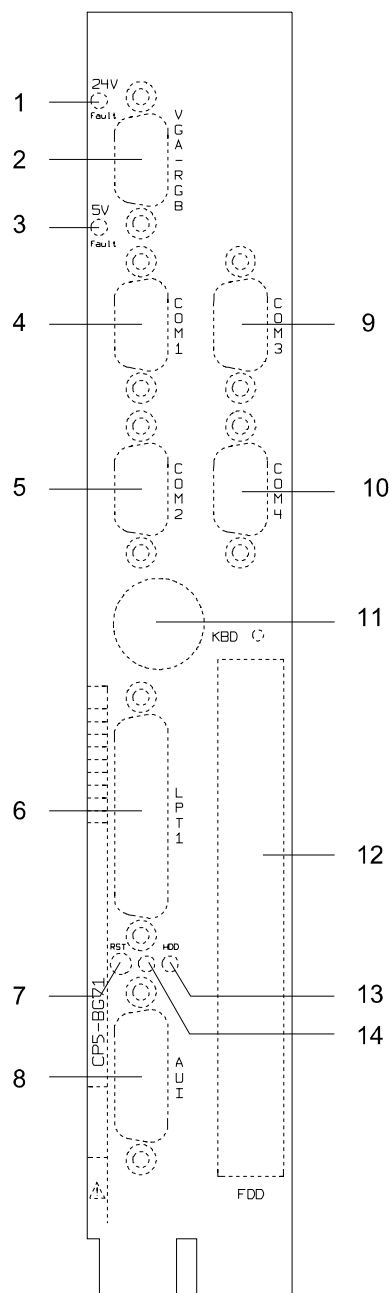
- Pentium processor
- 512 KB Second Level Cache
- 32 ... 256 MB main memory
- Keyboard interface
- VGA-adapter with 2 MB SG-RAM
- up to 4 slots for serial interface modules (COM1, COM2, COM3, COM4)
- 1 parallel interface (LPT1)
- Diskette drive (except on CP5-BG72)
- Hard disk interface
- accessible 16-Bit AT-Bus (CP5-BG73 and CP5-BG74)
- 16K Dual-Port-RAM for the PLC as a CP-interface
- Ethernet interface
- CPU functions
- I/O functionality
- Real-time accelerator

Operating and indicator elements on the front plate

- one 15-pin HD-D-type socket for connecting a monitor
- four 9-pin D-type plugs for COM1 (V24), COM2 (20mA), COM3 (V24) and COM4 (RS422/485)
- one DIN-socket for a standard AT-type keyboard and sym. line drivers for a max. of 250m
- Parallel interface LPT1, Centronics compatible with a 25-pin D-type socket
- RESET key
- One 3,5" diskette drive
- One slot for AT-type cards (CP5-BG73 and CP5-BG74)
- LED-indicator for hard disk access
- LED-indicator (rot) for error indications (may be extinguished by means of the RESET key)
- 2 LED's indicating a blown fuse for +5V or +24V
- AUI-connector for the Ethernet-controller
- Twisted pair Ethernet socket (CP5-BG74)

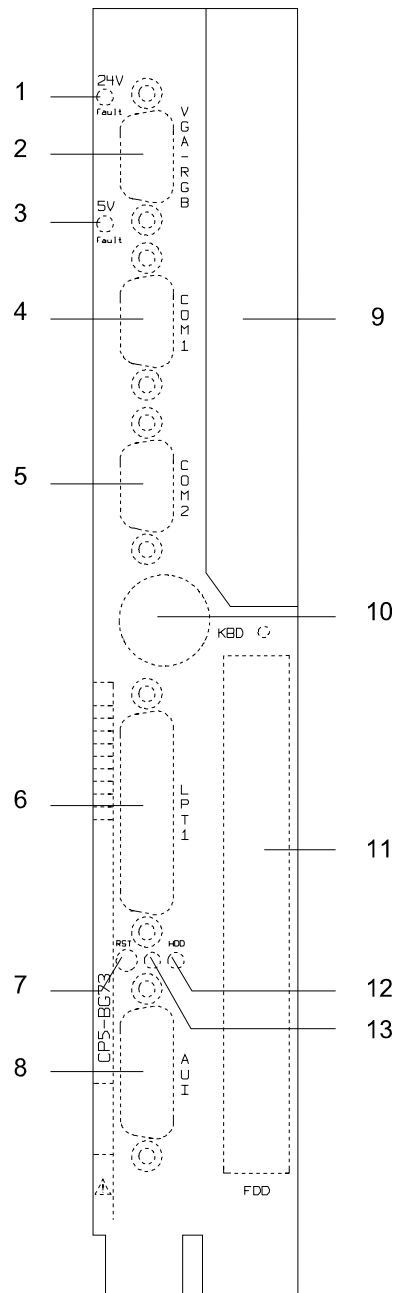
Operating and indicator elements

Front view of the CP5-BG71 M-Version



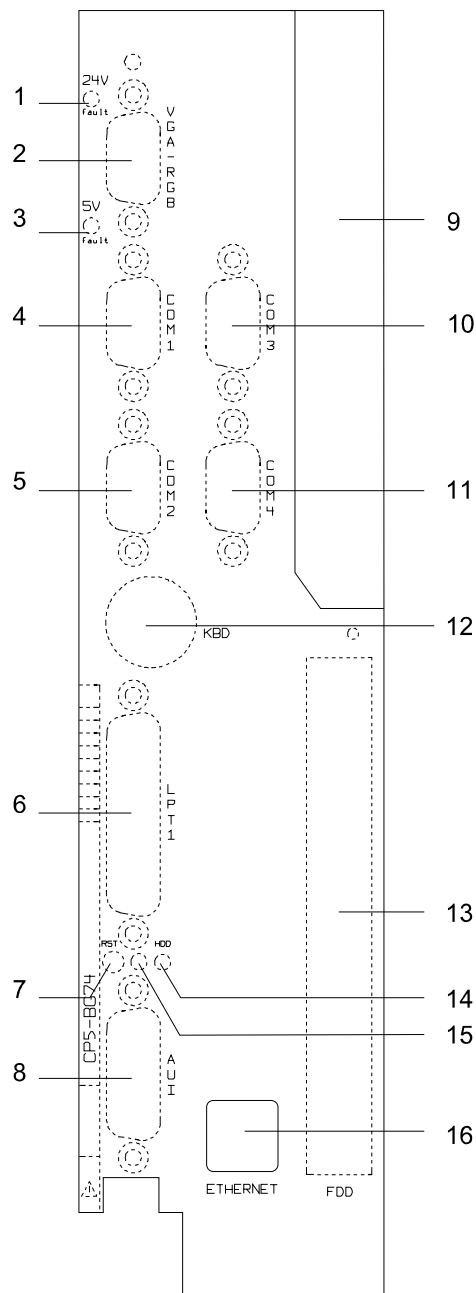
- [1] LED (red), 24V fuse
- [2] Socket, VGA/RGB-adapter
- [3] LED (red), 5V fuse
- [4] Plug, serial interface COM1 (RS232C)
- [5] Plug, serial interface COM2 (20mA)
- [6] Socket, parallel interface LPT1
- [7] RESET key
- [8] AUI Ethernet socket
- [9] Plug, serial interface COM3 (RS232C)
- [10] Plug, serial interface COM4 (RS422/485)
- [11] Keyboard connector
- [12] Diskette drive
- [13] LED (yellow), hard disk access
- [14] LED (red), error indicator

Front view
CP5-BG73
ML-version



- [1] LED (red), fuse 24V
- [2] Socket, VGA/RGB-adaptor
- [3] LED (red), fuse 5V
- [4] Plug, serial interface COM1 (RS232C)
- [5] Plug, serial interface COM2 (20mA)
- [6] Socket, parallel interface LPT1
- [7] RESET key
- [8] AUI Ethernet socket
- [9] ISA-Bus slot
- [10] Keyboard connector
- [11] Diskette drive
- [12] LED (yellow), hard disk access
- [13] LED (red), error indicator

Front view CP5-BG74 L-Version



- [1] LED (red), fuse 24V
- [2] Socket, VGA/RGB-adapter
- [3] LED (red), fuse 5V
- [4] Plug, serial interface COM1 (RS232C)
- [5] Plug, serial interface COM2 (20mA)
- [6] Socket, parallel interface LPT1
- [7] RESET key
- [8] AUI Ethernet socket
- [9] ISA-Bus slot
- [10] Plug, serial interface COM3 (RS232C)
- [11] Plug, serial interface COM4 (RS422/485)
- [12] Keyboard connector
- [13] Diskette drive
- [14] LED (yellow), hard disk access
- [15] LED (red), error indicator
- [16] RJ45-socket for twisted pair Ethernet

LEDs

24V fuse (red LED)

This LED is on when a short circuit on the 24V-supply causes the respective fuse to blow.

5V fuse (red LED)

The 5V-LED indicates that a short circuit on the 5V supply has blown the 5V fuse.

These fuses consist of Multifuse elements (thermal). The Multifuse will reset automatically as soon as the source of the short circuit is removed.

Error (red LED)

The VIPA Pentium-PC is equipped with a watchdog. When the system restarts or when it is RESET the watchdog is inactive and it can be activated or deactivated by means of software. Once the watchdog has been activated it must be triggered every 1,6s. If it is not re-triggered within this period the watchdog will initiate a system-RESET. This condition is displayed by the error-LED. The LED can be turned off by means of the RESET key.

Hard disk (yellow LED)

The hard disk LED is turned on when the hard disk is accessed.



Note

Do not turn the PC off while the hard disk is being accessed. This may result in a loss of data on the hard disk!

Interface allocations

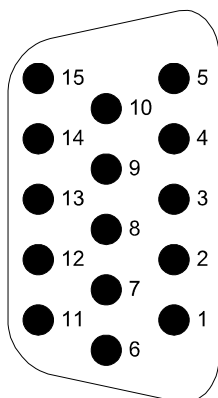
Summary

The following figures show the respective plugs or sockets when the module is located in the module rack with standard features. The top of the figure corresponds to the top of the plug.

- VGA/RGB socket
- Keyboard connector
- CENTRONICS interface LPT1
- Twisted Pair connector
- AUI socket for Ethernet
- COM1 and COM3 with RS232C-interface
- COM2 with 20mA-interface
- COM4 with RS422/485- interface

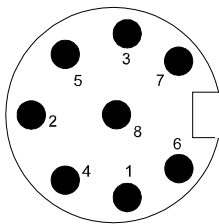
VGA/RGB- socket for connecting a monitor

In VGA-mode the socket provides the same connections as an original VGA-monitor. Any other monitor requires a special cable.



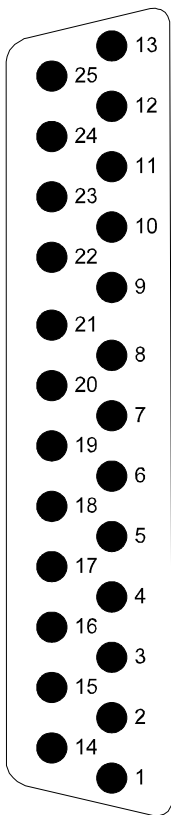
Pin no.	VGA Colour	RGB
1	Red	Red
2	Green	Green+Sync
3	Blue	Blue
4	not used	not used
5	GND	GND
6	GND Red	GND Red
7	GND Green	GND Green
8	GND Blue	GND Blue
9	reserved	reserved
10	GND Sync	not used
11	not used	not connected
12	reserved	reserved
13	HSync	not used
14	VSynC	not used
15	reserved	reserved

Keyboard connector



Pin no.	Signal	Description
1	KBCLK	
2	KBDATA	
3	GND	(for optional keyboard extension)
4	GND (5V)	
5	+5V	Supply voltage for the keyboard (protected by means of Multifuse F2 (1A))
6	KBDATA	(for optional keyboard extension)
7	KBCLK	(for optional keyboard extension)
8	+24V	Supply voltage for optional keyboard extension (protected by means of Multifuse F1 (0,5A))

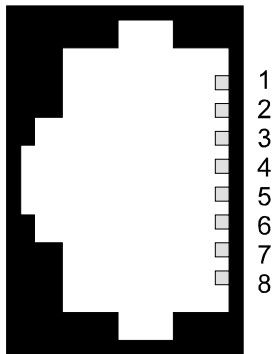
CENTRONICS-interface (LPT1)



Pin no.	Signal
1	STB-
2	PD0
3	PD1
4	PD2
5	PD3
6	PD4
7	PD5
8	PD6
9	PD7
10	/ACK
11	BUSY
12	PE
13	SLCT
14	/AFD
15	/ERR
16	/INIT
17	/SLCTIN
18	GND
19	GND
20	GND
21	GND
22	GND
23	GND
24	GND
25	GND

Twisted Pair via
RJ45 socket

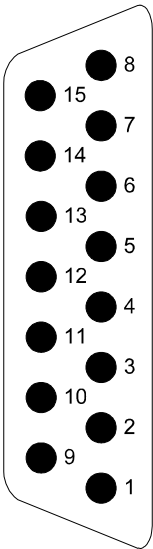
Data communication rate: 10MBit/s
Connector: RJ45 (Twisted Pair)



Pin no.	Signal
1	Transmit +
2	Transmit -
3	Receive +
4	-
5	-
6	Receive -
7	-
8	-

AUI-socket for
Ethernet interface

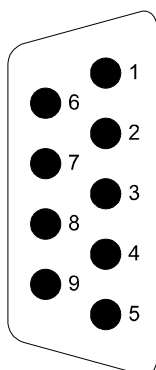
Data communication rate: 10MBit/s
Connector: 15-pin D-type socket



Pin no.	Signal
1	MEXT (external ground, screen)
2	CLSN (Collision+)
3	TRMT (Transmit+)
4	-
5	RCV (Receive+)
6	12V ground
7	-
8	-
9	CLSN (Collision-)
10	TRMT (Transmit-)
11	-
12	RCV (Receive-)
13	+12V / 300mA/5W
14	-
15	-

**RS232C-interfaces
COM1 and COM3**

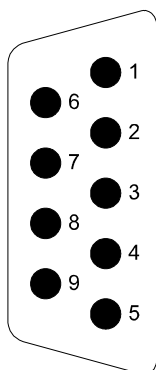
Data communication rate: up to 115,2kBit/s (voltage levels)
 Connector: 9-pin D-type plug



Pin no.	Signal
1	DCD-
2	RXD
3	TXD
4	DTR-
5	GND
6	DSR-
7	RTS-
8	CTS-
9	RI-

**20mA-interface
COM2**

Data communication rate: up to 19,2kBit/s (current levels)
 Connector: 9-pin D-type plug



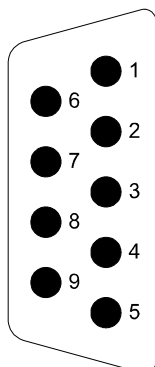
Pin no.	Signal
1	not connected
2	TxD+
3	S1+
4	RxD+
5	S2+
6	TxD-
7	S1-
8	RxD-
9	S2-

**20mA-interface
isolated**

The isolated interface has the same pin-assignment as above.

**RS422/485-
interfaces COM4**

Data communication rate: 115,2kBit/s
Connector: 9-pin D-type plug



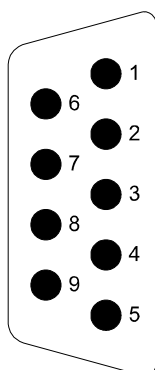
Pin no.	Signal RS422	Signal RS485
1	inhibited	inhibited
2	TxD+	inhibited
3	inhibited	SEL
4	RxD+	RxD+/TxD+
5	inhibited	SEL
6	TxD-	inhibited
7	inhibited	DTR
8	RxD-	RxD-/TxD-
9	inhibited	RTS

**Note!**

Pins shown as "inhibited" must not be connected!

**RS422/485-
interface isolated**

Data communication rate: 38,4kBit/s
Connector: 9-pin D-type plug



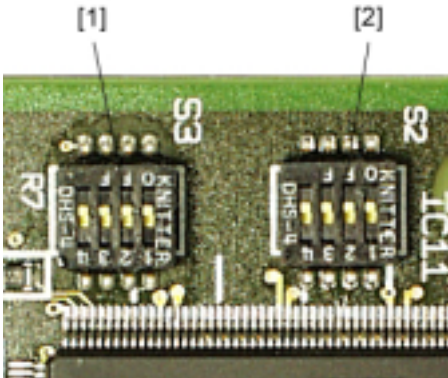
Pin no.	Signal RS422	Signal RS485
1	5V ISO	5V ISO
2	TxD+	inhibited
3	inhibited	SEL
4	RxD+	RxD+/TxD+
5	GND ISO	GND ISO
6	TxD-	inhibited
7	inhibited	DTR
8	RxD-	RxD-/TxD-
9	inhibited	RTS

**Note!**

Pins shown as "inhibited" must not be connected!

VGA/RGB-operation

Switch to
VGA/RGB by
means of S2



- [1] Keyboard operation (S3)
- [2] Select video level (S2)

S2 switch settings Switch 1, 2 Video level settings

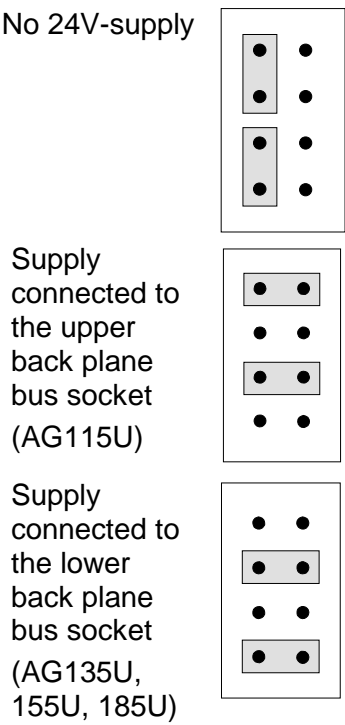
Switch 1	Switch 2	Level (peak-peak)
OFF	OFF	700mV
OFF	ON	900mV
ON	OFF	900mV
ON	ON	1100mV

Switch 3	not used
Switch 4	Monitor-operation
OFF	Standard VGA-monitor (default)
ON	RGB-monitor (Sync via green)

Keyboard connector

Optional keyboard extension The module requires a 24V supply when it is connected to the optional keyboard extension. The 24Volt supply is configured by means of jumper field X3 located on the CPP-board.

Supply voltage (X3)



Attention!
AT-type keyboards providing automatic selection of XT- and AT-mode are not supported by the *CPP*. This type of keyboard is not detected and will result in a keyboard error.
If possible, this type of keyboard should be set to permanent AT-type operation.

Parallel interface

The parallel interface supports bi-directional operations. This interface can be connected to a printer or an external drive, i.e. a CD-ROM or ZIP-Drive with a parallel interface.

Ethernet-interface

Summary Every CPP-module is provided with up to two interfaces for connection to an Ethernet-network. Depending on the type of Ethernet it may be necessary to provide a transceiver.

Hardware versions	Interfaces	CP5-BG71	CP5-BG73	CP5-BG74
	AUI	X	X	X
	RJ45			X
	BNC			X (old version)

Twisted Pair via RJ45 socket The RJ45 socket only exists on the BG74. The RJ45 socket provides a twisted pair connection to your Ethernet network. Twisted pair networks can only have a star-type structure. The star-type topology requires a hub (star coupler) that provides the link between the separate stations and Ethernet and that establishes connections to other hubs via Ethernet.

AUI socket for Ethernet connection Every CPP module has an AUI socket. This socket provides the connection to an Ethernet transceiver (bus-amplifier). Transceivers any type of Ethernet network are available from the relevant suppliers.

BNC socket (old version) Older BG74-modules are provided with a BNC socket instead of the RJ45 socket. The BNC socket provides a direct interface for Thin-Ethernet.



Note

You must always connect these modules by means of a T-piece. If the connection is located at the end of an Ethernet cable the unused end of the T-piece must be connected to a terminator.

Serial interfaces

Summary

Depending on the type the CPP-module can be provided with up to 4 serial interfaces that are configured as required by means of plug-in hybrid modules supplied by VIPA. The following options are available:

- RS232C
- 20mA
- 20mA isolated
- RS422/485
- RS422/485 isolated

Hardware versions	Interfaces (standard)	CP5-BG71	CP5-BG73	CP5-BG74
	COM1 (RS232C)	X	X	X
	COM2 (20mA)	X	X	X
	COM3 (RS232C)	X		X
	COM4 (RS422/485)	X		X

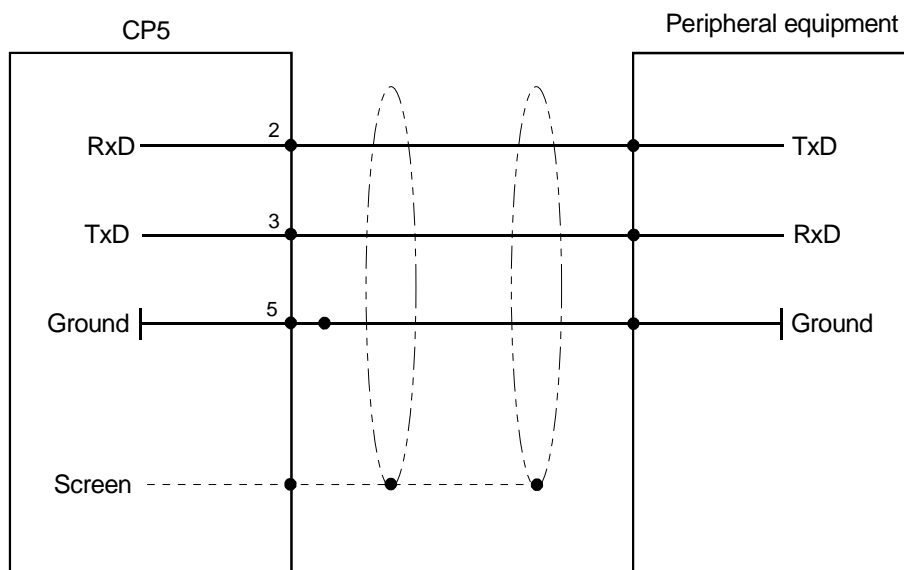
RS232C-interface

Characteristics of the RS232C located on the CPP:

- Logical states as voltage levels
- Point-to-point links with full-duplex serial communications in 2-wire technology
- Data communications over distances up to 15m
- Data communication rate up to 115kBaud

Handshake

The interface supports both types of handshake signal (RTS/CTS and DTR/DSR). The type of signal used depends on the wiring and the programming of the interface.

RS232C cable without hardware handshake

20mA-interface 9-pin D-type plug with 20mA-interface

Characteristics of the 20mA interface on the CPP:

- Logical levels represented by current levels
- Data communications up to a distance of 1000m, depending on Baudrate
- Data communication rate up to 19,2kBaud

Options for the 20mA mode:

- CPP is active participant and is the source of current
- CPP is passive participant, partner is the source of current

**Attention!**

For active operations current sources are provided on the S-signals. These must be connected into data lines as required.

In this case the module must be connected to a 24V power source.

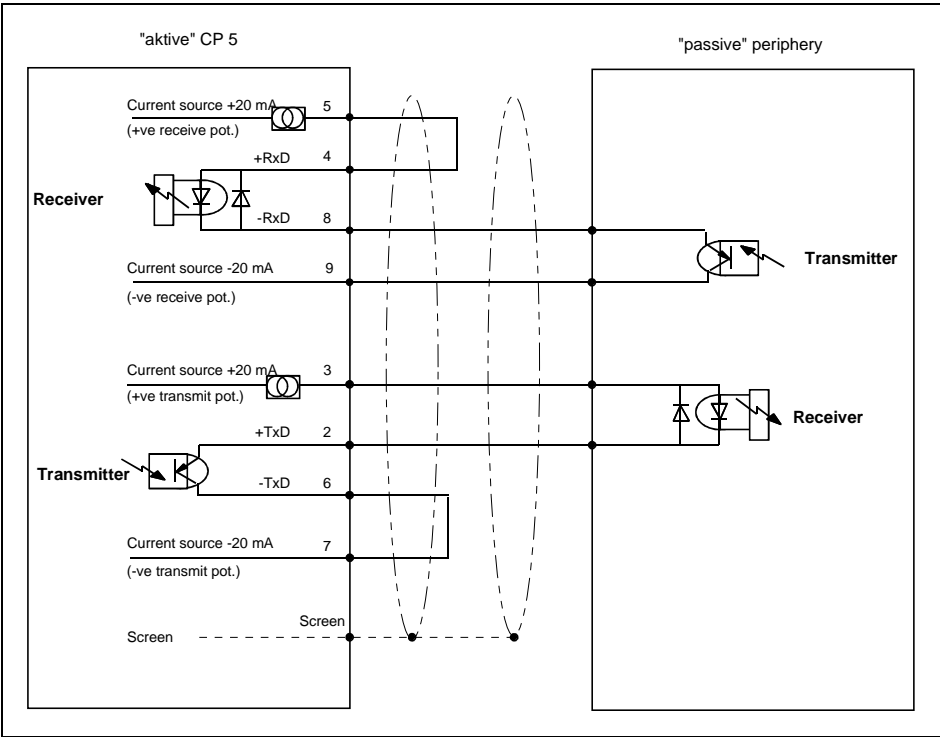
**20mA-interface
isolated**

Characteristics of the isolated 20mA interface on the CPP:

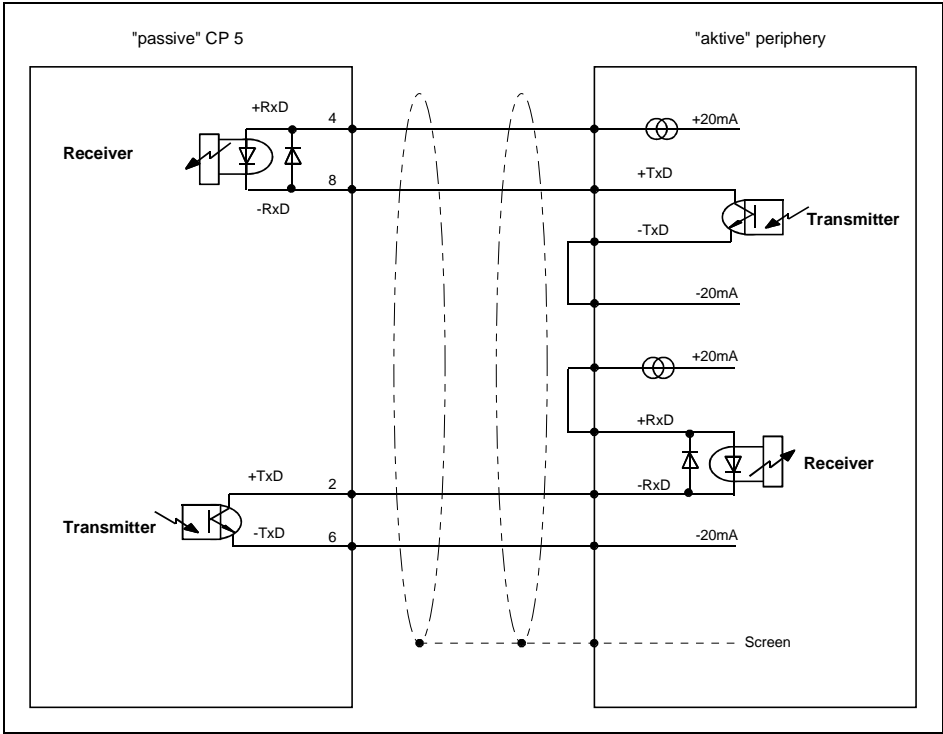
Same operation and wiring as for the previous 20mA-interface.

However, the supply voltages and interface connections are isolated.

Active 20mA-interface



Passive 20mA-interface



**RS422/485
interface COM4**

This interface is available for point-to-point links (RS422) or for bus systems with transmission and reception via the same line (RS485). In this case a busmaster is used to control the operating mode by means the SEL-signal.

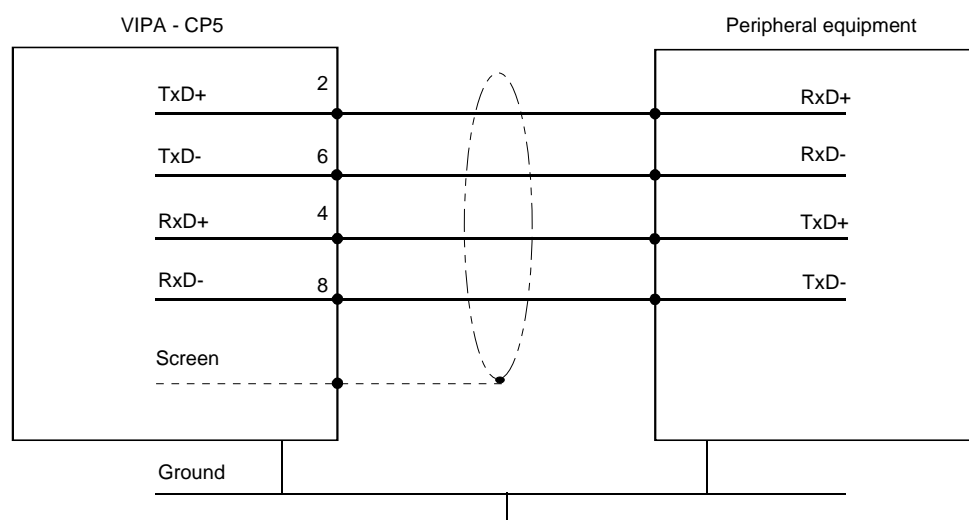
Activation:

You activate the required operating mode (RS422 or RS485) by means of appropriate connections in the plug.

RS422

Characteristics of RS422 on the CPP:

- Logical states are represented by different voltages on the individual cores of a twisted pair line.
- Point-to-point links using serial full duplex communications via 4-wire lines
- Data communications over distances of up to 1000m
- Data communication rates up to 115kBaud

**RS422 wiring
diagram****Attention!**

The ground signals of the two interfaces on the different devices must be connected to each other.

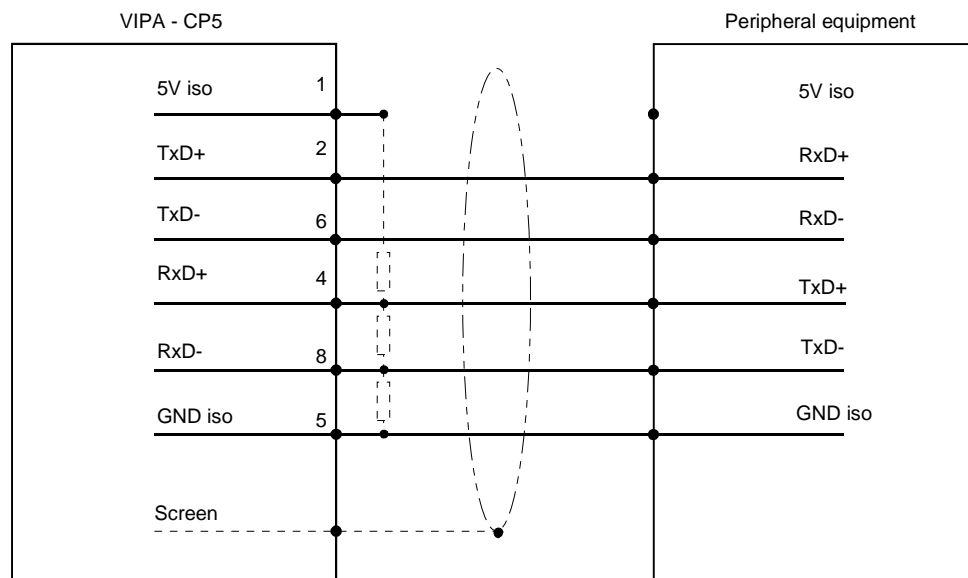
**RS422
insulated**

Characteristics of insulated RS422 on the CPP:

Same properties as the standard interface. In addition, pin 1 provides an isolated 5V supply and pin 5 the respective GND.

You can use this isolated voltage via resistors to provide quiescent voltage levels to signal lines to ensure a low level of reflections.

RS422 isolated, wiring diagram



RS485

Characteristics of RS485 on the CPP:

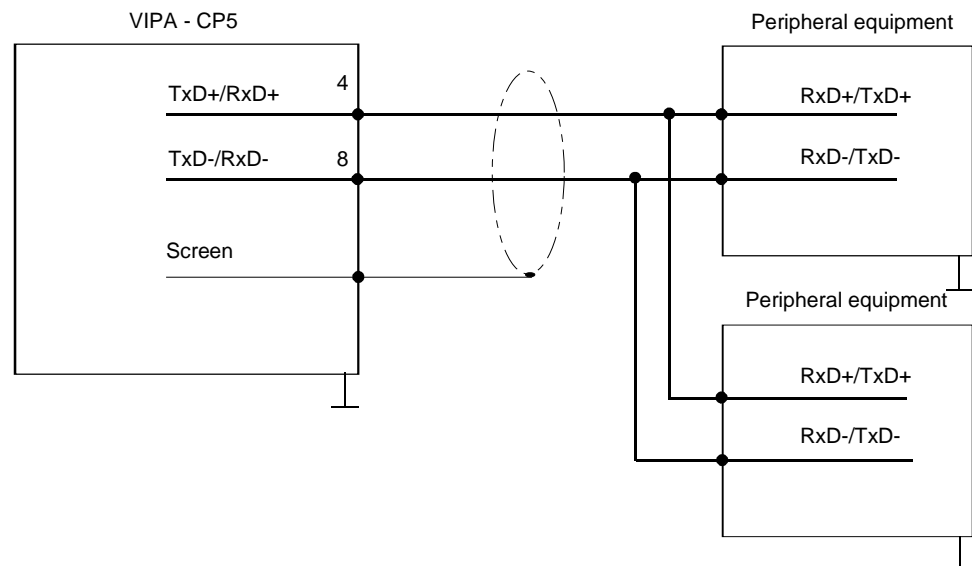
- Logical states represented by voltage differences between the two cores of a twisted pair cable
- Serial bus connection in two-wire technology using half duplex mode
- Data communications up to a max. distance of 500m
- Data communication rate up to 115kBaud

Transmit/receive switching for RS485

Transmit/receive switching is controlled by means of the SEL-signal.

- 5V (logical 1) selects transmit mode
- 0V (logical 0) selects receive mode

The SEL-signal can be controlled externally or it can be connected to DTR or RTS by means of links.

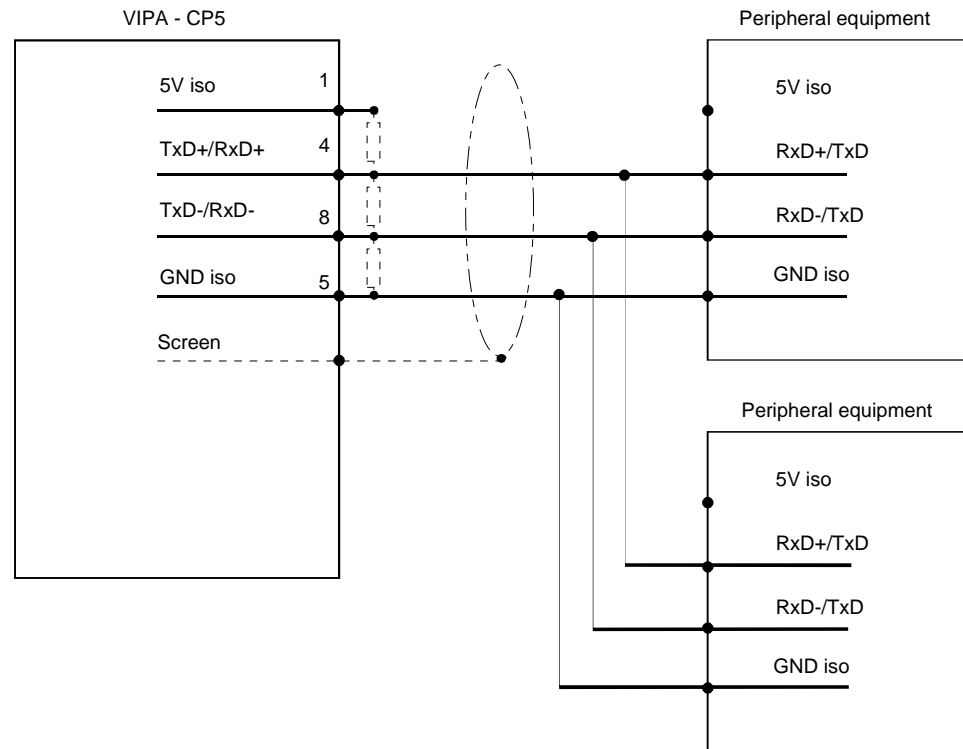
RS485 wiring diagram

**RS485
isolated**

Characteristics of isolated RS485 on the CPP:

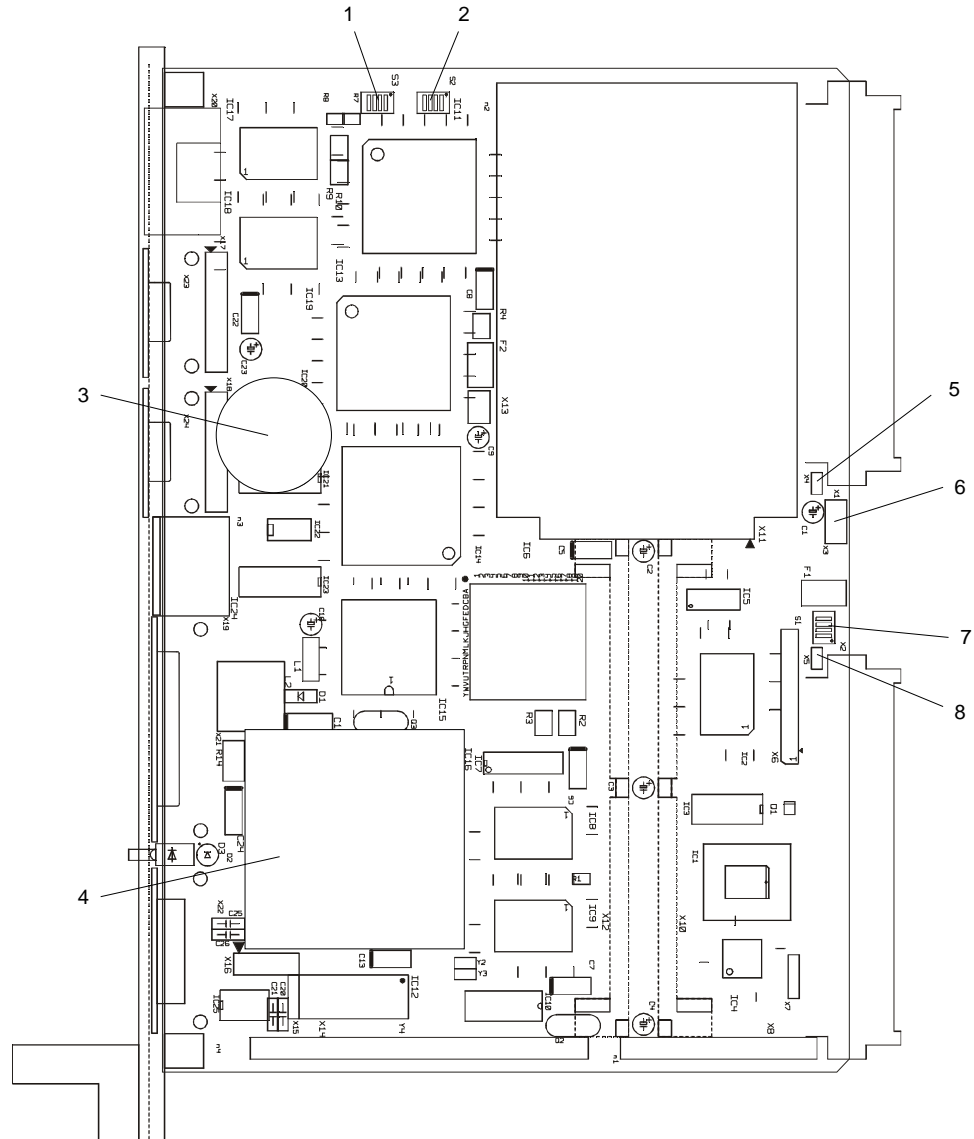
Same properties as the standard interface. In addition, pin 1 provides an isolated 5V supply and pin 5 the respective GND.

You can use this isolated voltage via resistors to provide quiescent voltage levels to signal lines to ensure a low level of reflections.

**RS485 isolated,
wiring diagram**

Jumpers and switches

This illustration shows the Pentium main board. These elements are usually not visible as they are located below an expansion board. The expansion board of the BG71 and the BG74 carries switch X1. You must determine the interrupt for COM3 and COM4 by means of this switch.



- | | | |
|-----|-----------------|--|
| [1] | DIP-switch S3 | Keyboard operation |
| [2] | DIP-switch S2 | Selection of video level |
| [3] | Battery | Lithium battery to sustain BIOS-data |
| [4] | Processor | Pentium |
| [5] | Connector X4 | Connection for PC-loudspeaker |
| [6] | Jumper field X3 | 24V power supply configuration |
| [7] | DIP-switch S1 | PLC-interrupt configuration |
| [8] | Connector X5 | Connection for external RESET-switch (can not be disconnected) |

**Keyboard
operating mode
DIP-switch S3**

Switch 1-4	Keyboard operation
all OFF	standard AT-type keyboard (default)
all ON	VIPA keyboard extension

**Video level
selection
DIP-switch S2**

Switch 5	Monitor operation
OFF	standard VGA-monitor (default)
ON	RGB-monitor (Sync via green)
Switch 6	Green level reduction
OFF	Normal
ON	Green level reduced by app. 15%
Switch 7, 8	Video level selection

Switch 7	Switch 8	Level (peak-peak)
OFF	OFF	700mV
OFF	ON	920mV
ON	OFF	1120mV
ON	ON	1250mV

**PLC-interrupt DIP-
switch S1**

Switch 1	PLC-interrupt IRD
ON	PLC-interrupt IRD activated
OFF	IRD deactivated
Switch 2	PLC-interrupt IRC
ON	PLC-interrupt IRC activated
OFF	IRD deactivated
Switch 3	PLC-interrupt IRB
ON	PLC-interrupt IRB activated
OFF	IRB deactivated
Switch 4	PLC-interrupt IRA
ON	PLC-interrupt IRA activated
OFF	IRA deactivated

Fuses for externally connected loads

These fuses consist of Multifuses. The Multifuse will reset as soon as the source for the overload is removed.

F1 Fuse für 24V-Ausgänge (0,5A)

F2 Fuse for 5V-outputs (1A)

external RESET-key connector X5

Here you can connect an additional RESET key. In contrast to the RESET key located on the front panel this key can not be disabled.

A RESET is initiated by shorting the pins of the connector.

PC-Speaker connector X4

Here you can connect a standard PC-Speaker. The assignment of this connector is as follows:

Pin no.	Signal
1	5V VCC
2	Audio signal

COM3/COM4 interrupt selection

Switch X1 is located on the expansion board for modules BG71 (M-version) and BG74 (L-version) that covers the main board to a certain degree. This switch selects the interrupt used for COM3 and COM4.

You can select one of the following options:

**Left-hand position**

COM4 : IRQ3

COM3 : IRQ4

Right-hand position

COM4 : IRQ15

COM3 : IRQ5

Power supply

5V-supply via X1 and X2

The module requires a 5V supply via the back panel.



Attention!

Due to the high current consumption of the CPP-module this may only be installed into module racks provided with an X1 and an X2 back panel bus socket!

Ratings

You must use a power supply capable of supplying a maximum current of 15A with forced air ventilation.



Attention!

Forced air ventilation is mandatory for the CPP-module!

Additional 24V supply

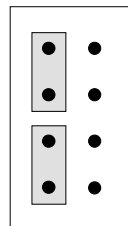
The module requires an additional 24V supply via the back panel bus:

- when the keyboard extension (optional) is used
- when using an active 20mA-interface

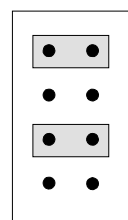
The 24V supply is configured by means of jumper field X3 located on the CPP board.



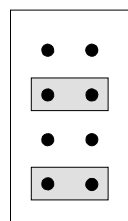
No 24V supply



Supply connected to the upper back plane bus socket (PLC-115U)



Supply connected to the lower back plane bus socket (PLC-135, 155U, 185U)



Commissioning

Checklist for commissioning

- Jumper settings
- Determine the plug-in slot
- Turn off the power supply to the PLC rack
- Insert the module
- Connect peripheral equipment
- Turn on the power supply to the PLC rack
- Processor should start without errors
- Install additional software

Plug-in locations for the CPP in the PLC

The following diagrams depict possible plug-in locations for the CPP-module in different versions of module racks.

Possible locations are identified by a ■.

The CPP-module should be installed in an enclosed adapter.

Plug-in locations in the AG-115U

Plug-in location ZG	PS	CPU	0	1	2	3	4	5	6	IM
PLC-115U										
CR700-1										
CR700-2			■	■	■	■	■	■		
CR700-3			■	■	■	■	■	■		
CR700-0LA										
CR700-0LB			■	■	■					
ER701-0										
ER701-1										
ER701-2										
ER701-3			■	■	■	■	■	■	■	



Attention!

An enclosed adapter with 2 or 4 plug in locations is required when the CPP-module should be installed in a PLC-115U module rack.

You must use a 5V/15A power supply!

Plug-in locations in PLC-135 through PLC-185U

Plug-in location ZG	3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139	147	155	163
PLC-135U																					
ZG -3KA13			■	■	■	■	■	■	■												
ZG -3KA21			■	■	■	■	■	■	■												
ZG -3KA31			■	■	■	■	■	■	■												
ZG -3KA41			■	■	■	■	■	■	■												
ZG -3UA11			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
ZG -3UA21			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
ZG -3UA31			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
ZG -3UA41			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
ZG -3UA51			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
PLC-135U/155U																					
ZG -3UA11			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
ZG -3UA21			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
ZG -3UA31			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
ZG -3UA51			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
PLC- 155U																					
ZG -3UA11			■		■	■	■	■		■	■	■	■	■	■	■	■				
ZG -3UA21			■		■	■	■	■		■	■	■	■	■	■	■	■				
PLC- 185U																					
EG -3UA11			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
EG -3UA21			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
EG -3UA31			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
EG -3UA41			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			



Attention!

Due to the high current consumption of the CPP the module can only be used in PLC's with an X1 and an X2 back panel bus! Active 20mA operation for the serial interface or the connection to the VIPA keyboard extension is only possible when the PLC provides a 24V power supply!

Connection of peripheral equipment

The front panel of the CPP-module carries the connections for operating and peripheral equipment.

You can find a more extensive description of the connection options in an earlier section of this chapter.

Commissioning requires that a keyboard and a monitor are available. You can also connect a printer and a mouse.

Large installations are supported by a CD-ROM drive that is connected to the parallel interface.

**Attention!**

The monitor cable like other connection cables between the CPP and the keyboard, printer, monitor and mouse must never be installed in parallel with high-power lines!

You must install a separate cabling rack that has a minimum separation of 50cm with respect to high-power lines.

Connecting a monitor

Connect the monitor to the VGA/RGB-interface. You should adhere to the following:

- You must use double-screened coaxial cable (TRIAx cable) in an environment that is subject to high levels of EMC.
This can be used over a maximum distance of 250m without additional protection.
- On TRIAX-cables you must only connect the outer screen of the monitor cable to the chassis of the respective monitor.
- Make sure you use large-surface metal-metal connections.
- Separate the electrical ground of the monitor from the chassis ground.
- Connect the monitor to the same phase of the mains power that the PLC is connected to.
- Differences in ground potential between the module rack and the monitor enclosure can result in AC distortion of the images on the monitor (dark horizontal bars). For this reason you must install equipotential bonding conductors between the switch cabinet with PLC and the monitor enclosure.

Notes on the installation of monitors

- When installing monitors for asynchronous operation you must ensure that the distance between the monitors is at least 15 cm to avoid distortion to the display.
- The exception are monitors with Mu-metal-screens.
- Implement a sufficiently large separation between the monitor and foreign sources of magnetic interference.
- Do not install monitors in steel racks or on steel tables. Any magnetisation of the steel sheeting can cause incorrect colours or distorted displays.
- Avoid the vicinity of transformers, two-way radios, loudspeaker magnets and high-power lines when installing a monitor.
- You can reduce the effect of magnetic fields by means of Mu-metal screen.

Special conditions for the use of standard office monitors

- Standard office monitors with metallized plastic enclosures must never be used in an environment with a high level of EMC as the metallized internal surface can not be connected to the external ground. It is also not possible to separate the electrical ground from the chassis ground of office-type monitors, a mandatory condition for the use in an environment with high levels of EMC.
- You can use such monitors only with single-screen coaxial cables. For this reason these monitors can only be connected to the CPP under conditions where the signal cable can be kept short.

Connecting a printer

Printers with a serial interface are connected to the RS232C-interface (standard: COM1, COM3) of your CPP.

Printers with a parallel interface are connected to the LPT1-socket located on the front panel.

Maximum length of cables

The following table lists the maximum length for signal cables of the different devices. These are subject to an interference-free installation as described above.

Equipment	Length configuration near	Length configuration far
Printer with RS232C-interface	20m	-
Printer with parallel interface	3m	-
Monitor with TRIAX-cable	250m	250m
Keyboard	1,5m	250m with VIPA keyboard extension
Mouse	20m	-

Checklist before power is turned on

Before turning on power you must check whether all preparation work has been completed by means of the list below:

- Did you consider the environmental conditions for the CPP and the connected peripheral equipment?
- Is the CPP installed into the correct plug-in location in the module rack?
- Did you connect peripheral equipment correctly?
- Did you connect the screening of all cables correctly?
- Did you position the monitor correctly and did you consider the electromagnetic conditions?
- Did you comply with the rules for installations for PLCs?

Turn peripheral equipment on

At this point you should turn peripheral equipment like monitors and printers on.

Turn power supply on

Turn on the power supply of the PLC rack. The CPP or the peripheral equipment will execute certain procedures that are described under "Start-up" below.

Start-up behaviour

After power-on the CPP executes a system check and initiates start-up processing if the test is successful:

- The LEDs NUM LOCK, SCROLL LOCK and CAPS LOCK will flash on the keyboard.
- The BIOS displays its boot information on the screen.
- depending on the specific selection the process will continue up to the DOS-prompt or until the required Windows-platform has been started.
- At this point you can install the software you require.



Note!

When the BIOS displays its start-up information you can access the BIOS-setup routine by depressing the DEL-key.

For more information on the BIOS-setup please refer to the chapter "BIOS-setup and system programming"

Expansion options

RAM installation options

You can install different types of DRAM into the CPP which must be PS2-type DRAM-modules. You can install from 32MB to a max. of 256MB provided that the following configurations are satisfied:

Total memory	Socket
32 MB	4Mx32
64 MB	8Mx32
128 MB	16Mx32
256 MB	32Mx32

We recommend that EDO-RAM-modules with an access time of 60ns.

Processor types

At present the CPP-modules are available with two versions of the Intel Pentium-processor:

- Intel Pentium 166 MHz
- Intel Pentium 233 MHz (standard)

Technical data

General

CPU	Socket 7, with Intel HX-chipset and PCI-Bus
Processor	Intel Pentium 233 MMX
Cache	512KB
RAM	2xPS2-sockets 32...256 MB EDO RAM (standard 32MB EDO 60ns)
Watchdog	triggerable with LED and RESET-key
Keyboard	Standard-AT, optionally up to 250 m
Video-Interface	ATI Mach64 264VT2MB SG-RAM
Diskette drive	3,5" (720KB/1,44MB)
Hard disk interface	PCI-Enhanced-IDE-Controller (32 Bit)
parallel interfaces	LPT1: CENTRONICS bi-directional enhanced Mode
Ethernet interface	AUI (IEEE 802.3)
CP-interface	16 page frames of 1K x 8Bit
CPU-interface	PLC-periphery with automatic process imaging
System-BIOS	AWARD as per VIPA-spec.
VGA-BIOS	ATI
internal battery back-up min.	6 months
Supply voltage	+5V, DC $\pm 5\%$
Supply voltage for options	24 V, DC $\pm 5\%$
Dissipation	ca. 20W
Current consumption	minimum app. 3,0A maximum app. 5,0A typical 3,8A

VIPA CP5-BG71 (M-version)

Current consumption	3,0A without options
Serial interfaces	COM1: RS232C COM2: 20 mA COM3: RS232C COM4: RS422/485 each with 16 Byte FIFO
Space required	2 slots

VIPA CP5-BG73 (ML-version)

Current consumption	3,0A without options
Serial interfaces	COM1: RS232C COM2: 20 mA each with 16 Byte FIFO
AT-Bus	1 slot 16 Bit ISA 96 Bus ± 12 V, 60 mA
Space required	2 slots

VIPA CP5-BG74 (L-version)

Current consumption	3,4A without options
Serial interfaces	COM1: RS232C COM2: 20 mA COM3: RS232C COM4: RS422/485 each with 16 Byte FIFO
Ethernet interface	AUI (IEEE 802.3) RJ45-socket (Thin Ethernet)
AT-Bus	1 slot 16 Bit ISA 96 Bus ± 12 V, 60 mA
Space required	3 slots

Environmental conditions

Without options

	<i>Operational</i>	<i>Storage/Transport</i>
Temperature	0°C to 55°C	-20°C to 70°C
Temperature variations	20°C/h	20°C/h
Humidity	95% at 25°C	95% at 25°C
Altitude above sea level	-300m to 3300m	-300m to 13000m

Hard disk option

	<i>Operational</i>	<i>Storage/Transport</i>
Temperature	5°C to 50°C	-40°C to 70°C
Temperature variations	20°C/h	20°C/h
Humidity	10% to 90%	10% to 90%
Altitude above sea level	-300m to 3300m	-300m to 13000m
Shock: 1/2 sine, 11ms	5G	100G
Vibration: 1 octave/min., 10-400Hz	1G	5G

Diskette drive option

	<i>Operational</i>	<i>Storage /Transport</i>
Temperature	4°C to 46°C	-20°C to 60°C
Temperature variations	20°C/h	30°C/h
Humidity	20% to 80%	10% to 90%
Altitude above sea level	-300m to 3300m	-300m to 13000m
Shock: 1/2 sine, 10ms	5G	15G
Vibration: 1 Octave/Min., 10-100Hz	0.5G	2G

Part 3 BIOS and system configuration

Summary

The CPP is equipped with firmware that contains the basic I/O functions for the installed hardware - the BIOS. An PLC-interface caters for communications with the PLC.

The following are described here:

- BIOS-setup
- VIPA Special Feature setup
- Hardware interrupts
- DMA-channels
- Memory maps
- PLC-Interface

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BIOS summary

The BIOS of the CPP consists of a number of parts:

- ATI-BIOS
- AWARD-BIOS
- VIPA Special Feature

ATI-BIOS

This BIOS contains functions for the connected display screen.

ATI-BIOS parameters can not be changed.

AWARD-BIOS (Setup: DEL-key)

This section contains the usual functions required for the operation of standard components of an AT-type processor.

VIPA Special Feature Setup

VIPA has added a number of functions. These comprise the initialisation of the page frame interface for the PLC and other functions that required to ensure a safe start-up when the system configuration was lost for some reason.

These functions form an integral part of the AWARD-BIOS and are configured via the AWARD-Setup.

BIOS-Setup

When you turn on the system the BIOS version is displayed on screen. This is followed by a BIOS test of the system components and memory. When these tests have been completed the system attempts to boot. You can gain access to BIOS-setup by depressing the DEL-key in the period between the boot procedure and the system start-up.

A message reminding you of this fact is displayed on screen.

Control keys in the dialogue box

ESC key

The ESC-key closes the dialogue box and re-displays the menu. Selected parameters are accepted but they are not entered into CMOS memory.

Cursor keys

You can use the cursor keys to select the parameter you want to change.

F1 key

F1 displays the default settings of BIOS and setup.

F2 key

You can change the display colour by means of F2.

PU/PD

Parameters can be changed by means of the keys PgUp and PgDn or Bild↑ and Bild↓ or + and - on the numeric key pad.



Note!

Please note that keyboard drivers (e.g. German) have not been loaded on the setup. Any changes are only saved if you confirm your changes explicitly by depressing "Y" when you wish to terminate the setup. On the German keyboard you must depress the Z to issue the Y.

Menu

Changes to system settings are not normally required. Changes to these settings should only be entered by experienced users.

The setup program is initiated and the main menu displayed when you depress the DEL key (Entf key on German keyboards) after a re-start or after power is turned on:

ROM PCI/ISA BIOS (2A59F000) CMOS SETUP UTILITY AWARD SOFTWARE, INC.	
STANDARD CMOS SETUP BIOS FEATURES SETUP CHIPSET FEATURES SETUP POWER MANAGEMENT SETUP PNP/PCI CONFIGURATION LOAD BIOS DEFAULTS LOAD SETUP DEFAULTS	INTEGRATED PERIPHERALS SPECIAL FEATURES SETUP SUPERVISOR PASSWORD USER PASSWORD IDE HDD AUTO DETECTION SAVE & EXIT SETUP EXIT WITHOUT SAVING
Esc : Quit F10 : Save & Exit Setup	: Select Item (Shift)F2 : Change Color
Time, Date, Hard Disk Type...	

Standard CMOS Setup

This menu item opens a dialog box providing access to the time, date, disk drives and keyboard test. The display also provides information on the installed RAM size.

BIOS Features Setup

This menu item displays another dialogue box where you can change system settings directly.

Chipset Features Setup

You can configure a large number of chipset parameters by means of the options provided by this dialogue box.

Power Management Setup

Here you can select under which conditions the PC should turn off certain components and enter sleep-mode.

PNP/PCI Configuration	Here you can define the settings for older adapters and components that do not support Plug&Play. This dialog box provides access to the system resources.
Load BIOS Defaults	This function loads a set of basic low performance settings that are required in order that your system starts safely.
Load Setup Defaults	Setup Defaults loads a set of basic parameters that allow nearly every system to start up with proper performance.
Integrated Peripherals	Under Integrated Peripherals you can change certain on-board interface settings.
Special Features Setup	This dialogue box is used to enter parameters required for the installation of the PLC-interface.
Supervisor Password	Here you can protect the entire PC including the setup by means of a password.
User Password	The user password only protects your system. You can still change the setup at any time.
IDD HDD Auto Detection	Starts a diagnostic program that detects and displays the type of hard disk connected to your system. When you confirm the respective type the parameters are included in the BIOS-mask under the Standard CMOS-Setup.
Save and Exit Setup	Parameters are stored into CMOS-RAM and the Setup-program is terminated. The PC will re-boot with the new parameters.
Exit without Saving	Terminates the system-setup without saving the entered data into the CMOS-RAM. The PC will re-boot with the original parameters.

Standard CMOS-Setup

This menu item opens a dialog box providing access to the time, date, disk drives and keyboard test. The display also provides information on the installed RAM size.

```

ROM PCI/ISA BIOS (2A59F000)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.

```

Date (mm:dd:yy) : Fri, Mar 6 1998 Time (hh:mm:ss) : 16 : 49 : 52									
HARD DISKS	TYPE	SIZE	CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE	
Primary Master	: Auto	0	0	0	0	0	0	0	AUTO
Primary Slave	: None	0	0	0	0	0	0	0	AUTO
Secondary Master	: None	0	0	0	0	0	0	0	AUTO
Secondary Slave	: None	0	0	0	0	0	0	0	AUTO

Drive A : 1.44M, 3.5 in.
Drive B : None

Video : EGA/VGA
Halt On : All Errors

Base Memory: 640K
Extended Memory: 31744K
Other Memory: 384K

Total Memory: 32768K

```

ESC : Quit          : Select Item      PU/PD/+/- : Modify
F1  : Help          (Shift)F2 : Change Color

```

Date, Time

Please note that the date must be entered in the American format. You must first enter the month followed by the day. You can also use the DATE command of MS-DOS to change the date or in the Control Panel of Windows.

Hard Disks

You can install a single IDE hard disk in your PC.

The simplest procedure to determine the type of hard disk is to use the main menu function *IDE HDD Auto Detection*. This detects the type of hard disk and enters it into the table.

You should select "Auto" for the *Primary Master* and the remaining 3 entries to "None".

Drive A/B

You select the size and capacity for diskette drives from a menu.

Current 3,5"-drives are nearly always 1,44 MB types; 5,25"-drives are usually 1,2 MB types. Floppy-Streamers are not entered into the setup parameters. The addressing and control of a floppy-streamer is the sole responsibility of the respective Backup-software.

- Video** The Video option offers a choice of *Mono*, *CGA 40*, *CGA 80* and *EGA/VGA*. This setting is meaningless for VGA-adapters as the BIOS on the adapter handles these parameters automatically.
- Halt on** The Halt-option determines the behaviour of the BIOS if an error is detected.
The standard setting is Halt on *all errors* to ensure that no error is ignored. If an error should occur during the boot process the PC will interrupt the boot and display the warning "Press <F1> to continue". The system waits until you press the F1 key. If this option is not active the system will not wait for the F1 key if an error occurs and it will continue booting as if nothing has happened.
Other options are *All, but Keyboard*; *All, but Diskette*; *All, but Diskette or Keyboard* and *No Errors*. These are intended for special applications, e.g. where a PC should boot even if the keyboard has not been connected.
- Memory** The bottom right-hand portion of the dialogue box contains details on the memory size of your system. You can not change this parameter. These values are changed automatically when you change the available memory size by means of other setup functions.

BIOS Features Setup

The BIOS-Feature Setup provides options that you can use to modify the system performance. These entries can be used to change the cache, the shadow-RAM configuration, boot conditions as well as keyboard handling.

```

ROM PCI/ISA BIOS (2A59F000)
  BIOS FEATURES SETUP
  AWARD SOFTWARE, INC.

CPU Internal Cache      : Enabled
External Cache         : Enabled
Quick Power On Self Test : Disabled
Boot Sequence          : A,C,SCSI
Swap Floppy Drive      : Disabled
Boot Up Floppy Seek    : Enabled
Boot Up NumLock Status : On
Boot Up System Speed   : High
Gate A20 Option        : Fast
Typematic Rate Setting : Enabled
Typematic Rate (Chars/Sec) : 30
Typematic Delay (Msec) : 250
Security Option        : Setup
PS/2 mouse function control: Disabled
PCI/VGA Palette Snoop : Disabled
OS Select For DRAM > 64MB : Non-OS2

Video BIOS Shadow      : Enabled
C8000-CBFFF Shadow    : Disabled
CC000-CFFFF Shadow    : Disabled
D0000-D3FFF Shadow    : Disabled
D4000-D7FFF Shadow    : Disabled
D8000-DBFFF Shadow    : Disabled
DC000-DFFFF Shadow    : Disabled

ESC : Quit                : Select Item
F1  : Help                PU/PD/+/- : Modify
F5  : Old Values          (Shift)F2 : Color
F6  : Load BIOS Defaults
F7  : Load Setup Defaults
  
```

CPU Internal Cache

You can use this option to turn on the internal cache-memory of the processor.

External Cache

You can use this option to turn on the external cache-memory for the CPU (Second-Level-Cache).

Quick Power On Self Test

If the Quick Power On Self Test is active the BIOS will only perform a shortened RAM-Test. This can speed up the system start-up.

Boot Sequence	<p>Here you can define which drive is searched first for an operating system.</p> <p>A:, C:, SCSI The system will first attempt to boot from drive A:, then from drive C: and finally from a SCSI-type hard disk.</p> <p>SCSI, C:, A: The system will first attempt to boot from a SCSI-type drive, then from C: and finally from A:.</p> <p>You can select the different options by means of the PageUp and PageDown (Bild↑ and Bild↓) keys.</p>
Swap Floppy Drive	<p>If this function is active drive A becomes drive B and vice versa.</p>
Boot Up Floppy Seek	<p>The diskette drive is accessed and performs a seek operation when the system boots. This function should be turned off to reduce wear and tear on the drive.</p>
Boot Up Num Lock Status	<p>This Option activates the numeric keypad on the keyboard when the system starts. You can also activate the numeric keypad by means of the Num-key.</p>
Boot Up System Speed	<p>This option selects the clock frequency your system uses during the start-up procedure.</p>
Fast Gate A20 Option	<p>This function is required to provide compatibility with XT-PC's. When gate A20 is active you can access the high memory area above 1MB. This function enables the fast processing mode for this signal.</p>
Typematic Rate Setting	<p>This option enables or disables the keyboard parameters for "Typematic Rate Delay (msec)" and "Typematic Rate (Chars/Sec)".</p>
Typematic Rate (Chars/Sec)	<p>This function sets the repeat rate for the keyboard when a key is pressed for a long time.</p>
Typematic Delay (msec)	<p>When you depress a key the respective character is repeated automatically when the time entered here has expired.</p>

Security Option	<p>Determines how the password is used.</p> <p>System: the password is required each time the system is started.</p> <p>Setup: the password is only required when you access the BIOS-Setup function.</p>
PS/2 mouse function control	<p>When this function is enabled the system will attempt to detect a PS/2-mouse during the boot procedure and to reserve IRQ12 for the mouse. If the function is disabled IRQ12 is available for other adapter cards.</p> <p>The setting for this function is fixed!</p>
PCI/VGA Palette Snoop	<p>Certain display adapters, for instance MPEG adapters, do not comply with the VGA standard. These adapters can cause colour definition problems. If the function is enabled you can correct for the differences in the displayed colour. You should not enable this function.</p>
OS Select For DRAM > 64MB	<p>You should only enable this function when you will be using the OS/2 operating system along with a memory size exceeding 64 MB DRAM.</p>
Shadow-RAM	<p>Both the BIOS and the Setup functions are located in an EPROM. During start-up the contents of the EPROM is copied into a portion of main memory. This RAM is protected from any further write accesses and it is referred to as Shadow-RAM.</p> <p>The Shadow-RAM option for the VGA-BIOS should always be enabled. This decreases the time required for a cold-boot and increases the MS-DOS-performance.</p> <p>Certain adapters require a certain amount of caution when shadowing is used as they may contain internal RAM in addition to the EPROM. This RAM is write protected by the Shadow-RAM option and the adapter might not function properly. Such failures can occur on certain network adapters as well as SCSI-adapters.</p> <p>Shadowing should not be used in conjunction with PCI adapters. The BIOS of a PCI-card is usually located in an area that is not covered by the shadow-registers. Even if the PCI-BIOS is located in the adapter range between C800 and EFFF during the boot procedure, it is automatically re-located by the processor BIOS into another area of memory after the system has started.</p>

Cipset Features Setup

You can define the settings that are specific to your chipset in this dialogue box. You should only change these options if you are fully acquainted with the technical repercussions of your settings.

ROM PCI/ISA BIOS (2A59F000) CHIPSET FEATURES SETUP AWARD SOFTWARE, INC.	
Auto Configuration : Enabled	Memory Parity/ECC Check : Disable
DRAM Timing : 60ns	Single Bit Error Report : Disabled
DRAM RAS# Precharge Time : 3	L2 Cache Cacheable Size : 64MB
DRAM R/W Leadoff Timing : 6/5	Chipset NA# Asserted : Enabled
Fast RAS# To CAS# Delay : 3	Pipeline Cache Timing : Fastest
DRAM Read Burst (EDO/FPM) : x222/x333	Passive Release : Enabled
DRAM Write Burst Timing : x222	Delayed Transaction : Disabled
Turbo Read Leadoff : Disabled	
DRAM Speculative Leadoff : Disabled	
Turn-Around Insertion : Disabled	
ISA Clock : PCICLK/4	
System BIOS Cacheable : Enabled	
Video BIOS Cacheable : Enabled	
8 Bit I/O Recovery Time : 1	
16 Bit I/O Recovery Time : 1	ESC : Quit : Select Item
Memory Hole At 15M-16M : Disabled	F1 : Help PU/PD/+/- : Modify
Peer Concurrency : Enabled	F5 : Old Values (Shift) F2 : Color
Chipset Special Features : Enabled	F6 : Load BIOS Defaults
DRAM ECC/PARITY Select : Parity	F7 : Load Setup Defaults

Auto Configuration

Initiates the automatic chipset settings if the function is *enabled*. When the automatic configuration has been enabled you can select a DRAM timing of 60 or 70ns. This value will be used to determine the remaining 9 settings automatically.

If the function is deactivated you must enter the settings manually.

System BIOS Cacheable

When this function is active the System-BIOS is also cached. This increases system performance.

Video BIOS Cacheable

When this function is active the Video-BIOS is also cached. This increases system performance.

8 Bit I/O Recovery Time

This function determines the timing for 8-Bit ISA-cards.

16 Bit I/O Recovery Time

This function determines the timing for 16-Bit ISA-cards.

Memory Hole At 15M-16M

When this function is active an area of 1 MB located between 15 MB and 16 MB is reserved for ISA-Bus adapters.

**Note!**

You can change other chipset parameters by means of the remaining parameters. These should never be changed as they could impede the proper operation of your PC.

Power Management Setup

Here you can define the parameters for Power Management. You can select under which conditions the PC should turn off certain components and enter sleep-mode.

ROM PCI/ISA BIOS (2A59F000)		
POWER MANAGEMENT SETUP		
AWARD SOFTWARE, INC.		
Power Management	: Max Saving	** Power Down & Resume Events **
PM Control by APM	: Yes	
Video Off Method	: V/H SYNC+Blank	
MODEM Use IRQ	: 3	
Doze Mode	: 1 Min	
Standby Mode	: 1 Min	IRQ3 (COM 2) : ON
Suspend Mode	: 1 Min	IRQ4 (COM 1) : ON
HDD Power Down	: 1 Min	IRQ5 (LPT 2) : ON
** Wake Up Events In Doze & Standby **		IRQ6 (Floppy Disk) : OFF
IRQ3 (Wake-Up Event)	: ON	IRQ7 (LPT 1) : ON
IRQ4 (Wake-Up Event)	: ON	IRQ8 (RTC Alarm) : OFF
IRQ8 (Wake-Up Event)	: ON	IRQ9 (IRQ2 Redir) : ON
IRQ12 (Wake-Up Event)	: ON	IRQ10 (Reserved) : ON
		IRQ11 (Reserved) : ON
		IRQ12 (PS/2 Mouse) : ON
		IRQ13 (Coprocessor) : ON
		IRQ14 (Hard Disk) : ON
		IRQ15 (Reserved) : ON
		ESC : Quit : Select Item
		F1 : Help PU/PD/+/- : Modify
		F5 : Old Values (Shift) F2 : Color
		F6 : Load BIOS Defaults
		F7 : Load Setup Defaults

Power Management

- Min Saving:** The system will enter powersave-mode after a long period of inactivity
- Max Saving:** The system will enter powersave-mode after a short period of inactivity
- Disabled:** Powersave-mode disabled. You should select this option when you intend to execute performance tests. You should also disable power management during the installation of the operating system.
- User Defined:** With this option you can define your own power-management values for Doze-, Standby-, Suspend-Mode and HDD Power Down.

PM Control by APM

If enabled, the APM (Advanced Power Management) of the respective operating system is responsible for the power management of your PC. This usually employs the HALT-command of your processor to save current.

Video Off Method	<p>This function determines the method used by power management to control your display screen.</p> <p><i>V/H Sync+Blank:</i> video memory is erased and the vertical and horizontal sync pulses are disabled.</p> <p><i>DPMS:</i> this parameter requires that your monitor supports DPMS. This means that your monitor will go to Standby-Mode after a certain period of inactivity.</p> <p><i>Blank Screen:</i> video memory is erased. This will inhibit burn-in on older types of monitor.</p>
MODEM Use IRQ	<p>Here you can specify the interrupt used by your modem (if installed). This When this interrupt occurs your system will be turned on.</p>
Doze Mode	<p>This parameter specifies the time delay before your processor is placed into "doze" mode.</p>
Standby Mode	<p>This option turns the processor and the video adapter off. The processor and all the other components remain active.</p>
Suspend Mode	<p>This is the highest level of powersave mode. All components except for the CPU are turned off. You must set this parameter to a minimum of 15 minutes.</p>
HDD Power Down	<p>This parameter determines the delay time before your hard disk is turned off. You should not enter a value less than 30 Minutes.</p>
Wake Up Events In Doze & Standby	<p>The power-save mode can also be deactivated by means of the interrupts you enter here.</p>
Power Down & Resume Events	<p>Here you specify the interrupts for which the system should remain in power-save mode if the respective setting is ON. If the value is OFF the system will be activated by the respective interrupt.</p>

PNP/PCI Configuration

This page is used to specify the settings that are used for Plug & Play. The PNP- and PCI-setup controls the assignment of system resources like Interrupts and DMA's. You should not attempt to change these if your system performs properly. However, if you are using older ISA-type cards that are not PNP compliant you can reserve the respective resources here.

ROM PCI/ISA BIOS (2A59F000) PNP/PCI CONFIGURATION AWARD SOFTWARE, INC.	
Resources Controlled By : Manual Reset Configuration Data : Disabled	PCI IRQ Activated By : Level PCI IDE IRQ Map To : PCI-AUTO Primary IDE INT# : A Secondary IDE INT# : B
IRQ-3 assigned to : Legacy ISA IRQ-4 assigned to : Legacy ISA IRQ-5 assigned to : PCI/ISA PnP IRQ-7 assigned to : PCI/ISA PnP IRQ-9 assigned to : PCI/ISA PnP IRQ-10 assigned to : PCI/ISA PnP IRQ-11 assigned to : PCI/ISA PnP IRQ-12 assigned to : PCI/ISA PnP IRQ-14 assigned to : PCI/ISA PnP IRQ-15 assigned to : PCI/ISA PnP DMA-0 assigned to : PCI/ISA PnP DMA-1 assigned to : PCI/ISA PnP DMA-3 assigned to : PCI/ISA PnP DMA-5 assigned to : PCI/ISA PnP DMA-6 assigned to : PCI/ISA PnP DMA-7 assigned to : PCI/ISA PnP	ESC : Quit : Select Item F1 : Help PU/PD/+/- : Modify F5 : Old Values (Shift) F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults

Resources Controlled by

This parameter determines whether the PNP-configuration is provided by the setup or automatically. You should select *Auto* unless you encounter problems with interrupt- and DMA-assignments.

Reset Configuration Data

This option is of great importance when you have installed new components and your system no longer boots. If you have *enabled* this option the information of the Extended System Configuration Data (ESCD) is erased and replaced by new settings. With the next start-up operation the option is disabled again.

PCI IRQ activated by

This option determines whether an interrupt is activated by a signal level (Level) or a signal edge (Edge). Due to IRQ-sharing you should use the *Level*-triggered mode for all your adapters. Only some outdated cards may insist on *Edge*-mode.

**PCI IDE IRQ
map to**

This option determines the mapping of IRQ14/15. If you are using onboard-IDE channels you should set this entry to *PCI-Auto*. This ensures that both interrupts are connected to the PCI-bus. If you are using an ISA-IDE controller you should set this option to *ISA*.

Primary/Secondary IDE INT#: This option determines the PCI-bus allocation interrupt for the 1st. or 2nd. IDE-controller of the PCI-bus.

Load BIOS Defaults

This function loads default BIOS settings for proper operation of your system. These settings are not designed for high performance operation.

Load Setup Defaults

The Setup Defaults are a basic set of BIOS settings designed to ensure that nearly every system configuration operates with good performance.

Integrated Peripherals

On this menu item you can enable, disable or configure the hardware that is available on your main board. You should not change these settings if your PC operates properly.

ROM PCI/ISA BIOS (2A59F000) INTEGRATED PERIPHERALS AWARD SOFTWARE, INC.	
IDE HDD Block Mode	: Enabled
PCI Slot IDE 2nd Channel	: Disabled
On-Chip Primary PCI IDE	: Enabled
On-Chip Secondary PCI IDE	: Disabled
IDE Primary Master PIO	: Auto
IDE Primary Slave PIO	: Auto
IDE Secondary Master PIO	: Auto
IDE Secondary Slave PIO	: Auto
USB Controller	: Disabled
Onboard FDC Controller	: Enabled
Onboard UART 1	: Auto
Onboard UART 2	: Auto
Onboard Parallel Port	: 378/IRQ7
Parallel Port Mode	: Normal
ESC : Quit F1 : Help F5 : Old Values (Shift) F6 : Load BIOS Defaults F7 : Load Setup Defaults	

IDE HDD Block Mode

If you *enable* this function the hard disk can transfer multiple blocks simultaneously. Use this function with great care. You must only enable this function if your hard disk supports block transfers. If the function is *enabled* the number of blocks per sector that your hard disk can transfer is determined automatically by your system.

PCI Slot IDE 2nd Channel

You can enable or disable the 2nd. IDE-channel by means of this option. If the channel is disabled IRQ 15 becomes available. It is possible that your operating system re-enables the 2nd. Channel causing a conflict with the respective error message. This option should be set to "disabled" as the CPP does not support a second IDE-channel.

On-Chip Primary/Secondary PCI IDE

The IDE-controller on the main board has facilities for two IDE-channels. If you set this option to *enabled* you can define the channels yourself. This option should be set to disabled as the CPP does not have facilities for a second IDE-channel.

**IDE
Primary/Secondary
Master/Slave PIO**

These four PIO-fields (Programmed Input/Output) can be used to define a PIO mode for the four drives supported by your IDE-controller. The higher the PIO number, the higher the respective performance. In *Auto*-mode the system determines the best setting for each drive.

USB Controller

This parameter can turn the USB (Universal Serial Bus) on or off if you have installed it.

The CP5-module is not provided with a USB.

**Onboard FDC
Controller**

This option enables or disables the diskette drive controller on the main board. If the function is set to *disabled* IRQ 6 is available.

**Note!**

If this function is set to *disabled* the internal diskette drive of the CPP will be inoperable!

Onboard UART 1/2

This option configures the serial interfaces. You can specify an address/interrupt combination.

**Onboard Parallel
Port**

This option defines the address/interrupt-combination for the parallel port. Standard values are for LPT1: 378/IRQ 7 and for LPT2: 278/IRQ 5

Parallel Port Mode

This parameter defines the operating mode for the parallel interface. If you are using external peripherals like CD-ROM drives and scanners via the port you should select *ECP* and also enter an unused DMA-channel. Please note that this procedure allocates IRQ 7.

VIPA Special Features Setup

Here you define the parameters for your PLC-interface. You must define parameters for the PLC into which the CP5 module has been installed as well as the page frame address used by the CP5 to communicate with the PLC.

```

ROM PCI/ISA BIOS (2A59F000)
SPECIAL FEATURES SETUP
AWARD SOFTWARE, INC.

```

<pre> Serial Number : 1383h / 4995 ***** PLC - Interface ***** Operation Mode : CP486DX Base Page : 16 </pre>	<pre> AG Type : AG115 </pre>
<pre> ESC : Quit : Select Item F1 : Help PU/PD/+/- : Modify F5 : Old Values (Shift)F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults </pre>	

Serial Number	This field displays the unique serial number of your module. This can not be modified.
----------------------	--

Operation Mode	Operation Mode specifies that your CPP is set to CP486DX-mode. You have access to the same options as for the VIPA CP486DX.
-----------------------	---

Base Page	The base page frame address determines the starting address for the 16 page frames that are mapped into the memory map of the controller. The PLC program works in the base page by default. The other page frames are used by the other controllers in the system.
------------------	---

The page frame address of the base page must be divisible by 16 and it is located in the range from 0...240. You can define the following values: 0, 16, 32, 64 ... 240. The page frame addresses of base pages in the controller must not overlap.

AG Type	This parameter defines the PLC for the communications with the PLC. You can enter either AG115U or AG135/155U
----------------	---

Supervisor Password

Here you can protect the entire PC including the setup by means of a password.

User Password

This function protects your system by means of a password. The password is requested when you the system is turned on, re-started or when you access the BIOS-setup functions.

IDD HDD Auto Detection

This menu item starts a diagnostic routine that determines and displays the hard disk type installed in your system. If you confirm the displayed hard disk type the respective parameters are transferred into the BIOS-mask.

Save and Exit Setup

The parameters are saved in CMOS-RAM and the setup routine is terminated. The PC will continue the boot procedure using the new parameters.

Exit without Saving

This function terminates the configuration procedure and any entered data is discarded. The PC will continue the boot procedure with the old parameters.

Hardware Interrupts

The CP5-module contains an expansion board. This board carries a switch for the selection of the IRQ for COM3 and COM4 (CP5-BG71, CP5-BG72, CP5-BG74).

The following table lists all the interrupts together with the allocation:

Interrupt	System-IRQ	Description
IRQ0	08h	System timer
IRQ1	09h	Keyboard standard (101/102 keys)
IRQ2	0Ah	Cascade IRQ8 - IRQ15
IRQ3	0Bh	COM2
IRQ3	0Bh	COM4 optionally IRQ15 (77h)
IRQ4	0Ch	COM1
IRQ4	0Ch	COM3 optionally IRQ5 (0Dh)
IRQ5	0Dh	COM3, optionally IRQ4 (0Ch)
IRQ6	0Eh	Standard diskette drive controller
IRQ7	0Fh	LPT1
IRQ8	70h	CMOS-/real-time clock
IRQ9	71h	3com Ethernet controller
IRQ10	72h	unused
IRQ11	73h	unused
IRQ12	74h	Page frame/BASP interrupt
IRQ13	75h	Numeric coprocessor
IRQ14	76h	Standard IDE hard disk drive controller
IRQ15	77h	COM4, optionally IRQ3 (0Bh)

Interrupt selection COM3/COM4

The expansion board of the module BG71 (M-version) and BG74 (L-version) that partially obscures the main board carries switch X1. This switch determines the interrupt used by COM3 and COM4.

You can use one of the following settings:



**Left-hand
position**
COM4 : IRQ3
COM3 : IRQ4

**Right-hand
position**
COM4 : IRQ15
COM3 : IRQ5

DMA Channels

Channel	Description
CH0	-
CH1	-
CH2	FD-controller
CH3	-
CH4	Cascade CH00-CH03
CH5	-
CH6	Reserved for VIPA expansion board
CH7	-

Memory Map

Addressing range	Description
0000000h - 009FFFFh	640 KB DRAM main memory
00A0000h - 00BFFFFh	128 KB video memory
00C0000h - 00C7FFFh	32 KB VGA-BIOS
00C8000h - 00CBFFFh	16 KB PLC-interface data area
00CC000h - 00CFFFFh	16 KB reserved
00D8000h - 00DFFFFh	32 KB unused
00E0000h - 00FFFFFFh	128 KB BIOS
0100000h - 1FFFFFFFh (max.)	Extended Memory (main memory)

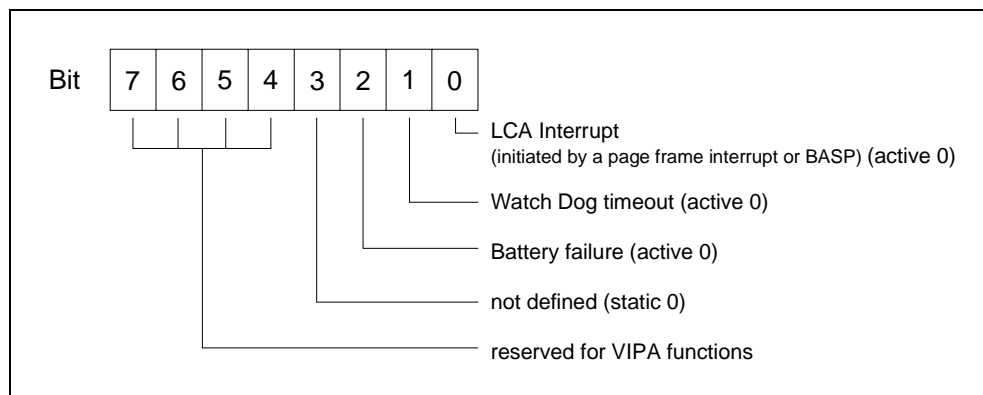
I/O Addressing

The VIPA PC assigns the following I/O addresses in addition to the I/O addresses allocated by any standard Pentium-PC:

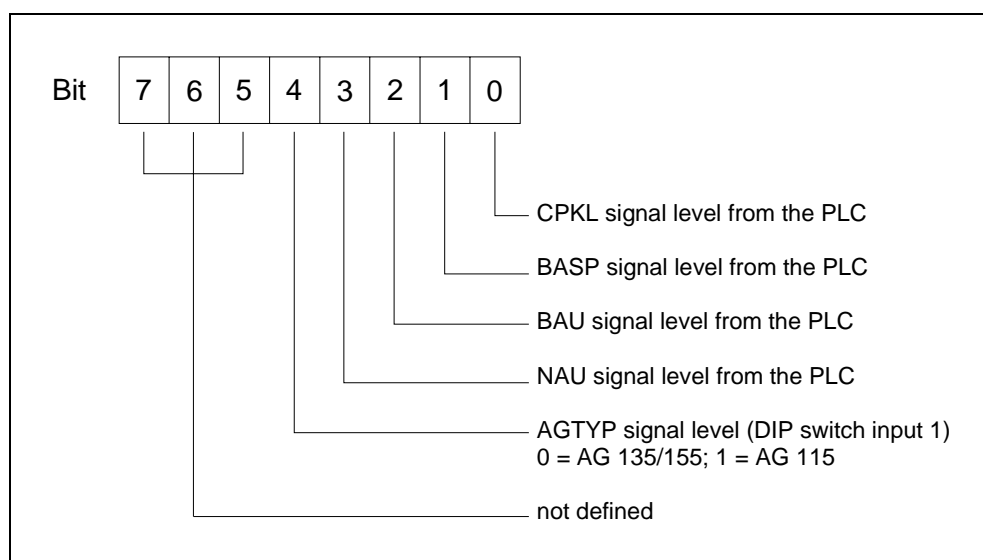
Addressing range	Description
000h - 00Fh	DMA-Controller
020h - 021h	Programmable Interrupt Controller
040h - 043h	System Timer
060h - 060h	Keyboard Controller
061h - 061h	Port B Register, PPI, 8255
064h - 064h	Keyboard Controller
070h - 071h	CMOS-/Real-Time Clock
081h - 083h	DMA-Controller
087h - 087h	DMA-Controller
089h - 08Bh	DMA-Controller
08Fh - 08Fh	DMA-Controller
092h - 092h	Alternate Gate A20 and Hot Reset
0A0h - 0A1h	Programmable Interrupt Controller
0C0h - 0DFh	DMA-Controller
0F0h - 0FFh	Numeric Co-processor
1F0h - 1F7h	Standard IDE Hard Disk Drive Controller
210h - 21Fh	3com-Controller
270h - 277h	Security and Watchdog
280h	VIPA Status Register (read only)
281h	VIPA PLC Status Register (read only)
282h	VIPA Control Register (write only)
283h - 287h	VIPA reserved (must never be altered)
288h - 28Fh	VIPA PLC Interface Register
2E8h - 2EFh	COM-interface (COM4)
2F8h - 2FFh	COM- interface (COM2)
378h - 37Bh	LPT1
3B0h - 3BBh	ATI-VGA-Controller
3C0h - 3DFh	ATI-VGA-Controller
3E8h - 3EFh	COM- interface (COM3)
3F0h - 3F5h	Standard Diskette Drive Controller
3F6h - 3F7h	Standard IDE/ESDI Hard Disk Drive Controller
3F8h - 3FFh	COM- interface (COM1)

VIPA Status Register

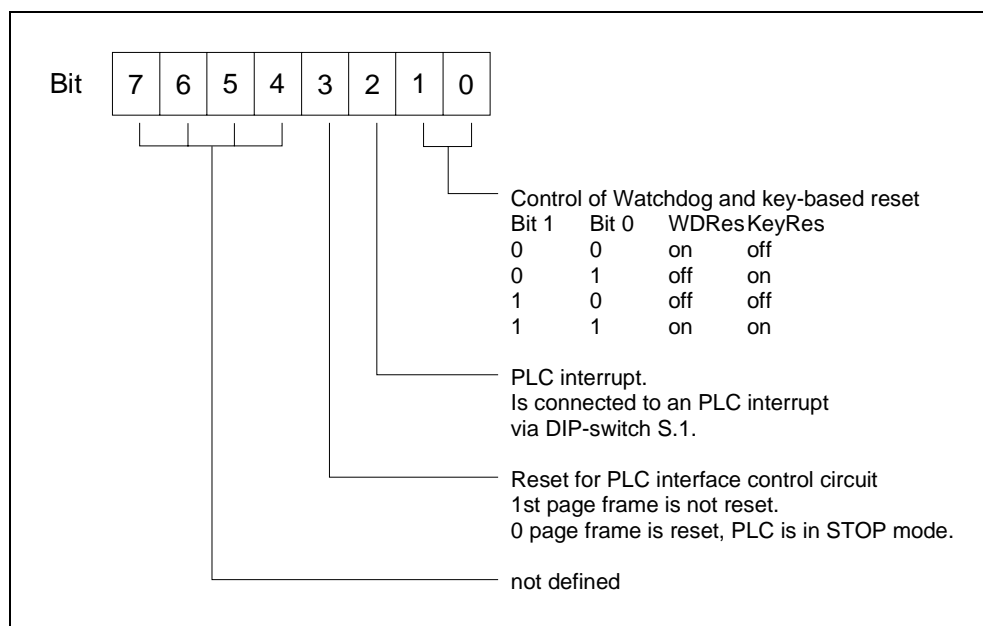
280h



281h



282h



Watchdog (I/O addressing range 270h-277h)

After the system has started or after a reset has been issued the watchdog is disabled and can be enabled or disabled by means of software.

When the watchdog has been enabled it must be triggered every 1,6 seconds. A trigger is generated by programming an edge (transition). If the watchdog is not retriggered within 1,6 seconds it will initiate a system reset (depending on CONTROL-register bit 0 and 1). For software purposes the status of the watchdog is always available in the CP-STATUS-register.

Enable/ disable watchdog

Use the following values to access the watchdog-register via IO-address 270h:

Enable watchdog	Load 40h into address 270h
Disable watchdog	Load 50h into address 270h
Trigger watchdog	Load 60h into address 270h and then load 70h into address 270h

Error (red LED)

After power-on the watchdog must be triggered every 1,6s. If it is not retriggered within this time the watchdog will initiate a system RESET. This operation of the watchdog is indicated by the error-LED.

The LED can be turned off by depressing the RESET-key.

PLC-Interface LCA Description

LCA	Access to the Dual Port RAM of the PLC-interface is managed by an LCA (Logic Cell Array). The CPP is delivered with LCA-version 20. This version is compatible with the PLC-interface of the former CP4DX supplied by VIPA.
Page frame interface	The page frame interface of the CPP consists of 16KB of RAM that is available for read and write operations from the PLC as well as the CP. Access to and the size of this memory is controlled by means of registers (page frame select register) on the CPP.
Page frame operation via page frame select register	<p>In this mode of operation the different page frames are selected by means of the page frame select register on the PLC. The width of the page frame select register (address 0FEFFh) is eight bits and it therefore supports 256 page numbers. In this mode any access by the PLC to the highest byte of the page frame issues the interrupt to the CPP.</p> <p>(Note: this mode can only be used on the PLC-side in the address range 0Fxxh).</p>

LCA-Version 20

In page frame mode the PLC-interface LCA can manage 16 KB of RAM on the back plane bus.

PLC-interface LCA register

The PC can gain access to the PLC-interface LCA registers via I/O addresses 288h-28Fh. The PLC can access the page frame select register via the PLC-address FEFFh.

Name	Access	Description
reserved	I/O address 288h	
Page frame select register	PC R bit 0-3 I/O address: 289h PLC R/W bit 0-3 Address: FEFFh	Selects the page in the page bank that must be accessed from the PLC-side. The CP can gain access to all 16 page frames via memory addresses (C800h:0h-C800h:3FFFh).
reserved	I/O address: 28Ah	
Page bank select register	PC R bit 0-3 I/O address: 28Bh PLC R/W bit 4-7 Address: FEFFh	In page frame mode the PLC writes the page frame number into the page frame select register FEFFh. If the value in the page bank select register matches the value in the page bank compare registers the PLC RAM is enabled as a page frame.
Page bank compare register	PC R/W bit 0-3 I/O address: 28Ch	Defines the page bank that can be used by the PC to respond as page RAM. (See description of the page bank select register). Default value: 0010(bin)
PLC Status register	PC R/W bit 2-6 I/O address 28Dh	<p>Status register: interrupt Bit-Nr.</p> <p>7 6 5 4 3 2 1 0</p> <p>reserved</p> <p>Disable interrupt page frame address 3FFh 0: enable (default) 1: disable</p> <p>Disable BASP interrupt 0: enable 1: disable (default)</p> <p>Disable interrupt page frame address 3FDh 0: enable (default) 1: disable</p> <p>Level for Interrupt Request Status Reg. 00: level 1 01: level 2 11: level 3</p> <p>reserved</p> <p>Default value: 1000(bin)</p>

PLC-interface LCA register **continued**

Name	Access	Description																								
Interrupt request/ Interrupt Status Register	PC R/W bit 0-3 I/O address 28Eh	<p>This register is used simultaneously as interrupt request and as Interrupt Status Register. For read operations the register will return the interrupt status. Interrupt flags can be cleared by means of a write operation.</p> <p>Bit-Nr.</p> <table border="1"><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr></table> <p>Level 1:</p> <p>General page frame interrupt</p> <p>BASP interrupt</p> <p>Bit-Nr.</p> <table border="1"><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr></table> <p>Level 2:</p> <p>Interrupt from page number 0-3, address 3FFh</p> <p>Bit-Nr.</p> <table border="1"><tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr></table> <p>Level 3:</p> <p>Interrupt from page number 0-3, address 3FDh</p> <p>Read from register:</p> <p>Bit = 1: interrupt received</p> <p>Write to register:</p> <p>Bit = 1: interrupt request is cleared</p>	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0																			
7	6	5	4	3	2	1	0																			
7	6	5	4	3	2	1	0																			
LCA version number	PC R bit 0-4 I/O address 28Fh	Returns the version number of the LCA (21)																								

Setting the LCA to page frame operation

The start address for the page frame on the back plane bus is fixed at F400h. After a reset the LCA will default to using the PLC page frame numbers 32-47 (page bank 2). In this case only the page frame interrupt is active and the BASP interrupt is masked off.

Page Bank	PLC page number	Page bank compare register (28Ch)
0	0-15	0
1	16-31	1
2	32-47	2
3	48-63	3
4	64-79	4
5	80-95	5
6	96-111	6
7	112-127	7
8	128-143	8
9	144-159	9
10	160-175	A
11	176-191	B
12	192-207	C
13	208-223	D
14	224-239	E
15	240-255	F

Address allocation for Dual Port RAM in page frame operation

Page frame no.	PLC bus address	PC address
n+15	F400h - F7FFh	0C800h:0000h-0C800h:03FFh
n+14	F400h - F7FFh	0C800h:0400h-0C800h:07FFh
n+13	F400h - F7FFh	0C800h:0800h-0C800h:0BFFh
n+12	F400h - F7FFh	0C800h:0C00h-0C800h:0FFFh
n+11	F400h - F7FFh	0C800h:1000h-0C800h:13FFh
n+10	F400h - F7FFh	0C800h:1400h-0C800h:17FFh
n+9	F400h - F7FFh	0C800h:1800h-0C800h:1BFFh
n+8	F400h - F7FFh	0C800h:1C00h-0C800h:1FFFh
n+7	F400h - F7FFh	0C800h:2000h-0C800h:23FFh
n+6	F400h - F7FFh	0C800h:2400h-0C800h:27FFh
n+5	F400h - F7FFh	0C800h:2800h-0C800h:2BFFh
n+4	F400h - F7FFh	0C800h:2C00h-0C800h:2FFFh
n+3	F400h - F7FFh	0C800h:3000h-0C800h:33FFh
n+2	F400h - F7FFh	0C800h:3400h-0C800h:37FFh
n+1	F400h - F7FFh	0C800h:3800h-0C800h:3BFFh
n	F400h - F7FFh	0C800h:3C00h-0C800h:3FFFh

n = 0,16,32,48,64,80,96,112,128,144,160,176,192,208,224,240

Interrupt processing

The registers used for interrupt processing are the PLC status register (addr. 28Dh) and the interrupt request/status register (addr. 28Eh). The operation of these registers is available from the description of the LCA registers.

The LCA analyses the page frame interrupt and the BASP interrupt (BASP=inhibit command output). Write operations to page frame addresses 3FFh and 3FDh initiate a page frame interrupt. The BASP interrupt is initiated when the BASP signal changes from "0" to "1". Every one of the three interrupts can be enabled or disabled individually (in the PLC status register). After a reset the page frame interrupt is enabled and the BASP interrupt is disabled. Interrupts are available on CP interrupt line 12.

When an interrupt occurs the interrupt status bits must be checked to determine which type of interrupt (page frame or BASP interrupt) gave rise to the event. This check can be performed by reading the Interrupt Status Register from level 1. To determine the page frame address and page number that have initiated the interrupt the status register must be read from level 2 or 3.

To clear the interrupts the reaction to an interrupt must be a write operation into the Interrupt Request/Status Register. The respective interrupt-vector is located at address 1D0h - 1D3h. All outstanding interrupts from page frame address 3FFh and 3FDh for page frames 0 to 3 are cleared by writing a 1 into bit 0 of the level 1 Interrupt Request Register. A single interrupt request can be cleared by writing to the level 2 or 3 Interrupt Request Register.

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