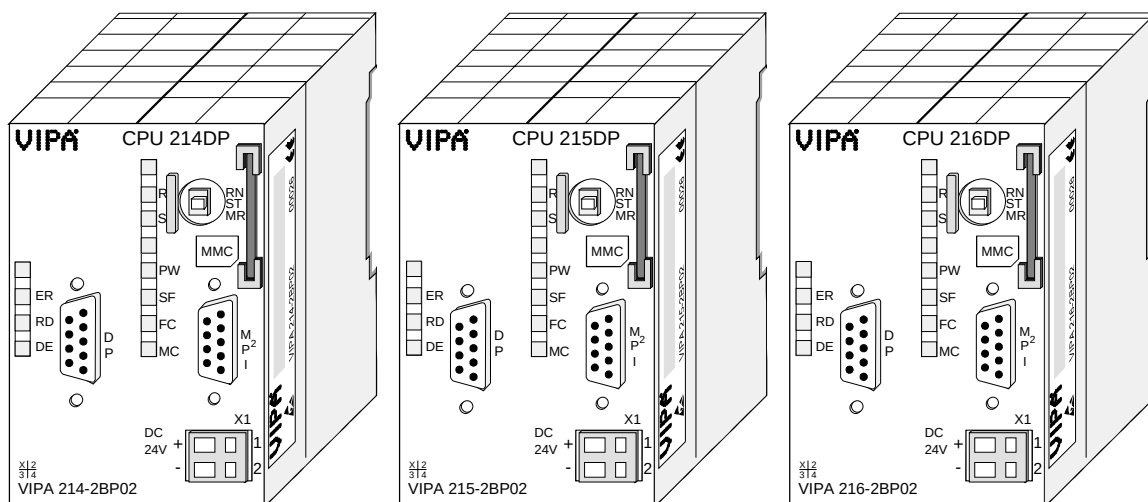


CPU 21xDP Identical to CPU 21x, additionally with:

- Integrated PROFIBUS slave
- Status LEDs for PROFIBUS status and diagnostics



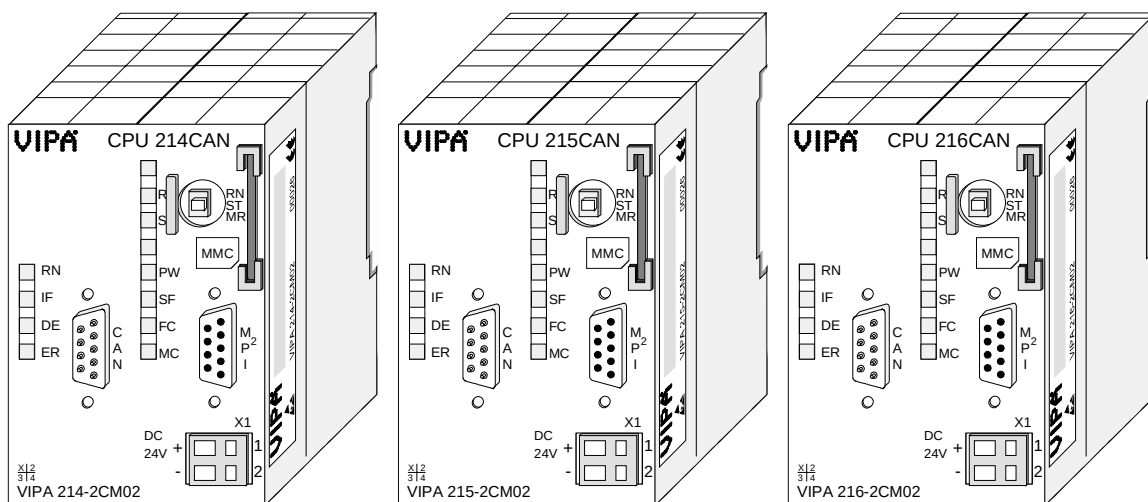
**Order data
CPU 21xDP**

Type	Order number	Description
CPU 214DP	VIPA 214-2BP02	SPS CPU 214 with PROFIBUS slave and 48/80KB of work/load memory
CPU 215DP	VIPA 215-2BP02	SPS CPU 215 with PROFIBUS slave and 96/144KB of work/load memory
CPU 216DP	VIPA 216-2BP02	SPS CPU 216 with PROFIBUS slave and 128/192KB of work/load memory

CPU 21xCAN

Identical to CPU 21x, additionally with:

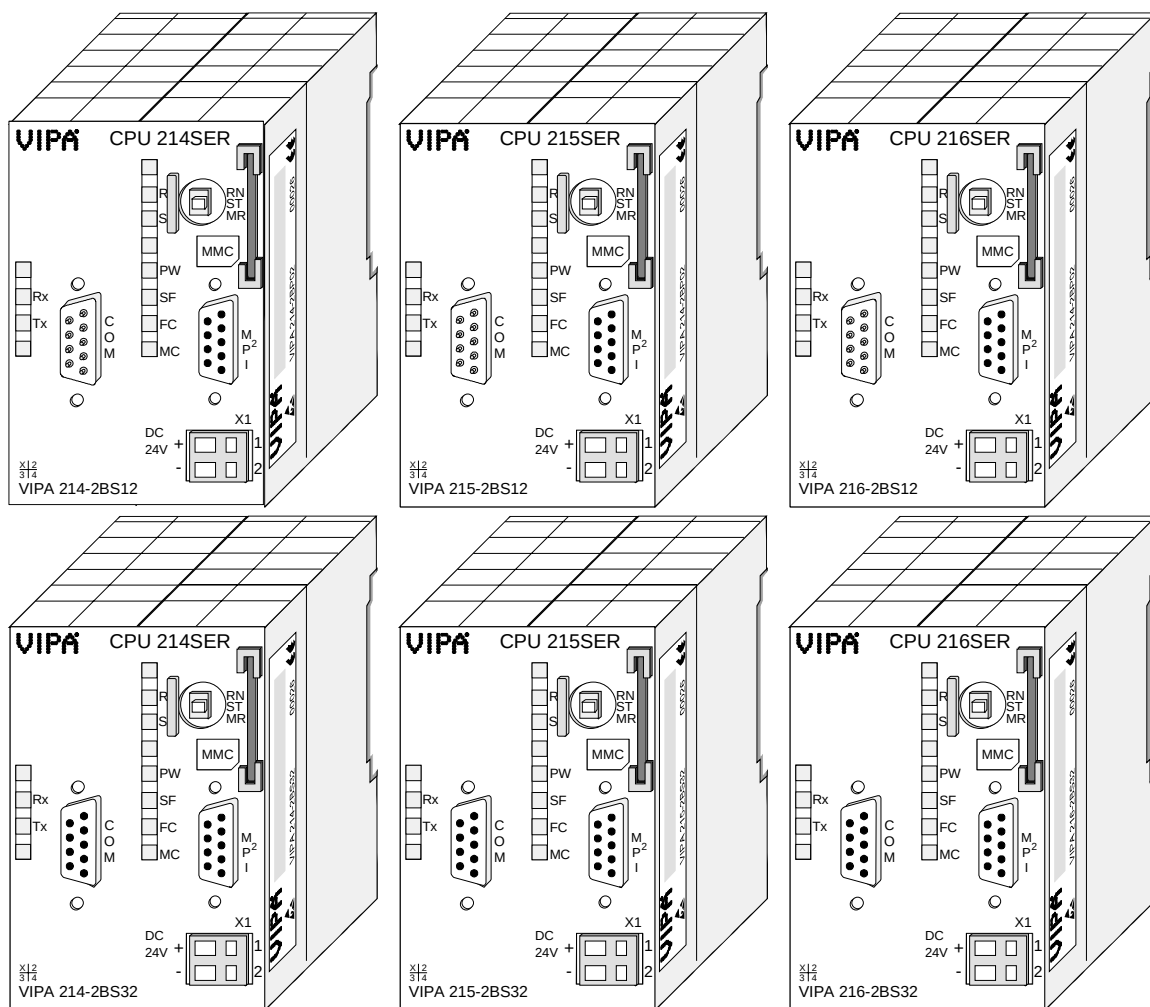
- Integrated CAN master
- Status-LEDs for CAN status and diagnostics


Order data
CPU 21xCAN

Type	Order number	Description
CPU 214CAN	VIPA 214-2CM02	PLC CPU 214 with CAN master and 48/80KB of work/load memory
CPU 215CAN	VIPA 215-2CM02	PLC CPU 215 with CAN master and 96/144KB of work/load memory
CPU 216CAN	VIPA 216-2CM02	PLC CPU 216 with CAN master and 128/192KB of work/load memory

CPU 21xSER-1 Identical to CPU 21x, additionally with:

- Serial Communication via two COM interfaces (RS232 or RS485)
- LEDs for communication

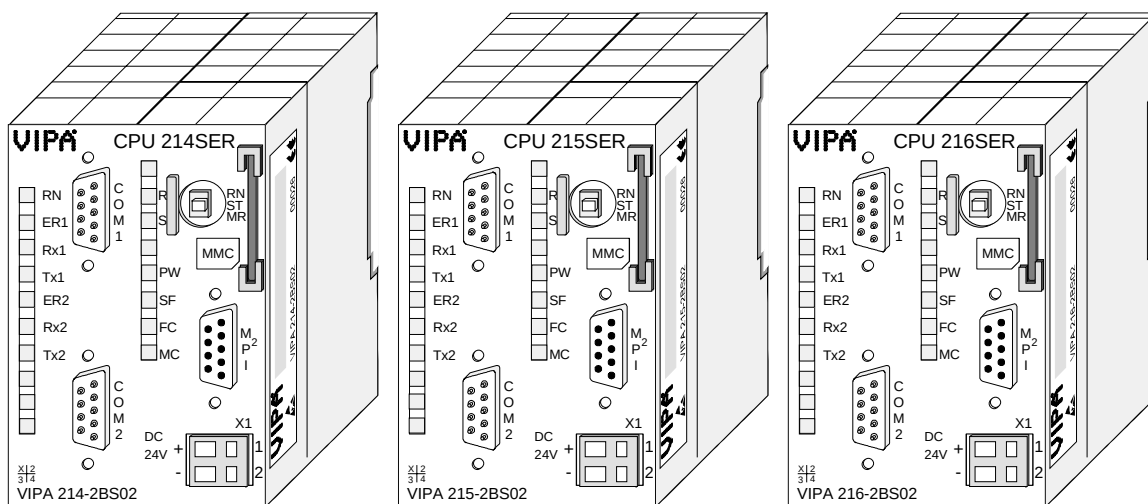


Order data
CPU 21xSER-1

Type	Order number	Description
CPU 214SER	VIPA 214-2BS12	SPS CPU 214 with 1xRS232 interface and 48/80kByte of work/load memory
CPU 215SER	VIPA 215-2BS12	SPS CPU 215 with 1xRS232 interface and 96/144kByte of work/load memory
CPU 216SER	VIPA 216-2BS12	SPS CPU 216 with 1xRS232 interface and 128/192kByte of work/load memory
CPU 214SER	VIPA 214-2BS32	SPS CPU 214 with 1xRS485 interface and 48/80kByte of work/load memory
CPU 215SER	VIPA 215-2BS32	SPS CPU 215 with 1xRS485 interface and 96/144kByte of work/load memory
CPU 216SER	VIPA 216-2BS32	SPS CPU 216 with 1xRS485 interface and 128/192kByte of work/load memory

CPU 21xSER-2 Identical to CPU 21x, additionally with:

- Serial Communication via 2 RS232 interfaces
- LEDs for Communication

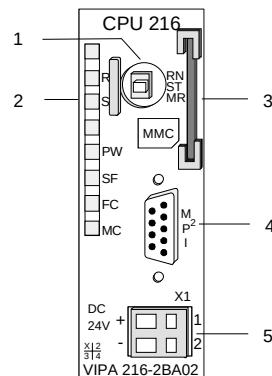


Order data
CPU 21xSER-2

Type	Order number	Description
CPU 214SER	VIPA 214-2BS02	SPS CPU 214 with 2xRS232 interface and 48/80kByte of work/load memory
CPU 215SER	VIPA 215-2BS02	SPS CPU 215 with 2xRS232 interface and 96/144kByte of work/load memory
CPU 216SER	VIPA 216-2BS02	SPS CPU 216 with 2xRS232 interface and 128/192kByte of work/load memory

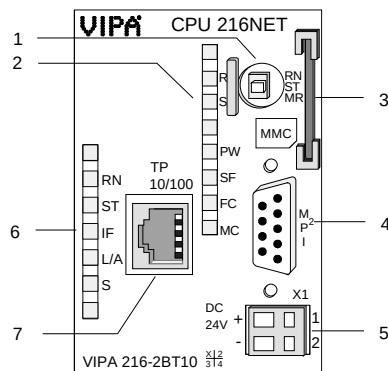
Structure

**Front view
CPU 21x**



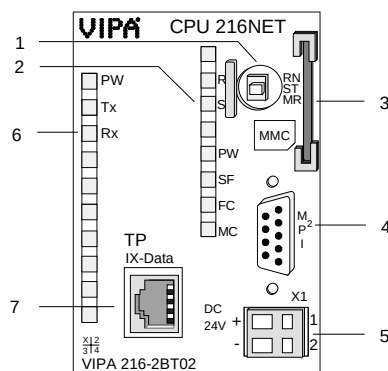
- [1] RUN/STOP/OVERALL RESET function selector
- [2] Status indicator LEDs CPU
- [3] Slot for MMC memory card
- [4] MP²I interface
- [5] Connector for 24V DC power supply

**Front view
CPU 21x-2BT10**



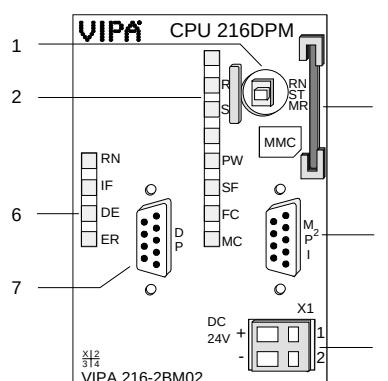
- [1] RUN/STOP/OVERALL RESET function selector
- [2] Status indicator LEDs CPU
- [3] Slot for MMC memory card
- [4] MP²I interface
- [5] Connector for 24V DC power supply
- [6] Status indicator LEDs Ethernet
- [7] RJ45 jack for twisted pair Ethernet

**Front view
CPU 21x-2BT02**



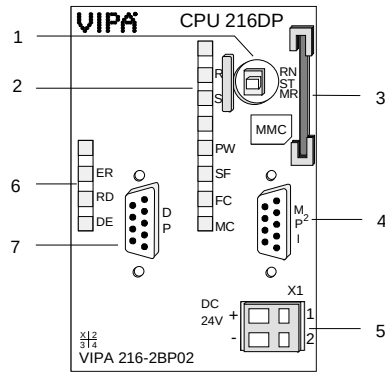
- [1] RUN/STOP/OVERALL RESET function selector
- [2] Status indicator LEDs CPU
- [3] Slot for MMC memory card
- [4] MP²I interface
- [5] Connector for 24V DC power supply
- [6] Status indicator LEDs Ethernet
- [7] RJ45 jack for twisted pair Ethernet

**Front view
CPU 21xDPM**



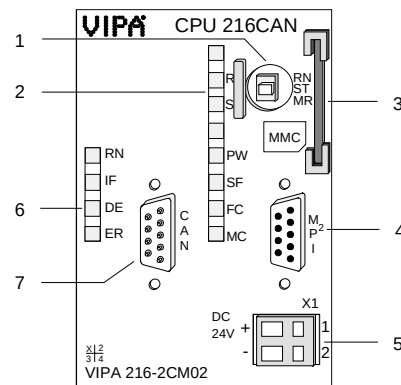
- [1] RUN/STOP/OVERALL RESET function selector
- [2] Status indicator LEDs CPU
- [3] Slot for MMC memory card
- [4] MP²I interface
- [5] Connector for 24V DC power supply
- [6] PROFIBUS-DP master status indicator LEDs
- [7] PROFIBUS interface

Front view CPU 21xDP



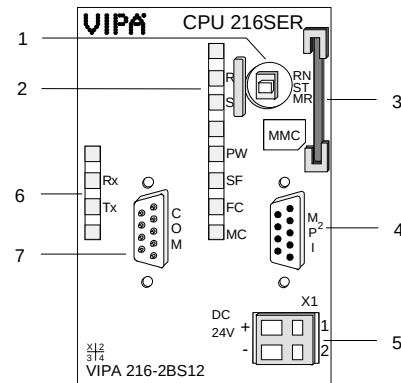
- [1] RUN/STOP/OVERALL RESET function selector
- [2] Status indicator LEDs CPU
- [3] Slot for MMC memory card
- [4] MP²I interface
- [5] Connector for 24V DC power supply
- [6] Status indicator LEDs PROFIBUS-DP slave
- [7] PROFIBUS DP interface

Front view CPU 21xCAN



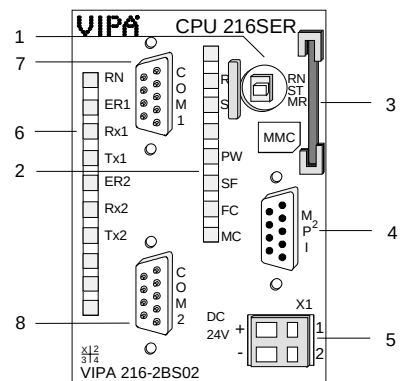
- [1] RUN/STOP/OVERALL RESET function selector
- [2] Status indicator LEDs CPU
- [3] Slot for MMC memory card
- [4] MP²I interface
- [5] Connector for 24V DC power supply
- [6] LEDs status indicator CAN master
- [7] CAN interface

Front view CPU 21xSER-1



- [1] RUN/STOP/OVERALL RESET function selector
- [2] Status indicator LEDs CPU
- [3] Slot for MMC memory card
- [4] MP²I interface
- [5] Connector for 24V DC power supply
- [6] LED status indicator communication
- [7] RS232 interface (only 21x-2BS12)
RS485 interface (only 21x-2BS32)

Front view CPU 21xSER-2



- [1] RUN/STOP/OVERALL RESET function selector
- [2] Status indicator LEDs CPU
- [3] Slot for MMC memory card
- [4] MP²I interface
- [5] Connector for 24V DC power supply
- [6] LED status indicator communication
- [7] RS232 interface 1
- [8] RS232 interface 2

Components

CPU 21x

The components of the CPU 21x that are described here are components of all the CPUs presented in this manual.

LEDs

The CPUs 21x have a number of LEDs that are used to diagnose bus conditions and to display the status of a program. The table below describes the diagnostic LEDs and the according colors.

These LEDs are part of every CPU in this manual.

Name	Color	Description
PW	green	Indicates CPU power on.
R	green	CPU status is RUN.
S	yellow	CPU status is STOP.
SF	red	Is turned on if a system error is detected (hardware defect)
FC	yellow	Is turned on when variables are forced (fixed).
MC	yellow	This LED blinks when the MMC is accessed.

Function selector RN/ST/MR

You can select the operating mode STOP (ST) and RUN (RN) by means of the function selector. The CPU automatically executes the operating mode START-UP when the mode changes from STOP to RUN.

You may issue an overall reset by placing the switch in the Memory Reset (MR) position.

MMC slot memory card

You may install a VIPA MMC memory card in this slot as external storage device (Order No.: VIPA 953-0KX10).

The access to the MMC takes always place after an overall reset.

Power supply

The CPU has an internal power supply. This is connected to an external supply voltage via two terminals located on the front of the unit.

The power supply requires DC 24V (20,4 ... 28,8V). In addition to the electronic circuitry of the CPU this supply voltage is used for the modules connected to the backplane bus.

The electronic circuitry of the CPU is not dc-insulated from the supply voltage. The power supply is protected against reverse polarity and short circuits.



Note!

Please ensure that the polarity of the supply voltage is correct.

Battery backup for clock and RAM

A rechargeable battery is installed on every CPU 21x to safeguard the contents of the RAM when power is removed. This battery is also used to buffer the internal clock.

The rechargeable battery is maintained by a charging circuit that receives its power from the internal power supply and that maintain the clock and RAM for a max. period of 30 days.

**Attention!**

The CPU will operate only if the battery is healthy.

The CPU will STOP when the battery is faulty. In this case the CPU should be checked. Please contact VIPA!

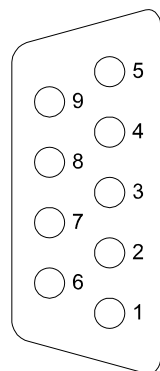
MP²I interface

The MPI unit provides the link for the data transfer between the CPU and the PC. Via bus communication you are able to exchange programs and data between different CPUs that are linked over MPI.

For a serial exchange between the partners you normally need a special MPI-converter. But now you are also able to use the VIPA "Green Cable" (Order-No. VIPA 950-0KB00), which allows you to establish a serial peer-to-peer connection over the MPI interface.

Please regard the "Hints for the deployment of the MPI interface" in chapter "Deployment CPU 21x".

The pin assignment of the MP²I jack is as follows:

9pin jack

Pin	Assignment
1	reserved (must not be connected)
2	M24V
3	RxD/TxD-P (Line B)
4	RTS
5	M5V
6	P5V
7	P24V
8	RxD/TxD-N (Line A)
9	n.c.

CPU 21x-2BT10

In addition to the components described in the section on the CPU 21x the CPU 21x-2BT10 module is provided with further LEDs and an Ethernet interface located at the left-hand side of the module.

LEDs

The LEDs are located on the left-hand side of the front panel and indicate communication activities.

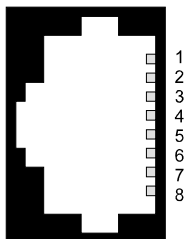
The table below shows the color and the meaning of these LEDs.

Name	Color	Description
RN	green	CP RUN On: CP project is loaded Off: CP is reset (no project)
ST	yellow	CP STOP On: CP status is reset Off: CP Project is transferred
IF	red	On: Internal CP error
L/A	green	Link/Activity: On: physically connected to Ethernet Off: no physical connection to Ethernet Blinks: Ethernet activity
S	green	Transfer speed: On: 100MBit Off: 10MBit

Ethernet interface

An RJ45 jack provides the interface to the twisted pair cable, required for Ethernet. The pin assignment of this jack is as follows:

8pin RJ45 jack:



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

**Note!**

For more detailed information on twisted pair networks refer to chapter "Deployment of the CPU 21x-2BT10 with TCP/IP".

CPU 21x-2BT02

In addition to the components described in the section on the CPU 21x the CPU 21x-2BT02 module is provided with further LEDs and an Ethernet interface located at the left-hand side of the module.

LEDs

The LEDs are located on the left-hand side of the front panel and indicate communication activities.

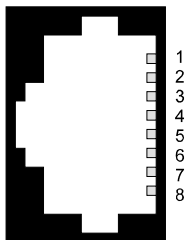
The table below shows the color and the meaning of these LEDs.

Name	Color	Description
PW	green	Indicates CPU power on
TxD	green	Transmit data
RxD	green	Receive data

Ethernet interface

An RJ45 jack provides the interface to the twisted pair cable, required for Ethernet. The pin assignment of this jack is as follows:

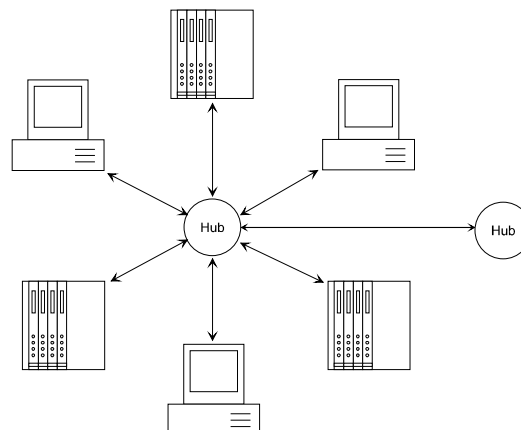
8pin RJ45 jack:



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

Star topology

A twisted pair network can only have a star topology. For this purpose a hub is required as the central node:

**Note!**

For more detailed information on twisted pair networks refer to chapter "Deployment of the CPU 21x-2BT02 with H1 / TCP/IP".



CPU 21xDPM

In addition to the components described in the section on the CPU 21x the CPU 21xDPM module is provided with 4 more LEDs and a PROFIBUS interface.

LEDs

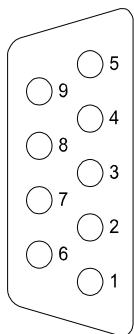
The LEDs are located in the left half of the front panel and they are used for diagnostic purposes. The following table shows the color and the significance of these LEDs.

Name	Color	Description
RN	green	DP-Master-RUN On: Master status is RUN. The slaves are being accessed and the outputs are 0 ("clear" state). On with DE: Master status is "operate". and is communicating with the slaves.
IF	red	Initialization error On: Error in PROFIBUS configuration
DE	yellow	DE (Data exchange) On: Indicates PROFIBUS communication activity.
ER	red	Error On: Slave has failed

PROFIBUS interface

The CPU 21xDPM is connected to the PROFIBUS system by means of a 9pin jack. The pin assignment of this interface is as shown:

9pin PROFIBUS D-type jack:



Pin	Assignment
1	Shield
2	n.c.
3	RxD/TxD-P (Line B)
4	RTS
5	M5V
6	P5V
7	n.c.
8	RxD/TxD-N (Line A)
9	n.c.

**Note!**

Refer to the chapter "Deployment of the CPU 21xDPM" for details on the PROFIBUS master.

CPU 21xDP

In addition to the components described in the section on the CPU 21x the CPU 21xDP module is provided with 3 more LEDs and a PROFIBUS interface.

LEDs

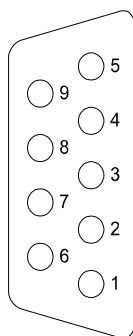
The LEDs are located in the left half of the front panel and they are used for diagnostic purposes. The following table shows the color and the significance of these LEDs.

Name	Color	Description
ER	red	Error On: Error in PROFIBUS part detected respectively CPU has been stopped. Flashing (2Hz): Initialization error Flashing (10Hz): Supply voltage < DC18V Flashing <i>alternately</i> with RD: Configuration error (error at Master configuration) Flashing <i>simultaneously</i> with RD: Error in parameterization
RD	green	Ready On: Data transfer via back plane bus Flashing: Self-test result is positive (READY) and successful initialization
DE	green	DE (Data exchange) On: Indicates an active PROFIBUS communication.

PROFIBUS interface

The CPU 21xDP is connected to the PROFIBUS system by means of a 9pin jack. The pin assignment of this interface is as shown:

9pin PROFIBUS D-type jack:



Pin	Assignment
1	Shield
2	n.c.
3	RxD/TxD-P (Line B)
4	RTS
5	M5V
6	P5V
7	n.c.
8	RxD/TxD-N (Line A)
9	n.c.

**Note!**

Refer to the chapter "Deployment of the CPU 21xDP" for details on the PROFIBUS.

CPU 21xCAN

In addition to the components described in the section on the CPU 21x the CPU 21xCAN module is provided with 4 more LEDs and a CAN interface.

LEDs

The LEDs are located in the left half of the front panel and they are used for diagnostic purposes. The following table shows the color and the significance of these LEDs.

Name	Color	Description
RN	green	CAN master RUN ON: CAN master state is RUN OFF: CAN master state is STOP
ER	red	Error ON: During initialization and at slave failure OFF: All slaves are in the state "operational"
BA	yellow	BA (Bus active) On: CAN bus communication respectively state "operational" Blinking (1Hz): State "pre-operational".
IF	red	Initialization ON: Initialization error at wrong parameterization. Off: Initialization is OK.

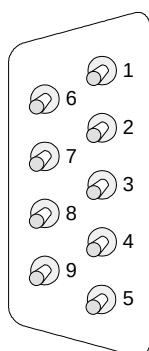
**Note!**

If all LEDs are blinking with 1Hz, the CAN master awaits valid parameters from the CPU. If the CAN master is not supplied with parameters by the CPU his LEDs get off after 5s.

CAN interface

The CPU 21xCAN is connected to the CAN system by means of a 9pin plug. The pin assignment of this interface is as shown:

9pin CAN D-type plug:



Pin	Assignment
1	reserved
2	CAN low
3	CAN Ground
4	reserved
5	Screen
6	Ground 24V
7	CAN high
8	reserved
9	n.c.

**Note!**

More details on the CAN master see chapter "Deployment CPU 21xCAN"!

CPU 11xSER-1

Additional to the components described before, the CPU 21x with order no. 21x-2BS12 has an RS232 interface and the CPU 21x with order no. 21x-2BS32 an RS485 interface.

LEDs

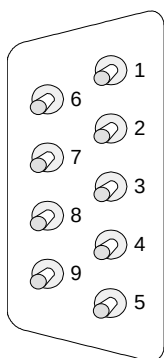
The LEDs are located in the left half of the front panel and they are used for diagnostic purposes. The following table shows the color and the significance of these LEDs.

Name	Color	Description
Rx	green	Interface receive data
Tx	green	Interface transmit data

RS232 interface

Via 9pin plug, you may establish a serial RS232 point-to-point connection. The pin assignment of this interface is as shown:

9pin plug (CPU 21x-2BS12)

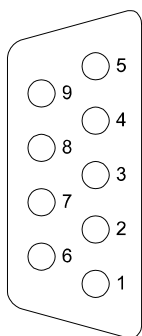


Pin	Assignment
1	CD-
2	RxD
3	TxD
4	DTR-
5	GND
6	DSR-
7	RTS-
8	CTS-
9	RI-

RS485 interface

Via 9pin slot, you may establish a serial RS485 bus connection. The pin assignment of this interface is as shown:

9pin jack (CPU 21x-2BS32)



Pin	Assignment
1	n.c.
2	n.c.
3	RxD/TxD-P (Line B)
4	RTS
5	M5V
6	P5V
7	n.c.
8	RxD/TxD-N (Line A)
9	n.c.

CPU 21xSER-2

In addition to the components described in the section on the CPU 21x the CPU 21xSER-2 module is provided with more LEDs and two serial RS232 interfaces.

LEDs

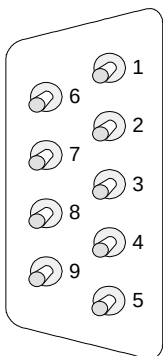
The LEDs are located in the left half of the front panel and they are used for diagnostic purposes. The following table shows the color and the significance of these LEDs.

Name	Color	Description
RN	green	Communication processor runs
ER1	red	Error Interface 1
Rx1	green	Interface 1 receive data
Tx1	green	Interface 1 transmit data
ER2	red	Error Interface 2
Rx2	green	Interface 2 receive data
Tx2	green	Interface 2 transmit data

**RS232
interface
COM1, COM2**

The CPU 21xSER-2 has got a communication processor with 2 RS232 interfaces. The pin assignment of the interfaces is as follows:

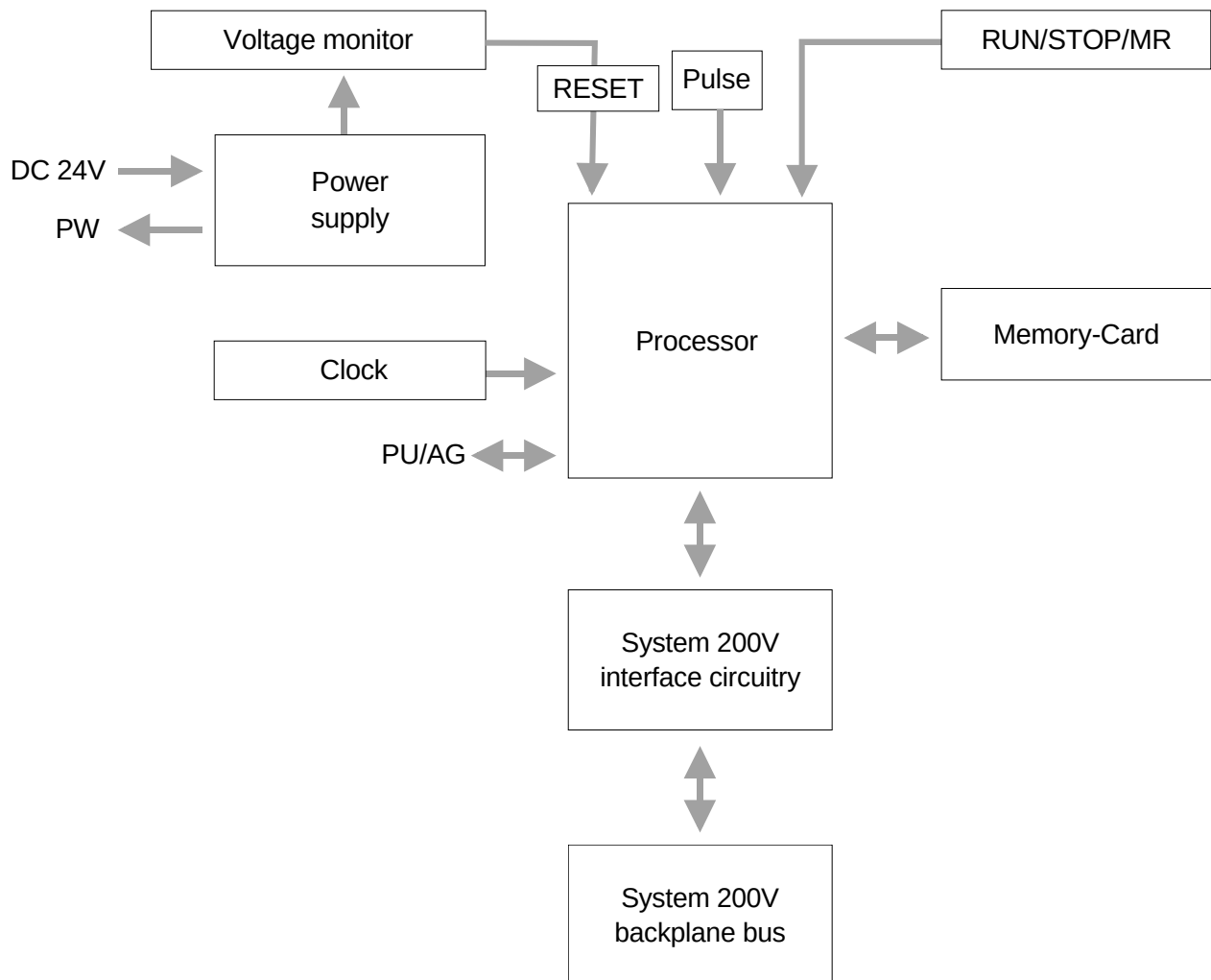
9pin plug



Pin	Assignment
1	CD-
2	RxD
3	TxD
4	DTR-
5	GND
6	DSR-
7	RTS-
8	CTS-
9	RI-

Block diagram

The following block diagram shows the basic hardware construction of the CPU 21x modules:



Technical data

CPU 21x

General

Electrical data		VIPA 214-1BC02, VIPA 214-1BA02 ... VIPA 216-1BA02
Power supply		DC 24V (20.4 ... 28.8V)
Current consumption		max. 1.5A
Dissipation power		max. 3.5W
Status indicators (LEDs)		by means of LEDs located on the front
Connections / interfaces		MP ² I interface for data communication
Clock, memory/clock backup		yes / Lithium accumulator, 30 days backup
Output current to backplane bus		max. 3A
Bit memory		8192 Bit (M0.0...M1023.7)
Timer		256 (T0...T255)
Counters		256 (Z0 ... Z255)
Number of Blocks	FB	1024 (FB0...FB1023)
	FC	1024 (FC0...FC1023)
	DB	2047 (DB1...DB2047)
Total addressing space input / output		1024/1024Byte, each 128 Byte for process image (PA)
Process image Inputs		1024Bit (I0.0...I127.7)
Process image Outputs		1024Bit (O0.0...O127.7)
Combination with peripheral modules		
max. no. of modules		32
max. digital I/O		32
max. analog I/O		16
Addressable inputs, outputs		1024 (digital), 128/128 (analog)
Dimensions and weight		
Dimensions (WxHxD) in mm		25.4x76x80
Weight		80g

Module specific

	CPU 214C	CPU 214	CPU 215	CPU 216
Work memory	32kByte	48kByte	96kByte	128kByte
Load memory	40kByte	80kByte	144kByte	192kByte
Cycle time bit operations	0.18µs	0.18µs	0.18µs	0.18µs
Cycle time word operations	0.78µs	0.78µs	0.78µs	0.78µs
Order-No.:	214-1BC02	214-1BA02	215-1BA02	216-1BA02

CPU 21x-2BT10

Electrical data	VIPA 214-2BT10 ... VIPA 216-2BT10
Power supply	DC 24V (20.4 ... 28.8V)
Current consumption	max. 1.5A
Dissipation power	max. 6W
Potential separation	≥ 500V AC to Ethernet
Status indicator (LEDs)	like CPU 21x additionally with LEDs for the Ethernet section
Connections/interfaces	like CPU 21x additionally with RJ45 jack (Ethernet)
Ethernet interface	CP 243
Connector	RJ45
Network topology	Star topology
Medium	Twisted pair
Transfer rate	10/100Mbit
Overall length	max. 100m per segment
PG/OP channel	8 (32 with CP firmware version 1.7.4 and up)
Configurable connections:	16
Dimensions and weight	
Dimensions (WxHxD) in mm	50.8x76x80
Weight	150g

CPU 21x-2BT02

Electrical data	VIPA 214-2BT02 ... VIPA 216-2BT02
Power supply	DC 24V (20.4 ... 28.8V)
Current consumption	max. 1.5A
Dissipation power	max. 6W
Potential separation	≥ 500V AC to Ethernet
Status indicator (LEDs)	like CPU 21x additionally with LEDs for the Ethernet section
Connections/interfaces	like CPU 21x additionally with RJ45 jack (Ethernet)
Ethernet interface	CP 243
Connector	RJ45
Network topology	Star topology
Medium	Twisted pair
Transfer rate	10Mbit
Overall length	max. 100m per segment
PG/OP channel	-
Configurable connections:	32
Dimensions and weight	
Dimensions (WxHxD) in mm	50.8x76x80
Weight	150g

CPU 21xDPM

Electrical Data	VIPA 214-2BM02 ... VIPA 216-2BM02
Power supply	DC 24V (20.4 ... 28.8V)
Current consumption	max. 1.5A
Dissipation power	max. 5W
Potential separation	≥ 500V AC to fieldbus
Status monitoring (LEDs)	like CPU 21x additionally with LEDs for the PROFIBUS section
Adapters/interfaces	like CPU 21x additionally with 9pin D-type jack (PROFIBUS)
PROFIBUS interface	
Connector	9pin D-type jack
Network topology	Linear bus, active bus termination at both ends
Medium	Screened and drilled twisted pair cable. Depending on environment screening may be omitted.
Transfer rate	9.6kbit/s up to 12Mbit/s
Overall length	100m at 12 Mbit/s without repeater, up to 1000m with repeater
max. no. of stations	32 stations on every segment without repeater. Expandable to 126 stations with repeater.
Combination with peripheral modules	
max. number of slaves	125
max. number of input bytes	1024
max. number of output bytes	1024
Dimensions and Weight	
Dimensions (WxHxD) in mm	50.8x76x80
Weight	150g

CPU 21xDP

Electrical data	VIPA 214-2BP02 ... VIPA 216-2BP02
Power supply	DC 24V (20.4 ... 28.8V)
Current consumption	max. 1.5A
Dissipation power	max. 5W
Potential separation	≥ 500V AC to fieldbus
Status indicator (LEDs)	like CPU 21x additionally with LEDs for the PROFIBUS section
Adapters/interfaces	like CPU 21x additionally with 9pin D-type jack (PROFIBUS)
PROFIBUS interface	
Connector	9pin D-type jack
Network topology	Linear bus, active bus termination at both ends
Medium	Screened and drilled twisted pair cable. Depending on environment screening may be omitted.
Transfer rate	9.6kbit/s up to 12Mbit/s
Overall length	100m at 12 Mbit/s without repeater, up to 1000m with repeater
max. no. of stations	32 stations on every segment without repeater. Expandable to 126 stations with repeater.
Dimensions and weight	
Dimensions (WxHxD) in mm	50.8x76x80
Weight	150g

CPU 21xCAN

Electrical Data	VIPA 214-2CM02 ... VIPA 216-2CM02
Power supply	DC 24V (20.4 ... 28.8V)
Current consumption	max. 1.5A
Dissipation power	max. 5W
Potential separation	≥ 500V AC to fieldbus
Status monitoring (LEDs)	like CPU 21x additionally with LEDs for the CAN section
Adapters/interfaces	like CPU 21x additionally with 9pin D-type jack (CAN)
CAN interface	
Connector	9pin D-type jack
Network topology	Linear bus, active bus termination at both ends
Medium	Screened and drilled twisted pair cable. Depending on environment screening may be omitted.
Transfer rate	10kbit/s up to 1Mbit/s
Overall length	without repeater 1000m at 50kbit/s
max. no. of stations	126 stations
Combination with peripheral modules	
max. number of slaves	125
max. number of TxPDOs	40
max. number of RxPDOs	40
max. number of input bytes	384
max. number of output bytes	384
Dimensions and Weight	
Dimensions (WxHxD) in mm	50.8x76x80
Weight	150g