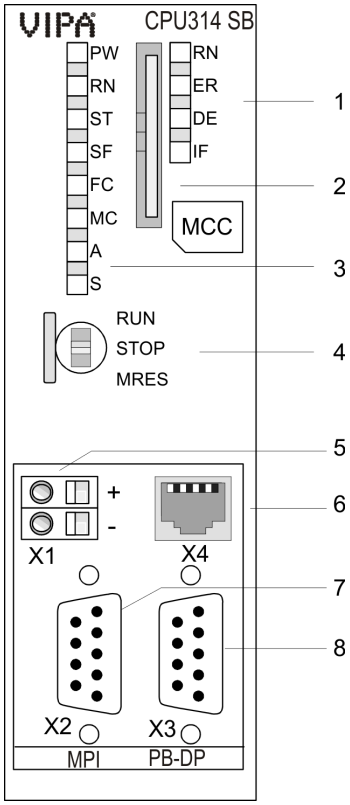
4.2 Structure

4.2.1 General

CPU 314-2AG13



1 LEDs of the integrated PROFIBUS DP master
2 Storage media slot (lockable)
3 LEDs of the CPU part
4 Operating mode switch CPU
5 Slot for DC 24V power supply
6 Twisted pair interface for Ethernet PG/OP channel
7 MPI interface
8 PROFIBUS DP/PtP interface

Components 5 - 8 are under the front flap!

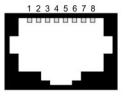
4.2.2 Interfaces

X1



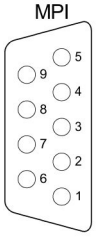
+ ① + DC 24 V
- ② 0 V

X4



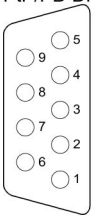
① Transmit +
② Transmit -
③ Receive +
④ -
⑤ -
⑥ Receive -
⑦ -
⑧ -

X2
MPI



① n. c.
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.

X3
PtP/PB-DP



① shield
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.

Power supply X1

The CPU has an integrated power supply:

- The power supply has to be provided with DC 24V. For this serves the double DC 24V slot, that is underneath the flap.
- Via the power supply not only the internal electronic is provided with voltage, but by means of the backplane bus also the connected modules.
- The power supply is protected against polarity inversion and overcurrent.
- The internal electronic is galvanically connected with the supply voltage.

MPI interface X2

9pin SubD jack:

- The MPI interface serves for the connection between programming unit and CPU.
- By means of this the project engineering and programming happens.
- MPI serves for communication between several CPUs or between HMIs and CPU.
- Standard setting is MPI Address 2.

Ethernet PG/OP channel X4

8pin RJ45 jack:

- The RJ45 jack serves the interface to the Ethernet PG/OP channel.
- This interface allows you to program res. remote control your CPU, to access the internal web site or to connect a visualization.
- Configurable connections are not possible.
- For online access to the CPU via Ethernet PG/OP channel valid IP address parameters have to be assigned to this.

PROFIBUS/PtP interface with configurable functionality X3

9pin SubD jack:

The CPU has a PROFIBUS/PtP interface with a fix pinout. After an overall reset the interface is deactivated. By appropriate configuration, the following functions for this interface may be enabled:

- PROFIBUS DP master operation
  - Configuration via PROFIBUS sub module X1 (MPI/DP) with *'Operation mode'* master in the hardware configuration.
- PROFIBUS DP slave operation
  - Configuration via PROFIBUS sub module X1 (MPI/DP) with *'Operation mode'* slave in the hardware configuration.
- PtP functionality
  - Using the PtP functionality the RS485 interface is allowed to connect via serial point-to-point connection to different source res. target systems.
  - Here the following protocols are supported: ASCII, STX/ETX, 3964R, USS and Modbus-Master (ASCII, RTU).
  - The activation of the PtP functionality happens by embedding the SPEEDBUS.GSD from VIPA in the hardware catalog. After the installation the CPU may be configured in a PROFIBUS master system and here the interface may be switched to PtP communication.

4.2.3 Memory management

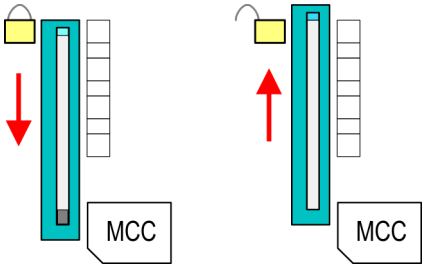
Memory

The CPU has an integrated memory. Information about the capacity of the memory may be found at the front of the CPU. The memory is divided into the following parts:

- Load memory 512kbyte
- Code memory (50% of the work memory)
- Data memory (50% of the work memory)
- Work memory 256kbyte
  - There is the possibility to extend the work memory to its maximum printed capacity 512kbyte by means of a MCC memory extension card.

4.2.4 Storage media slot

- As external storage medium for applications and firmware you may use a MMC storage module (**M**ulti**m**edia **c**ard).
- The VIPA storage media are pre-formatted with the PC format FAT16 and can be accessed via a card reader.
- After PowerON respectively an overall reset the CPU checks, if there is a storage medium with data valid for the CPU.
- Push the memory card into the slot until it snaps in leaded by a spring mechanism. This ensures contacting.
- By sliding down the sliding mechanism, a just installed memory card can be protected against drop out.
- To remove, slide the sliding mechanism up again and push the storage media against the spring pressure until it is unlocked with a click.



CAUTION!
If the media was already unlocked by the spring mechanism, with shifting the sliding mechanism, a just installed memory card can jump out of the slot!

4.2.5 Battery backup for clock and RAM

A rechargeable battery is installed on every CPU 31xS 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.

CAUTION!
Please connect the CPU at least for 24 hours to the power supply, so that the internal accumulator/battery is loaded accordingly.

After a power reset and with an empty battery the CPU starts with a BAT error and executes an overall reset. The loading procedure is not influenced by the BAT error.

The BAT error can be deleted again, if once during power cycle the time between switching on and off the power supply is at least 30sec. and the battery is fully loaded. Otherwise with a short power cycle the BAT error still exists and an overall reset is executed.

4.2.6 Operating mode switch



- With the operating mode switch you may switch the CPU between STOP and RUN.
- During the transition from STOP to RUN the operating mode START-UP is driven by the CPU.
- Placing the switch to MRES (Memory Reset), you request an overall reset with following load from MMC, if a project there exists.

4.2.7 LEDs

LEDs CPU

As soon as the CPU is supplied with 5V, the green PW-LED (Power) is on.

RN (RUN)	ST (STOP)	SF (SFAIL)	FC (FRCE)	MC (MMC)	Meaning
green	yellow	red	yellow	yellow	
Boot-up after PowerON					
●	BB*	●	●	●	* Blinking with 10Hz: Firmware is loaded.
●	●	●	●	●	Initialization: Phase 1
●	●	●	●	○	Initialization: Phase 2
●	●	●	○	○	Initialization: Phase 3
○	●	●	○	○	Initialization: Phase 4
Operation					
○	●	X	X	X	CPU is in STOP state.
BB	○	X	X	X	CPU is in start-up state, the RUN LED blinks during operating OB100 at least for 3s.
●	○	○	X	X	CPU is in state RUN without error.

RN (RUN)	ST (STOP)	SF (SFAIL)	FC (FRCE)	MC (MMC)	Meaning
X	X	●	X	X	There is a system fault. More information may be found in the diagnostics buffer of the CPU.
X	X	X	●	X	Variables are forced.
X	X	X	X	●	Access to the memory card.
X	BB*	○	○	○	* Blinking with 10Hz: Configuration is loaded.
Overall reset					
○	BB	X	X	X	Overall reset is requested.
○	BB*	X	X	X	* Blinking with 5Hz: Overall reset is executed.
Factory reset					
●	●	○	○	○	Factory reset is executed.
○	●	●	●	●	Factory reset finished without error.
Firmware update					
○	●	BB	BB	●	The alternate blinking indicates that there is new firmware on the memory card.
○	○	BB	BB	●	The alternate blinking indicates that a firmware update is executed.
○	●	●	●	●	Firmware update finished without error.
○	BB*	BB*	BB*	BB*	* Blinking with 10Hz: Error during Firmware update.

on: ● | off: ○ | blinking (2Hz): BB | not relevant: X

LEDs Ethernet PG/OP channel L/A, S

The green L/A-LED (Link/Activity) indicates the physical connection of the Ethernet PG/OP channel to Ethernet. Irregular flashing of the L/A-LED indicates communication of the Ethernet PG/OP channel via Ethernet.

If the green S-LED (Speed) is on, the Ethernet PG/OP has a communication speed of 100MBit/s otherwise 10MBit/s.

LEDs PROFIBUS/PtP interface X3

Dependent on the mode of operation the LEDs show information about the state of operation of the PROFIBUS part according to the following pattern:

Master operation

RN (RUN)	ER (ERR)	DE	IF	Meaning
green 	red 	green 	red 	
○	○	○	○	Master has no project, this means the interface is deactivated respectively PtP is active.

RN (RUN)	ER (ERR)	DE	IF	Meaning
●	○	○	○	Master has bus parameters and is in RUN without slaves.
●	○	BB	○	Master is in "clear" state (safety state). The inputs of the slaves may be read. The outputs are disabled.
●	○	●	○	Master is in "operate" state, this means data exchange between master and slaves. The outputs may be accessed.
●	●	●	○	CPU is in RUN, at least 1 slave is missing.
●	●	BB	○	CPU is in STOP, at least 1 slave is missing.
○	○	○	●	Initialization error at faulty parametrization.
○	●	○	●	Waiting state for start command from CPU.
on: ● | off: ○ | blinking (2Hz): BB				

Slave operation

RN (RUN)	ER (ERR)	DE	IF	Meaning
green	red	green	red	
○	○	○	○	Slave has no project respectively PtP is active.
BB	○	○	○	Slave is without master.
BB*	○	BB*	○	* Alternate flashing at configuration faults.
●	○	●	○	Slave exchanges data between master.
on: ● | off: ○ | blinking (2Hz): BB				

4.3 Technical data

Order no.	314-2AG13
Type	CPU 314SB/DPM
SPEED-Bus	-
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	200 mA
Current consumption (rated value)	1 A
Inrush current	5 A

Order no.	314-2AG13
I²t	0.5 A²s
Max. current drain at backplane bus	2.5 A
Power loss	6 W
Load and working memory	
Load memory, integrated	512 KB
Load memory, maximum	512 KB
Work memory, integrated	256 KB
Work memory, maximal	512 KB
Memory divided in 50% program / 50% data	✓
Memory card slot	MMC-Card with max. 1 GB
Hardware configuration	
Racks, max.	4
Modules per rack, max.	8 in multiple-, 32 in a single-rack configuration
Number of integrated DP master	1
Number of DP master via CP	4
Operable function modules	8
Operable communication modules PtP	8
Operable communication modules LAN	8
Command processing times	
Bit instructions, min.	0.01 µs
Word instruction, min.	0.01 µs
Double integer arithmetic, min.	0.01 µs
Floating-point arithmetic, min.	0.06 µs
Timers/Counters and their retentive characteristics	
Number of S7 counters	512
S7 counter remanence	adjustable 0 up to 512
S7 counter remanence adjustable	C0 .. C7
Number of S7 times	512
S7 times remanence	adjustable 0 up to 512
S7 times remanence adjustable	not retentive
Data range and retentive characteristic	
Number of flags	8192 Byte
Bit memories retentive characteristic adjustable	adjustable 0 up to 8192
Bit memories retentive characteristic preset	MB0 .. MB15
Number of data blocks	4095

Order no.	314-2AG13
Max. data blocks size	64 KB
Number range DBs	1 ... 4095
Max. local data size per execution level	1024 Byte
Max. local data size per block	1024 Byte
Blocks	
Number of OBs	23
Maximum OB size	64 KB
Total number DBs, FBs, FCs	-
Number of FBs	2048
Maximum FB size	64 KB
Number range FBs	0 ... 2047
Number of FCs	2048
Maximum FC size	64 KB
Number range FCs	0 ... 2047
Maximum nesting depth per priority class	8
Maximum nesting depth additional within an error OB	4
Time	
Real-time clock buffered	✓
Clock buffered period (min.)	6 w
Type of buffering	Vanadium Rechargeable Lithium Battery
Load time for 50% buffering period	20 h
Load time for 100% buffering period	48 h
Accuracy (max. deviation per day)	10 s
Number of operating hours counter	8
Clock synchronization	✓
Synchronization via MPI	Master/Slave
Synchronization via Ethernet (NTP)	no
Address areas (I/O)	
Input I/O address area	8192 Byte
Output I/O address area	8192 Byte
Process image adjustable	✓
Input process image preset	256 Byte
Output process image preset	256 Byte
Input process image maximal	2048 Byte
Output process image maximal	2048 Byte

Order no.	314-2AG13
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Electrically isolated	✓
MPI	-
MP²I (MPI/RS232)	-
DP master	yes
DP slave	yes
Point-to-point interface	✓
Functionality MPI	
Number of connections, max.	32
PG/OP channel	✓
Routing	✓
Global data communication	✓
S7 basic communication	✓
S7 communication	✓
S7 communication as server	✓
S7 communication as client	-
Transmission speed, min.	19.2 kbit/s
Transmission speed, max.	12 Mbit/s
Functionality PROFIBUS master	
PG/OP channel	✓
Routing	✓
S7 basic communication	✓
S7 communication	✓
S7 communication as server	✓
S7 communication as client	-
Activation/deactivation of DP slaves	✓
Direct data exchange (slave-to-slave communication)	-
DPV1	✓
Transmission speed, min.	9.6 kbit/s
Transmission speed, max.	12 Mbit/s
Number of DP slaves, max.	124
Address range inputs, max.	8 KB
Address range outputs, max.	8 KB
User data inputs per slave, max.	244 Byte

Order no.	314-2AG13
Functionality RJ45 interfaces	
Type	X4
Type of interface	Ethernet 10/100 MBit
Connector	RJ45
Electrically isolated	✓
PG/OP channel	✓
Number of connections, max.	4
Productive connections	-
Housing	
Material	PPE
Mounting	Rail System 300
Mechanical data	
Dimensions (WxHxD)	40 mm x 125 mm x 120 mm
Weight	290 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes