X20CP02xx

1 General information

The Compact CPUs are ideal for situations where cycle times in the millisecond range are sufficient and the cost-benefit ratio is decisive. Different variants with CAN and Ethernet can be adapted optimally to all requirements. Extremely slim automation solutions are the result.

- Embedded µP 16 / µP 25 with additional I/O processor
- 100/750 kB User SRAM
- 1/3 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 Compact CPU, µP 16, 100 kB SRAM, 1 MB FlashPROM, support for RS232, CAN bus according to the Compact CPU base, order bus base, power supply module and terminal block separately!
X20CP0291	X20 Compact CPU, µP 16, 100 kB SRAM, 1 MB FlashPROM, support for RS232, CAN bus according to the Compact CPU base, 1 100BASE-T Ethernet interface, order bus base, power supply module and terminal block separately!
X20CP0292	X20 Compact CPU, µP 25, 750 kB SRAM, 3 MB FlashPROM, support for RS232, CAN bus according to the Compact CPU base, 1 100BASE-T Ethernet interface, 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 power supply module, base for integrated RS232 interface, X20 connection, X20 locking plates (left and right) X20AC0SL1/ X20AC0SR1 included
X20BB27	X20 compact CPU base, for compact CPU and compact CPU power supply module, base for integrated RS232 and CAN bus interface, X20 connection, X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included
X20PS9500	X20 power supply module for Compact and Fieldbus CPUs and internal I/O power supply, X2X Link power supply
X20PS9502	X20 power supply module, for Compact and Fieldbus CPUs and internal I/O power supply, X2X Link power supply, supply not electrically isolated
	Terminal blocks
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed

Table 1: X20CP0201, X20CP0291, X20CP0292 - Order data

Order number	Included in delivery
X20AC0SL1	X20 end cover plate (left)
X20AC0SR1	X20 end cover plate (right)

3 Technical data

Model number	X20CP0201	X20CP0291	X20CP0292
Short description			
Interfaces	-	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 LED status indicator		
Ethernet	-	Yes, using LED status indicator	
Overtemperature	-		Yes, using software
Power consumption	2.2 W	2.7 W	3 W
Temperature sensor	No		Yes
ACOPOS support	Limited (User PROM) via CAN bus		Yes, via CAN bus
Visual Components support	Limited (User PROM)		Yes
Additional power dissipation caused by actuators (resistive) [W]	-		
Certifications			
CE	Yes		
KC	Yes		
EAC	Yes		
UL	cULus E115267 Industrial control equipment		
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5		
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X		
DNV GL	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **B** (4 g) EMC: **B** (bridge and open deck)		
KR	Yes		
Controller			
Real-time clock [1]	Yes, resolution 1 s, -18 to 28 ppm accuracy at 25°C		
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			
Self-discharge time	>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			
Interface IF2			
Signal	-	Ethernet	
Variant	-	1x RJ45 shielded	
Line length	-	Max. 100 m between 2 stations (segment length)	
Transfer rate	-	100 Mbit/s	
Transfer			
Physical layer	-	100BASE-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 interface		
Electrical isolation	-	PLC isolated from Ethernet (IF2)	
Operating conditions			
Mounting orientation			
Horizontal	Yes		
Vertical	Yes		
Installation elevation above sea level			
0 to 2000 m	No limitation		
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m		

Table 2: X20CP0201, X20CP0291, X20CP0292 - Technical data

Model number	X20CP0201	X20CP0291	X20CP0292
Degree of protection per EN 60529	IP20		
Ambient conditions			
Temperature			
Operation			
Horizontal mounting orientation	-25 to 60°C		
Vertical mounting orientation	-25 to 50°C		
Derating	-		
Storage	-40 to 85°C		
Transport	-40 to 85°C		
Relative humidity			
Operation	5 to 95%, non-condensing		
Storage	5 to 95%, non-condensing		
Transport	5 to 95%, non-condensing		
Mechanical properties			
Note	Order 1x terminal block X20TB12 separately. Order 1x power supply module X20PS9500 or X20PS9502 separately. Order 1x Compact CPU base X20BB22 or X20BB27 separately		
Spacing [6]	$37.5^{+0.2}$ mm		

Table 2: X20CP0201, X20CP0291, X20CP0292 - Technical data

1) The real-time clock is backed up 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 no longer required.
3) Not backed up.
4) For technical data, see the data sheet for power supply module X20PS9500.
5) For technical data, see the data sheet for power supply module X20PS9502.
6) Pitch is based on the width of Compact CPU base X20BB22 or X20BB27. Power supply module X20PS9500 or X20PS9502 is always required for the CPU.

4 LED status indicators

X20CP0201

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

1) Mode BOOT: LEDs "R/E" and "RDY" are off and the power supply LED flashes.

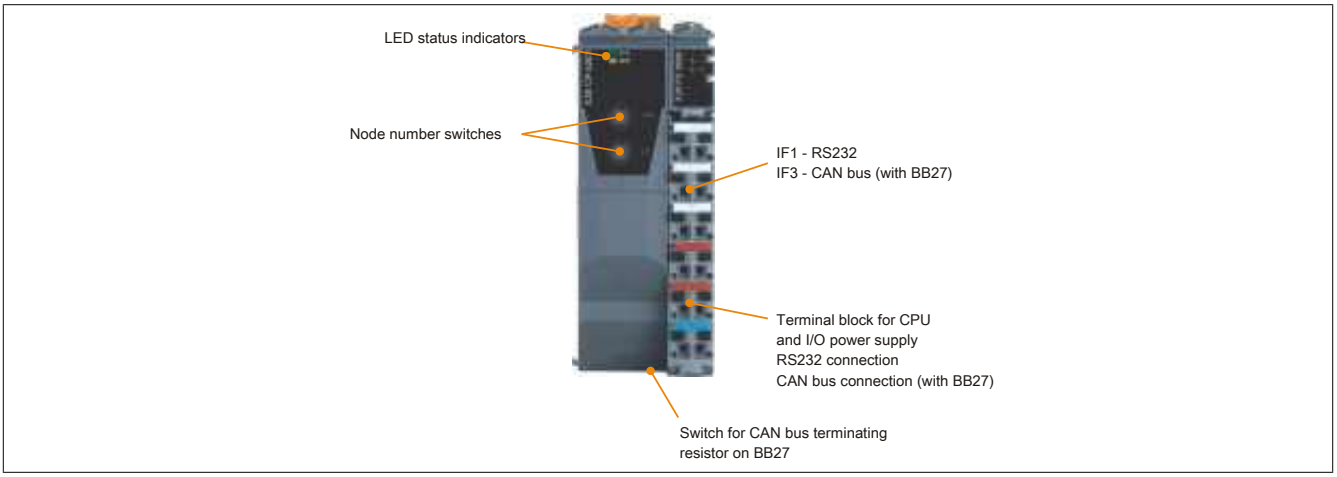
X20CP029x

Figure	LED	Color	Status	Description
	R/E	Green	On	Application running
		Red	On	Mode SERVICE
			Off	1)
	RDY	Yellow	On	Mode SERVICE
			Off	1)
	L/A	Green	On	The link to the Ethernet remote station is established.
			Blinking	The link to the Ethernet remote station is established. The LED blinks if Ethernet activity is taking place on the bus.

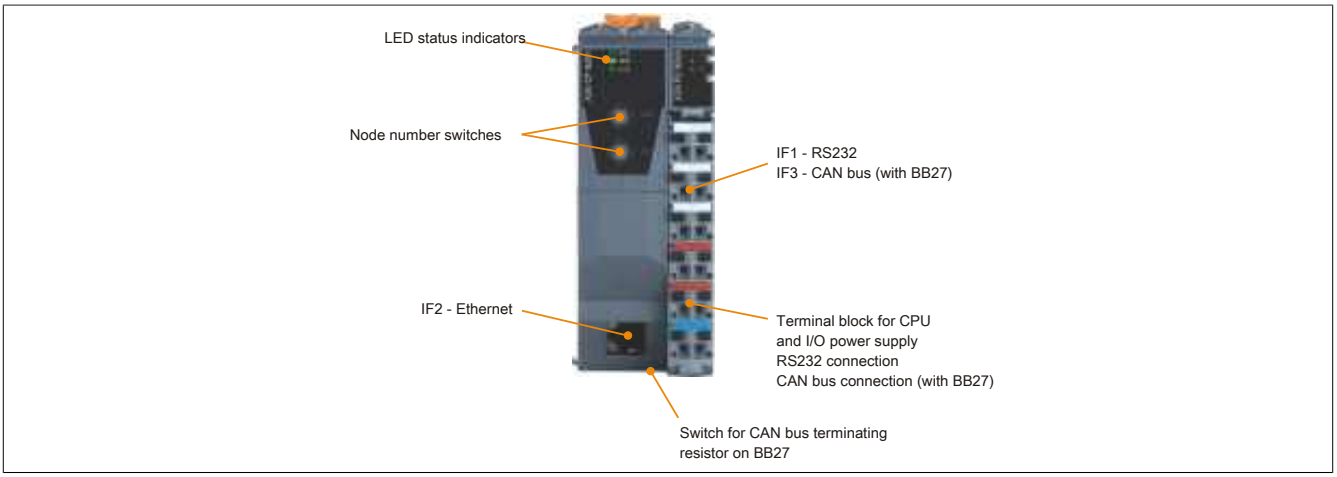
1) Mode BOOT: LEDs "R/E" and "RDY" are off and the power supply LED flashes.

5 Operating and connection elements

X20CP0201



X20CP0291 and X20CP0292



6 Node number switches

The two hex switches are used to set the node number. The switch position can be evaluated by the application program at any time. The operating system interprets the switch position only 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 that has been configured as the online interface. User flash memory is erased only when the update begins.
0x01 - 0xFE	RUN	Mode RUN. The application is running.
0xFF	DIAGNOSE	The CPU is starting up in diagnostic mode. Program sections in User RAM and User FlashPROM are not initialized. After diagnostic mode, the CPU always starts up with a **cold restart**.

X20CP0201

In conjunction with bus module X20BB27, the X20CP0201 is equipped with a CAN bus interface. The node number switches are used to set the INA2000 station number for CAN.

X20CP0291 and X20CP0292

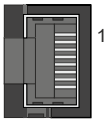
These two CPUs are equipped with an onboard Ethernet interface. When using bus module X20BB27, they are also equipped with a CAN bus interface.

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

7 Ethernet interface (IF2)

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

Pinout

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

For information about wiring X20 modules with an Ethernet interface, see section "Mechanical and electrical configuration - Wiring guidelines for X20 modules with Ethernet cables" of the X20 user's manual.

Information:

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

With operating system version 1.07 and later, the CPUs have a default IP address.

IP address: 192.168.0.1
Subnet mask: 255.255.0.0

8 Programming system flash memory

General information

The CPUs are delivered with a runtime system. When delivered, the node number switches are set to switch position 0x00. This means that bootstrap mode is set.

To boot the PLC in mode RUN, a corresponding switch position must be set (0x01 to 0xFE). A runtime system update is only possible in mode RUN.

Runtime system update

A runtime system update is performed using the programming system. When updating the runtime system (online runtime system update), the following procedure must be followed:

1. An online runtime system update is only possible when the processor is in mode RUN. For this purpose, the set node number must be in the range 0x01 to 0xFE.
2. Apply the supply voltage.
3. The runtime system update is performed via the existing online connection. The online connection can be established via the serial RS232 onboard interface, for example. For CPUs with an integrated Ethernet interface, the update is also possible via this interface.
4. Start the B&R Automation Studio programming environment.
5. Start the update procedure by selecting command **Online** from the **Project** menu. From the menu that opens, select command **Transfer Automation Runtime** and then following the instructions from B&R Automation Studio.
6. A dialog box for setting the runtime system version is displayed. The runtime system version is already preselected by the project settings made by the user. It is possible in the pop-up menu to choose between the runtime system versions saved in the project. Clicking the **Browse** button makes it possible to load a specific runtime system version from the hard disk or CD.

   Next > opens a selection window where it is possible to select whether modules with target memory SYSTEM ROM should be transferred with the subsequent runtime system update. Otherwise, the modules can be transferred with a later download of the application.

   Next > opens a dialog box is opened where the CAN transfer rate, CAN ID and CAN node number can be defined (the CAN node number set here is only relevant if an interface module does not include a CAN node number switch). The CAN node number must be between decimal 01 and 99. A unique node number assignment is particularly necessary for online communication via a CAN network (INA2000 protocol).
7. The update procedure is started by selecting **Next >** . The update progress is displayed in a message box.

   ## Information:

   User flash memory is erased.
8. When the update procedure is completed, the online connection is resumed automatically.
9. The PLC is now ready for operation.

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