X20CP0201, X20CP0291, X20CP0292

1 General information

Compact CPUs are ideal for situations where cycle times in the millisecond range are sufficient and a cost-benefit analysis plays a decisive role. A range of models with CAN and Ethernet can adapt optimally to all demands. The result: extremely sleek automation solutions.

- Embedded µP 16 / µP 25 with additional I/O processor
- 100/750 kB User SRAM
- 1 MB / 3 MB User FlashPROM
- X20CP0291 and X20CP0292: Onboard Ethernet
- Only 37.5 mm wide
- No battery

2 Order data

CP0201

CP0291, CP0292

Model number	Short description
	Compact CPUs
X20CP0201	X20 CPU, compact CPU µP 16, 100 kB SRAM, 1 MB FlashPROM, support of RS232 and CAN according to compact CPU base, order bus base, power supply module and terminal block separately
X20CP0291	X20 CPU, compact CPU µP 16, 100 kB SRAM, 1 MB FlashPROM, support of RS232 and CAN according to compact CPU base, 1 Ethernet interface 100 Base-T, order bus base, power supply module and terminal block separately
X20CP0292	X20 CPU, compact CPU µP 25, 100 kB SRAM, 1 MB FlashPROM, support of RS232 and CAN according to compact CPU base, 3 Ethernet interface 750 Base-T, order bus base, power supply module and terminal block separately
	Required accessories
	System modules for compact CPUs
X20BB22	X20 compact CPU base, for compact CPU and compact CPU supply module, base for integrated RS232 interface, X20 connection, X20 locking plates X20AC0SL1/X20AC0SR1 (left and right) included
X20BB27	X20 compact CPU base, for compact CPU and compact CPU supply module, base for integrated RS232 and CAN interface, X20 connection, X20 locking plates X20AC0SL1/X20AC0SR1 (left and right) included
X20PS9500	X20 power supply module for compact and fieldbus CPUs and internal I/O supply, X2X Link supply
X20PS9502	X20 power supply module for compact and fieldbus and internal I/O supply, X2X Link supply, supply not electrically isolated
	Terminal blocks
X20TB12	X20 terminal block, 12-pin, 24 V keyed

Table 1: X20CP0201, X20CP0291, X20CP0292 - Order data

Model number	Included in delivery
X20AC0SL1	X20 locking plate, left
X20AC0SR1	X20 locking plate, right

3 Technical data

Product ID	X20CP0201	X20CP0291	X20CP0292
Short description			
Interfaces	-	1x Ethernet onboard	1x onboard Ethernet
System module	CPU		
General information			
B&R ID code	0x22A2	0x22A4	0x22A6
Status indicators	CPU function	CPU function, Ethernet	
Diagnostics			
CPU function	Yes, using status LED		
Ethernet	-	Yes, using status LED	
Overtemperature	-		Yes, using software
Power consumption	2.2 W	2.7 W	3.0 W
Temperature sensor	No		Yes
ACOPOS capability	Limited (User PROM)		Yes
Visual Components support	Limited (User PROM)		Yes
Additional power dissipation caused by the actuators (resistive) [W]	-		
Electrical isolation			
PLC - IF2	-	Yes	
Certification			
CE	Yes		
cULus	Yes		
cCSAus HazLoc Class 1 Division 2	Yes		
ATEX Zone 2	Yes		
KC	Yes		
GL	Yes		
GOST-R	Yes		
Controller			
Real-time clock [1]	Yes, resolution 1 s		
Processor			
Type	Embedded µP 16		Embedded µP 25
Integrated I/O processor	Processes I/O data points in the background		
Backup battery	No		
Shortest task class cycle time	4 ms		2 ms
Typical instruction cycle time	0.8 µs		0.5 µs
Permanent variables			
Buffer duration	>10 years		
Memory	2.75 kB FRAM [2]		
Standard memory			
User PROM	1 MB FlashPROM		3 MB FlashPROM
User RAM	100 kB SRAM [3]		750 kB SRAM [3]
Interfaces			
IF2 interface			
Signal	-	Ethernet	
Design	-	1x shielded RJ45 port	
Cable length	-	Max. 100 m between two stations (segment length)	
Transfer rate	-	100 Mbit/s	
Transmission			
Physical interfaces	-	100 BASE-TX	
Half-duplex	-	Yes	
Full-duplex	-	No	
Autonegotiation	-	No	
Auto-MDI / MDIX	-	Yes	
On base module			
X20BB22 [4]	Compact CPU base module with integrated RS232 interface		
X20BB27 [5]	Compact CPU base module with integrated RS232 and CAN interfaces		
Operating conditions			
Mounting orientation			
Horizontal	Yes		
Vertical	Yes		
Installation at elevations above sea level			
0 to 2000 m	No limitations		
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m		
EN 60529 protection	IP20		
Environmental conditions			
Temperature			
Operation			
Horizontal installation	-25 to 60°C		
Vertical installation	-25 to 50°C		
Derating	-		
Storage	-40 to 85°C		
Transport	-40 to 85°C		

Table 2: X20CP0201, X20CP0291, X20CP0292 - Technical data

Product ID	X20CP0201	X20CP0291	X20CP0292
Relative humidity			
Operation	5 to 95%, non-condensing		
Storage	5 to 95%, non-condensing		
Transport	5 to 95%, non-condensing		
Mechanical characteristics			
Note	Order 1x X20TB12 terminal block separately Order 1x X20PS9500 or X20PS9502 power supply module separately Order 1x X20BB22 or X20BB27 compact CPU base separately		
Spacing 6)	37.5$^{+0.2}$ mm		

Table 2: X20CP0201, X20CP0291, X20CP0292 - Technical data

1) The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor. The gold foil capacitor is completely charged after 18 continuous hours of operation.
2) This FRAM stores its contents ferroelectrically. A backup battery is therefore not necessary.
3) Not buffered.
4) For technical data, see the data sheet for the X20PS9500 power supply module.
5) For technical data, see the data sheet for the X20PS9502 power supply module.
6) Spacing is based on the width of the X20BB22 or X20BB27 compact CPU base. An X20PS9500 or X20PS9502 power supply module is also always required for the CPU.

4 LED status indicators

Figure	LED	Color	Status	Description
	R/E	Green	On	Application running
		Red	On	SERVICE mode
			Off	1)
	RDY	Yellow	On	SERVICE mode
			Off	1)

Table 3: X20CP0201 - Status LEDs

1) BOOT mode: R/E and RDY LEDs are off and the power supply LED is blinking

Figure	LED	Color	Status	Description
	R/E	Green	On	Application running
		Red	On	SERVICE mode
			Off	1)
	RDY	Yellow	On	SERVICE mode
			Off	1)
	L/A	Green	On	A link to the peer station has been established.
			Blinking	A link to the peer station has been established. Indicates Ethernet activity is taking place on the bus.

Table 4: X20CP029x - Status LEDs

1) BOOT mode: R/E and RDY LEDs are off and the power supply LED is blinking

5 Operating and connection elements

X20CP0201

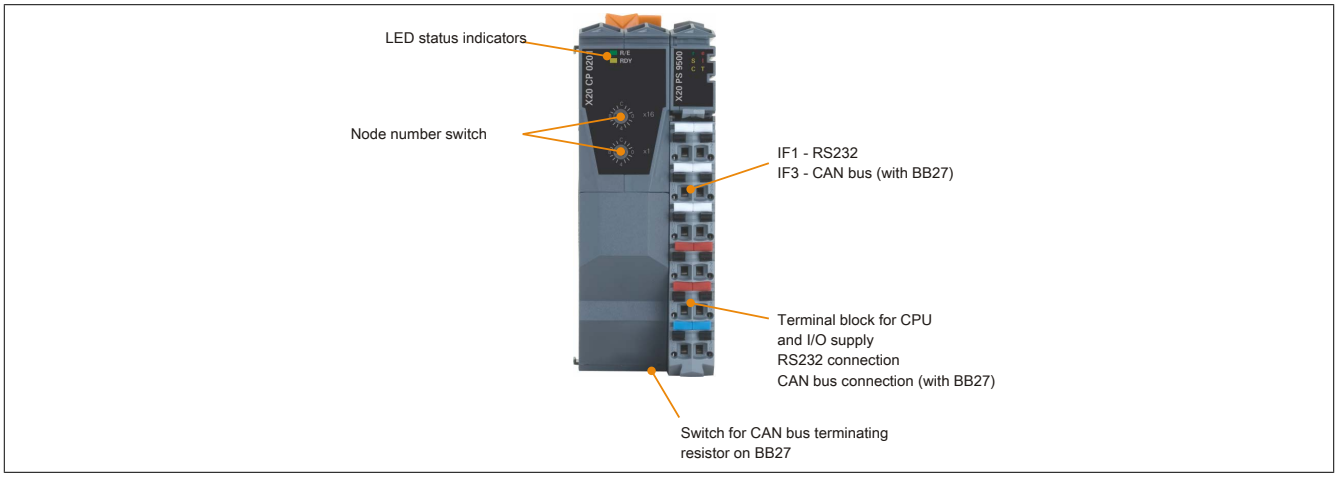


Figure 1: X20 compact CPUs - Operating elements for X20CP0201

X20CP0291 and X20CP0292

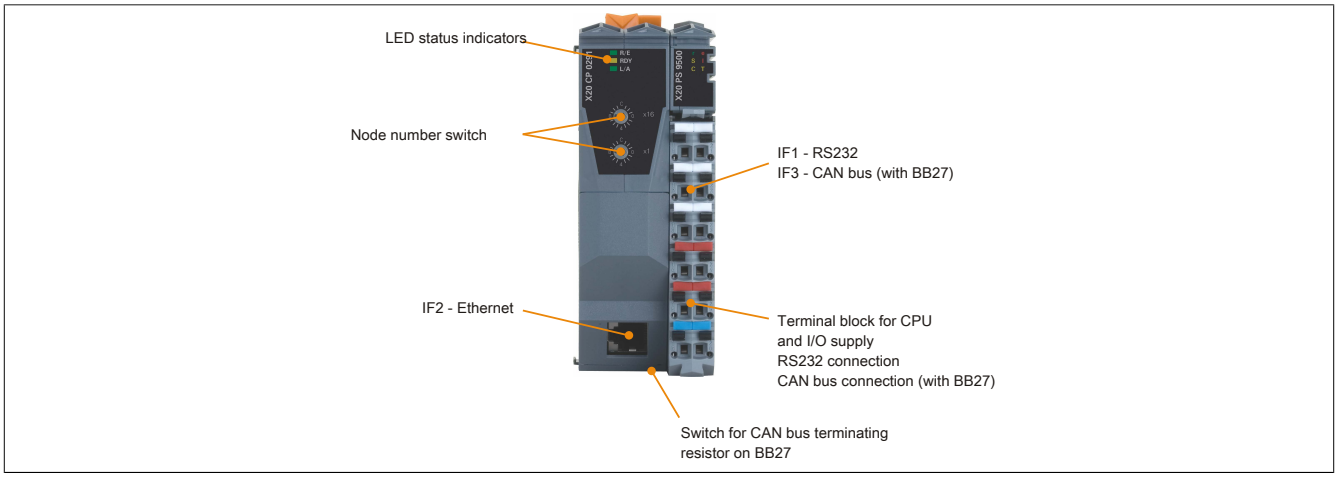


Figure 2: X20 compact CPUs - Operating elements for X20CP0291 and X20CP0292

6 Node number switches

Figure 3: Node number switches

The node number is set using the two hex switches. The switch setting can be evaluated by the application program at any time. The operating system only evaluates the switch position when the device is switched on.

Switch position	Operating mode	Description
0x00	BOOT	In this switch position, the operating system can be installed via the RS232 interface configured as the online interface. User Flash is deleted only after the update begins.
0x01 - 0xFE	RUN	RUN mode, the application is running.
0xFF	Diagnostics	Boots the CPU in Diagnostics mode. Program sections in User RAM and User FlashPROM are not initialized. Following diagnostics mode, the CPU always boots with a **cold restart**.

Table 5: X20 CPUs - Operating modes

X20CP0201

When used with the X20BB27 bus module, the X20CP0201 has access to a CAN bus interface. The INA2000 station number for CAN is set using the node number switches.

X20CP0291 and X20CP0292

Both of these CPUs are equipped with an onboard Ethernet interface. When used with the X20BB27 bus module, they also have access to a CAN bus interface.

The number set using the two hex switches defines the INA2000 station number of both the CAN and the Ethernet interface.

7 Ethernet interface (IF2)

Figure 4: X20 compact CPUs - Ethernet interface for X20CP0291 and X20CP0292

The X20CP0291 and X20CP0292 are equipped with an Ethernet interface. The connection is made using a 100 BASE-T twisted pair RJ45 socket.

Pinout

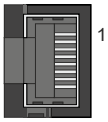
Interface	Pinout		
	Pin	Ethernet	
 Shielded RJ45 port	1	RXD	Receive data
	2	RXD\	Receive data\
	3	TXD	Transmit data
	4	Termination	
	5	Termination	
	6	TXD\	Transmit data\
	7	Termination	
	8	Termination	

Table 6: RJ45 port - Pinout

Information about cabling X20 modules with an Ethernet interface can be found in the module's download section on the B&R website (www.br-automation.com).

Information:

The Ethernet interface (IF2) is not suited for POWERLINK.

Starting with operating system version 1.07, CPUs have a default IP address.

IP address: 192.168.0.1
Subnet mask: 255.255.0.0

8 Programming the system flash memory

General information

CPUs are delivered with a runtime system. When delivered, the node number switch is set to switch position 0x00 (bootstrap loader mode).

A suitable switch position must be set (0x01 to 0xFE) in order to boot the PLC in RUN mode. Updating the runtime system is only possible in RUN mode.

Runtime system update

The runtime system can be updated via the programming environment. When updating the runtime system via an online connection, the following procedure must be carried out:

1. An online runtime system update is only possible if the processor is in RUN mode. For this to be true, the node number must be set to a value in the range 0x01 to 0xFE.
2. Switch on the power.
3. The runtime system update is performed via the existing online connection. The online connection can be established via the onboard serial RS232 interface, for example. If a CPU has an Ethernet interface, then it too can be used to perform the update.
4. Start B&R Automation Studio.
5. Start the update procedure by selecting **Online** from the **Project** menu. Select **Transfer Automation Runtime** from the pop-up menu. Now follow the instructions given by B&R Automation Studio.
6. A window opens up for setting the runtime system version. The runtime system version is already pre-selected by the project settings made by the user. The drop-down menu can be used to select one of the runtime system versions stored in the project. Clicking on the **Browse** button allows a runtime system version to be loaded from the hard drive or CD.

   Clicking on **Next** opens a pop-up window that allows the user to select whether modules with target memory SYSTEM ROM should be transferred during the subsequent runtime system update. If not, these modules can also be transferred later during an application download.

   Clicking on **Next** opens a dialog box where the user can set the CAN transfer rate, CAN ID and CAN node number (the CAN node number set here is only relevant if an interface module does not have a CAN node number switch). The CAN node number must be between decimal 01 and 99. Assigning a unique node number is especially important with online communication over a CAN network (INA2000 protocol).
7. The update procedure is started by clicking on **Next**. Update progress is shown in a message box.

   > **Information:**
   >
   > **User flash memory is deleted.**
8. When the update procedure is complete, the online connection is reestablished automatically.
9. The PLC is now ready for use.

Updating the runtime system is possible not only via an online connection, but also via a CAN network, serial network (INA2000 protocol) or Ethernet network, depending on the system configuration.