X20CP148x and X20CP348x

1 General information

Based on state-of-the-art Intel Celeron processor technology, the X20 CPUs cover a wide spectrum of demands. They can be implemented in solutions ranging from standard applications to those requiring the highest levels of performance.

The x86 100MHz-compatible X20CP1483 is the entry-level X20 CPU. With an optimum price/performance ratio, it has the same basic features as all of the larger CPUs.

USB and Ethernet are included in every CPU. In addition, every CPU has a POWERLINK connection for real-time communication.
In addition, there are up to three multi-purpose slots for additional interface modules.

- Intel Celeron 650/400/266 Performance with additional I/O processor
- Entry-level CPU is Intel x86 100MHz-compatible with additional I/O processor
- Ethernet, POWERLINK V1/V2 and USB onboard
- Modular expansion of interfaces
- CompactFlash as removable application memory
- Fan-free or exchangeable fan
- Extremely compact

2 Oder data - X20CP148x



Model number	Short description
	CPUs
X20CP1483	X20 CPU, x86 100 MHz Intel compatible, 32 MB DRAM, 128 kB SRAM, exchangeable application memory: CompactFlash, 1 insert slot for X20 interface modules, 2 USB interfaces, 1 RS232 interface, 1 Ethernet interface 10/100 Base-T, 1 POWERLINK V1/V2 interface, incl. power supply module, TB12 terminal block and slot covers, X20AC0SR1 X20 end plate right included, order program memory separately.
X20CP1483-1	X20 CPU, x86 100 MHz Intel compatible, 64 MB DRAM, 128 kB SRAM, exchangeable application memory: CompactFlash, 1 insert slot for X20 interface modules, 2 USB interfaces, 1 RS232 interface, 1 Ethernet interface 10/100 Base-T, 1 POWERLINK V1/V2 interface, incl. power supply module, TB12 terminal block and slot covers, X20AC0SR1 X20 end plate right included, order program memory separately.
X20CP1484	X20 CPU, Celeron 266 compatible, 32 MB DRAM, 1 MB SRAM, exchangeable application memory: CompactFlash, 1 insert slot for X20 interface modules, 2 USB interfaces, 1 RS232 interface, 1 Ethernet interface 10/100 Base-T, 1 POWERLINK V1/V2 interface, incl. power supply module, TB12 terminal block and slot covers, X20AC0SR1 X20 end plate right included, order program memory separately.
X20CP1484-1	X20 CPU, Celeron 266 compatible, 64 MB DRAM, 1 MB SRAM, exchangeable application memory: CompactFlash, 1 insert slot for X20 interface modules, 2 USB interfaces, 1 RS232 interface, 1 Ethernet interface 10/100 Base-T, 1 POWERLINK V1/V2 interface, incl. power supply module, TB12 terminal block and slot covers, X20AC0SR1 X20 end plate right included, order program memory separately.
X20CP1485	X20 CPU, Celeron 400, 32 MB DRAM, 1 MB SRAM, exchangeable application memory: CompactFlash, 1 insert slot for X20 interface modules, 2 USB interfaces, 1 RS232 interface, 1 Ethernet interface 10/100 Base-T, 1 POWERLINK V1/V2 interface, incl. power supply module, TB12 terminal block and slot covers, X20AC0SR1 X20 end plate right included, order program memory separately.
X20CP1485-1	X20 CPU, Celeron 400, 64 MB DRAM, 1 MB SRAM, exchangeable application memory: CompactFlash, 1 insert slot for X20 interface modules, 2 USB interfaces, 1 RS232 interface, 1 Ethernet interface 10/100 Base-T, 1 POWERLINK V1/V2 interface, incl. power supply module, TB12 terminal block and slot covers, X20AC0SR1 X20 end plate right included, order program memory separately.
X20CP1486	X20 CPU, Celeron 650, 64 MB DRAM, 1 MB SRAM, exchangeable application memory: CompactFlash, 1 insert slot for X20 interface modules, 2 USB interfaces, 1 RS232 interface, 1 Ethernet interface 10/100 Base-T, 1 POWERLINK V1/V2 interface, incl. power supply module, TB12 terminal block and slot covers, X20AC0SR1 X20 end plate right included, order program memory separately.
	Required accessories
	CompactFlash
0CFCRD.0128E.01	Compact Flash 128MB WD extended Temp.
0CFCRD.0512E.01	Compact Flash 512MB WD extended Temp.
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)
	Optional accessories
	Batteries
0AC201.91	Lithium batteries 4 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell
	X20 CPU exchangeable fan
X20AC0EF1	X20 CPU exchangable fan

Table 1: X20CP1483, X20CP1483-1, X20CP1484, X20CP1484-1, X20CP1485, X20CP1485-1, X20CP1486 - Order data

3 Technical data - X20CP148x

Product ID	X20CP1483	X20CP1483-1	X20CP1484	X20CP1484-1	X20CP1485	X20CP1485-1	X20CP1486
Short description							
Interfaces	1x RS232, 1x Ethernet, 1x POWERLINK V1/V2, 2x USB, 1x X2X Link						
System module	CPU						
General information							
Cooling	Fan-free						Fanless with derating (see operational conditions) Exchangeable fans for entire temperature range Fan is monitored
B&R ID code	0xA239	0xAEC5	0x23A5	0xAABE	0x1F18	0xA2AB	0x2164
Status indicators	CPU function, overtemperature, Ethernet, POWERLINK, CompactFlash, battery						
Diagnostics							
Battery	Yes, using status LED and software status						
CPU function	Yes, with status LED						
CompactFlash	Yes, with status LED						
Ethernet	Yes, with status LED						
POWERLINK	Yes, with status LED						
Overtemperature	Yes, with status LED						
Fan diagnostics	-						Yes, with software status
ACOPOS capability	Yes						
Visual Components capability	Yes						
Power consumption - Without memory card, interface module and USB	6.0 W		10.5 W				13.5 W
Internal power consumption of the X2X Link and I/O supply [1]							
Bus	1.42 W						
I/O internal	0.6 W						
Additional power dissipation caused by the actuators (resistive) [W]	-						
Electrical isolation							
IF1 - IF2	Yes						
IF1 - IF3	Yes						
IF1 - IF4	No						
IF1 - IF5	No						
IF1 - IF6	Yes						
IF2 - IF4	Yes						
IF2 - IF5	Yes						
IF3 - IF4	Yes						
IF3 - IF5	Yes						
IF4 - IF5	No						
IF4 - IF6	Yes						
IF5 - IF6	Yes						
PLC - IF1	No						
PLC - IF2	Yes						
PLC - IF3	Yes						
PLC - IF4	No						
PLC - IF5	No						
PLC - IF6	Yes						
Certification							
CE	Yes						
c-UL-us	Yes						
GOST-R	Yes						
CPU and X2X Link supply							
Input voltage	24 VDC -15% / +20%						
Input Current	Max. 2.2 A						
Saving	Integrated, cannot be exchanged						
Reverse polarity protection	Yes						
X2X Link supply output							
Rated output power	7.0 W						
Parallel operation	Yes [2]						
Redundant operation	Yes						
Input I/O supply							
Input voltage	24 VDC -15% / +20%						
Saving	Required line fuse max. 10 A (slow blow)						
Output I/O supply							
Rated output voltage	24 VDC						
Permitted contact load	10.0 A						

Table 3: X20CP1483, X20CP1483-1, X20CP1484, X20CP1484-1, X20CP1485, X20CP1485-1, X20CP1486 - Technical data

Product ID	X20CP1483	X20CP1483-1	X20CP1484	X20CP1484-1	X20CP1485	X20CP1485-1	X20CP1486
General supply							
Status indicators	Overload, operating status, module status, RS232 data transfer						
Diagnostics							
RS232 data transfer	Yes, with status LED						
Module run/error	Yes, using status LED and software status						
Overload	Yes, using status LED and software status						
Electrical isolation							
I/O feed - I/O supply	No						
CPU/X2X Link feed - CPU/X2X Link supply	Yes						
Controller							
CompactFlash slot	1						
Real-time clock	Nonvolatile memory, resolution 1 second						
FPU	Yes						
Processor							
Type	x86 100 comp.		Celeron 266 comp.		Celeron 400		Celeron 650
L2 cache	-				256 kB		
L1 cache for data and program code	16 kB		2x 16 Kb				
Integrated I/O processor	Processes I/O data points in the background						
Modular interface slots	1						
Remanent variables	Max. 32 kB [3]		Max. 64 kB [3]		Max. 256 kB [3]		
Shortest task class cycle time	1 ms		800 µs		400 µs		200 µs
Typical instruction cycle time	0.09 µs		0.007 µs		0.0055 µs		0.0034 µs
Data Buffering							
Battery monitoring	Yes						
Lithium battery	At least 3 years						
Standard memory							
RAM	32 MB SDRAM	64 MB SDRAM	32 MB SDRAM	64 MB SDRAM	32 MB SDRAM	64 MB SDRAM	
User RAM	128 kB SRAM [4]		1 MB SRAM [4]				
Interfaces							
Interface IF1							
Type	RS232						
Design	Contact via 12-pin terminal block TB12						
Transfer rate	Max. 115.2 kbit/s						
Interface IF2							
Type	Ethernet						
Design	Shielded RJ45 port						
Cable length	Max. 100 m between two stations (segment length)						
Transfer rate	10/100 Mbit/s						
Interface IF3							
Fieldbus	POWERLINK V1/V2						
Type	100 Base-T (ANSI/IEEE 802.3)						
Design	Shielded RJ45 port						
Cable length	Max. 100 m between two stations (segment length)						
Transfer rate	100 Mbit/s						
Interface IF4							
Type	USB 1.1						
Quantity	1						
Design	Type A						
Interface IF5							
Type	USB 1.1						
Quantity	1						
Design	Type A						
IF6 interface							
Type	X2X Link master						
Quantity	1						
Operating conditions							
Mounting orientation							
Horizontal	Yes						
Vertical	Yes						
Installation at altitudes above sea level							
0 to 2000 m	No derating						
> 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		0 to 55°C				0 to 55°C, fanless: 0 to 45°C
Vertical installation	-25 to 50°C		0 to 50°C				0 to 55°C, fanless operation not permitted
Storage	-40 to 85°C		-25 to 70°C				
Transport	-40 to 85°C		-25 to 70°C				

Table 3: X20CP1483, X20CP1483-1, X20CP1484, X20CP1484-1, X20CP1485, X20CP1485-1, X20CP1486 - Technical data

Product ID	X20CP1483	X20CP1483-1	X20CP1484	X20CP1484-1	X20CP1485	X20CP1485-1	X20CP1486
Relative humidity							
Operation	5 to 95%, non-condensing		5 to 95%, non-condensing			5 to 95%	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing		5 to 95%, non-condensing			5 to 95%	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing		5 to 95%, non-condensing			5 to 95%	5 to 95%, non-condensing
Mechanical characteristics							
Note	Order application memory (CompactFlash) separately Backup battery included in delivery X20 locking plate (right) included in delivery X20 terminal block (12-pin) included in delivery Interface module slot covers included in the delivery						
Dimensions							
Width	150 mm						
Height	99 mm						
Depth	85 mm						

Table 3: X20CP1483, X20CP1483-1, X20CP1484, X20CP1484-1, X20CP1485, X20CP1485-1, X20CP1486 - Technical data

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.
2) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.
3) Can be configured in Automation Studio
4) Minus the configured remanent variables

6 X20 CPUs - Status LEDs

Image	LED	Color	Status	Description
	R/E	Green	On	Application running
		Red	On	SERVICE mode
	RDY/F	Yellow	On	SERVICE or BOOT mode
		Red	On	Overtemperature
	S/E	Green/red		Status/Error LED. The LED states are described in section 6.1 "S/E LED" on page 11.
	EPL	Green	On	A link to the POWERLINK remote station has been established.
			Blinking	A link to the POWERLINK remote station has been established. The LED blinks when Ethernet activity is present on the bus.
	ETH	Green	On	A link to the Ethernet remote station has been established.
			Blinking	A link to the Ethernet remote station has been established. The LED blinks when Ethernet activity is present on the bus.
	CF	Green	On	CompactFlash inserted and detected
		Yellow	On	CompactFlash read/write access
	DC OK	Yellow	On	CPU power supply OK
		Red	On	Backup battery is empty

Table 7: X20 CPUs - CPU status indicator

6.1 S/E LED

The status/error LED is a green/red dual LED. The status LEDs can have different meanings depending on operating mode.

6.1.1 Ethernet mode

In this mode, the interface is operated as an Ethernet interface.

Green - status	Description
On	Interface operated as Ethernet interface

Table 8: Status/error LED - Ethernet operating mode

6.1.2 POWERLINK V1

Status LED		Status of the POWERLINK station
Green	Red	
On	Off	The POWERLINK station is running with no errors.
Off	On	A system error has occurred. The error type can be read using the PLC logbook. An irreparable problem has occurred. The system cannot properly carry out its tasks. This status can only be changed by resetting the module.
Blinking alternately		The POWERLINK managing node failed. This error code can only occur in controlled node operation. This means that the set station number lies within the range 0x01 - 0xFD.
Off	Blinking	System failure. The red blinking LED signals an error code (see section 6.2 "System failure error codes" on page 13).
Off	Off	Module is: • Switched off • Starting up • Not correctly configured in Automation Studio • Defective

Table 9: Status/error LED - POWERLINK V1 operating mode

6.1.3 POWERLINK V2

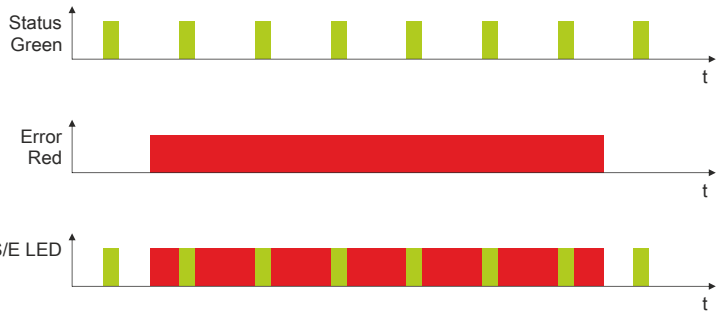
Red - error	Description
On	The module has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED: • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE  Note: The LED blinks red several times immediately after startup. This is not an error.

Table 10: Status / Error LED as error LED - POWERLINK V2 operating mode

Green - status	Description
Off NOT_ACTIVE	**Status** Module is in the NOT_ACTIVE state or is: • Switched off • Starting up • Not correctly configured in Automation Studio • Defective **Managing Node (MN)** The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the module goes directly into PRE_OPERATIONAL_1 state (single flash). However, if POWERLINK communication is detected before the time expires, then the MN will not be started. **Controlled Node (CN)** The bus is monitored for POWERLINK frames. If a corresponding frame is not received within the defined time frame (timeout), then the module will directly enter the state BASIC_ETHERNET (flickering). If, however, POWERLINK communication is detected during this time, the module goes directly into the PRE_OPERATIONAL_1 status (single flash).
Green flickering (approx. 10 Hz) BASIC_ETHERNET	**Status** The status of the module is BASIC_ETHERNET. The interface is operated as an Ethernet TCP/IP interface. **Managing Node (MN)** This status can only be changed by resetting the module. **Controlled Node (CN)** If POWERLINK communication is detected while in this status, the status of the module changes to PRE_OPERATIONAL_1 (single flash).
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	**Status** The status of the module is PRE_OPERATIONAL_1. **Managing Node (MN)** The MN starts the operation of the "reduced cycle". There is not yet any cyclic communication. **Controlled Node (CN)** In this status, the module can be configured by the MN. The CN waits until it receives an SoC frame and then switches to PRE_OPERATIONAL_2 status (double flash). A lit red LED in this state indicates MN failure.
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	**Status** The status of the module is PRE_OPERATIONAL_2. **Managing Node (MN)** The MN begins with the cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this status. **Controlled Node (CN)** In this status, the module can be configured by the MN. After this, a command changes the status to READY_TO_OPERATE (triple flash). A lit red LED in this state indicates MN failure.

Table 11: Status / Error LED as status LED - POWERLINK V2 operating mode

Green - status	Description
Triple flash (approx. 1 Hz) READY_TO_OPERATE	**Status** The status of the module is READY_TO_OPERATE. **Managing Node (MN)** Cyclic and asynchronous communication. Received PDO data is ignored. **Controlled Node (CN)** The module configuration is complete. Normal cyclic and asynchronous communication. The PDO data sent corresponds to the PDO mapping used. However, cyclic data is not yet evaluated. A lit red LED in this state indicates MN failure.
On OPERATIONAL	**Status** The status of the module is OPERATIONAL. PDO Mapping is active and cyclic data is evaluated.
Blinking (approx. 2.5 Hz) STOPPED	**Status** The status of the module is STOPPED. **Managing Node (MN)** This status is not possible for the MN. **Controlled Node (CN)** No output data is produced and no input data is received. Only the appropriate command from the MN can enter or leave this state.

Table 11: Status / Error LED as status LED - POWERLINK V2 operating mode

6.2 System failure error codes

Incorrect configuration or defective hardware can cause a system failure error.

The error is displayed via the red error LED using four switch-on phases. The switch-on phases are either 150 ms or 600 ms long. Error code outputs are repeated cyclically after 2 seconds.

Error description	Error code displayed by red status LED									
RAM errors: The module is defective and must be replaced.	●	●	●	-	Break	●	●	●	-	Break
Hardware errors: The module or a system component is defective and must be replaced.	-	●	●	-	Break	-	●	●	-	Break

Table 12: Status/error LED as error LED - system failure error codes

Legend:
● ... 150 ms
\- ... 600 ms
Break ... 2 sec. delay

7 Status LEDs for integrated power supply

Image	LED	Color	Status	Description
	r	Green	Off	Module supply not connected
			Single flash	Reset mode
			Blinking	PREOPERATIONAL mode
			On	RUN mode
	e	Red	Off	Module supply not connected or everything is OK
			Double flash	LED indicates one of the following states: • X2X Link power supply is overloaded • I/O supply too low • Input voltage for X2X Link supply too low
	e + r	Steady red / single green flash		Invalid firmware
	S	Yellow	Off	No RS232 activity
			On	The LED is on, when data is being sent or received via the RS232 interface
	I	Red	Off	X2X Link supply in the acceptable range
			On	X2X Link power supply is overloaded

Table 13: X20 CPUs - Status indicators for integrated power supply

8 Control and connection elements

X20CP148x

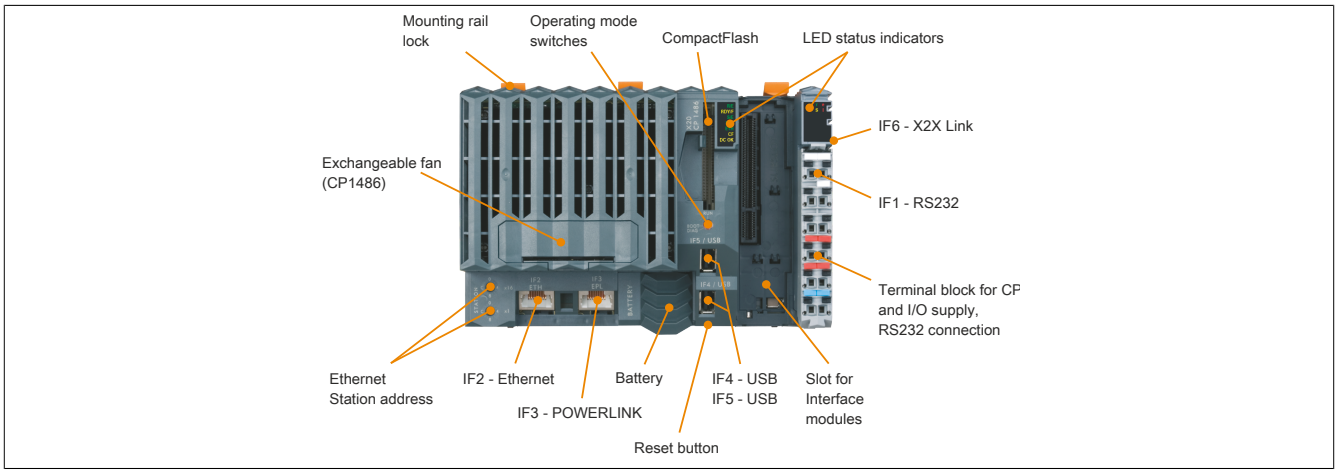


Figure 1: X20 CPUs - Operating elements for X20CP1483, X20CP1483-1, X20CP1484, X20CP1484-1, X20CP1485, X20CP1485-1 and X20CP1486

X20CP348x

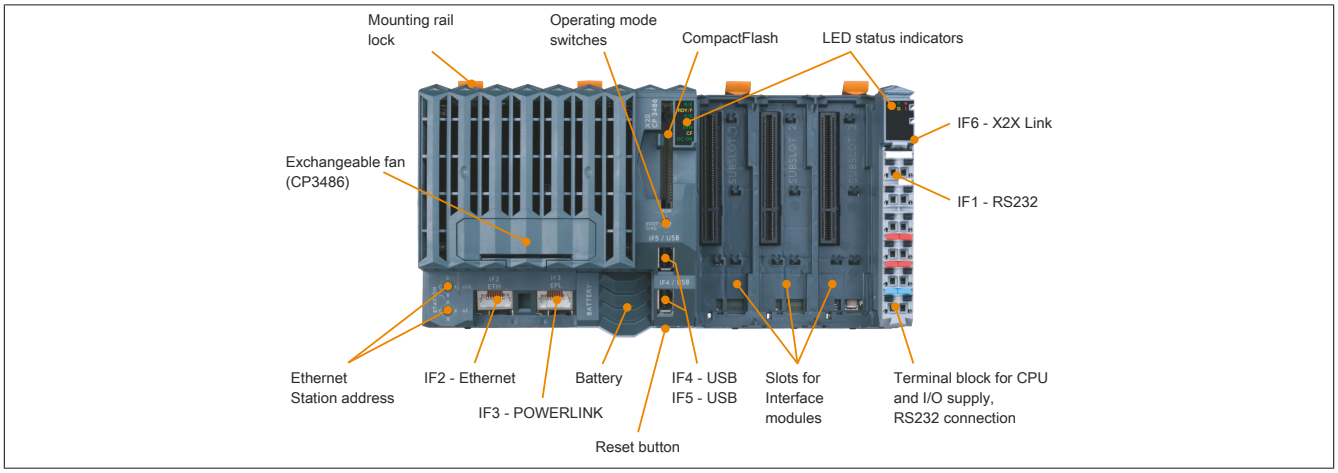


Figure 2: X20 CPUs - Operating elements for X20CP3484, X20CP3484-1, X20CP3485, X20CP3485-1 and X20CP3486

9 Slot for application memory

Program memory is required to operate the CPUs. The program memory is CompactFlash. It is not included with the delivery of the CPUs, instead it must be ordered as an accessory.

Information:

The CompactFlash card cannot be removed during operation.

10 Operating Mode Switch

An operating mode switch is used to set the operating mode.



Figure 3: X20 CPUs - Operating mode switch

Switch position	Operating mode	Description
BOOT	Boot	In this switch position the default B&R Automation Runtime (AR) is started, and the runtime system can be installed using the online interface (B&R Automation Studio). The User Flash is deleted after the download begins.
RUN	Run	RUN mode
DIAG	Diagnostics	The CPU boots in diagnostics mode. Program sections in User RAM and User FlashPROM are not initialized. After Diagnostics mode, the CPU always boots with a warm restart.

Table 14: X20 CPUs - Operating modes

11 Reset button

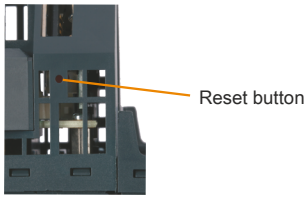


Figure 4: X20CPUs - Reset button

The reset button is located below the USB ports on the bottom of the housing. It can be pressed with any small pointed object (e.g. paper clip). Pressing the reset button triggers a hardware reset, which means:

- All application programs are stopped
- All outputs are set to zero

The PLC then boots into Service mode by default. The boot mode that follows after pressing the reset button can be defined in Automation Studio.