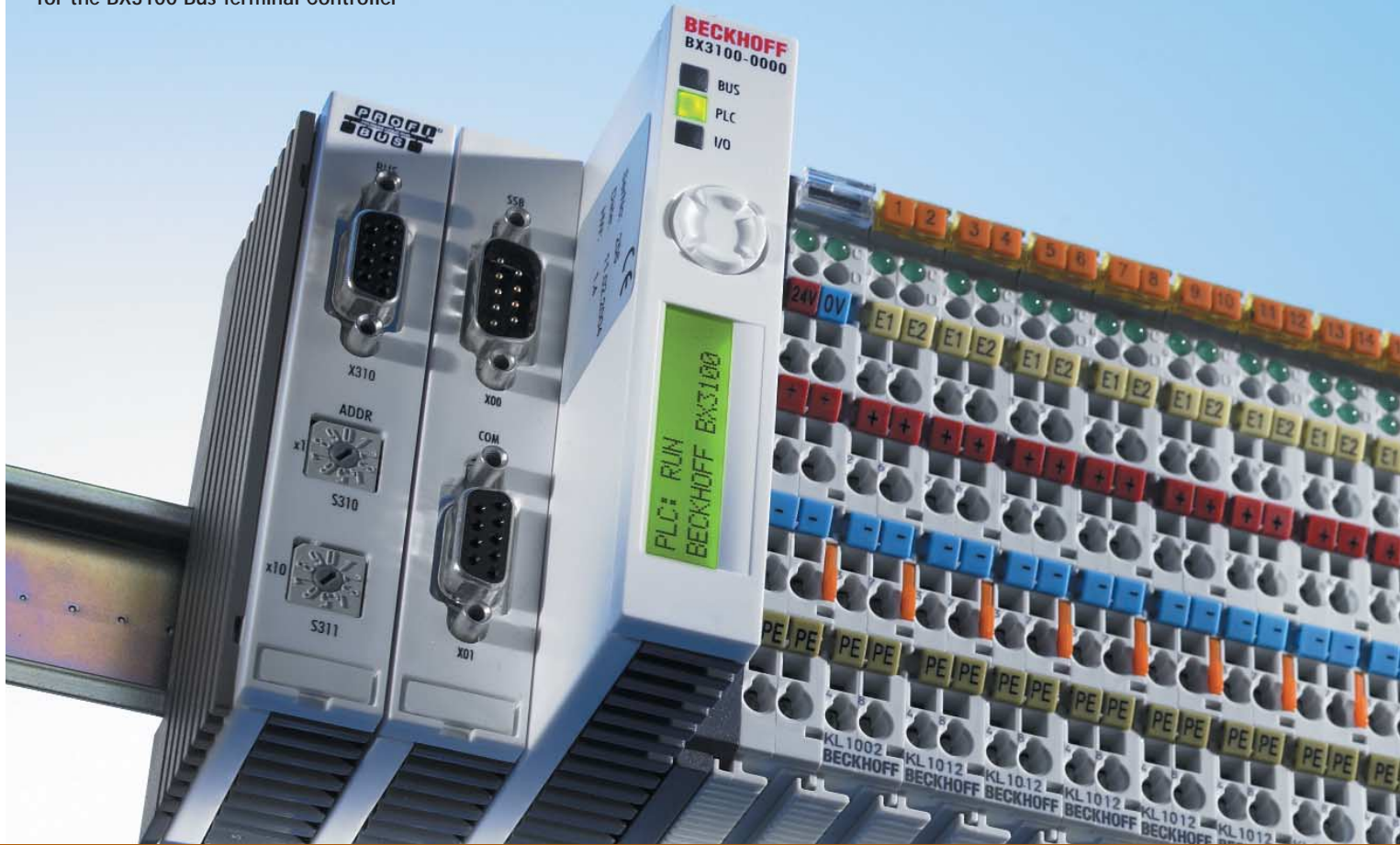


Functions and application options for the BX3100 Bus Terminal Controller



→ The BX3100 Bus Terminal Controller is a Profibus slave with an integrated PLC. It represents a further development of the BC3100 Controller and is now in full production. With its extended features and its five interfaces for fieldbus, Terminal Bus, SSB, COM1 and COM2, the small controller is truly multi-functional.

Small controller with five interfaces

The BX series Bus Terminal Controllers represent a control family offering a high degree of flexibility. The small controller is positioned between the BC series Bus Terminal Controller and the CX1000 Embedded PC. The concept of autonomous control and of a slave within a higher-level fieldbus system was adopted from the BC model. The main features distinguishing BC and BX are larger memory, expanded interfaces and performance. Compared with the BC3100, the BX3100 has a 3.5-times faster CPU, i.e. a program that takes approx. 10 ms on the BC3100 takes less than 3 ms on the BX3100. It has four times as much memory, i.e. 256 kB, sufficient for more than 30,000 rows of IL code.

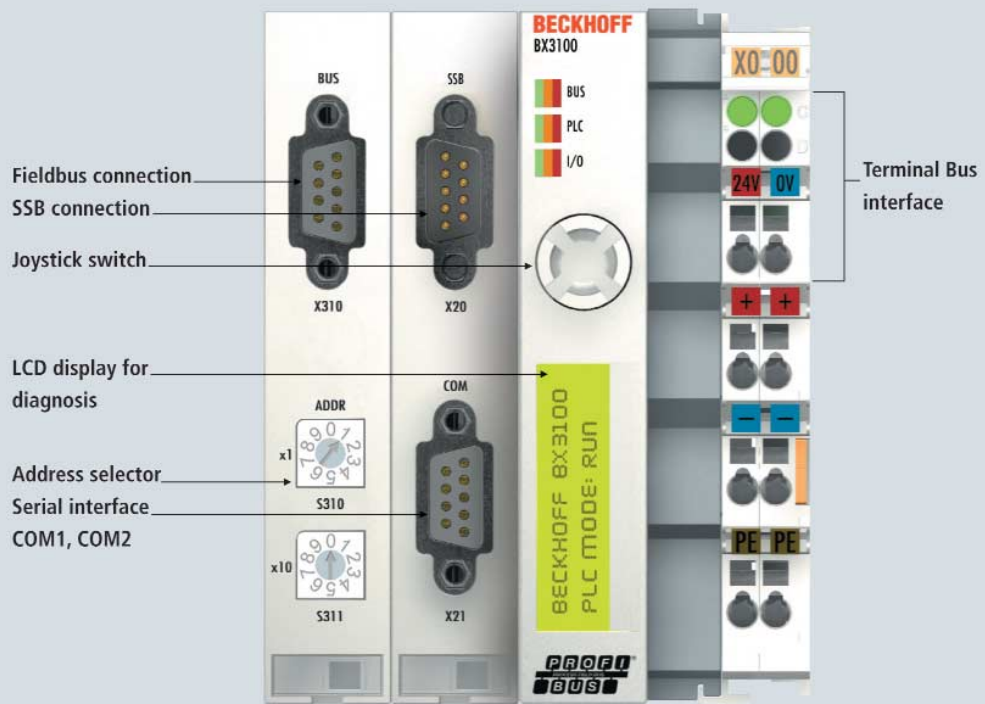
Programming via TwinCAT

Like all Beckhoff controllers, the BX is programmed with TwinCAT. Users therefore have the familiar TwinCAT tools available, e.g. PLC programming interface and System Manager. All 5 IEC 61131-3 languages are supported. Data are exchanged via the Profibus and Beckhoff FC3101 or FC3102 PC fieldbus cards. Optionally,

the program can be transferred via the serial interface (COM1). No special cable is required for this transfer – a simple serial cable with D-Sub connector is sufficient. The project file can be downloaded to the BX and later uploaded again. Additionally, program changes can be made online, i.e. during the PLC project, enabling faster and simpler commissioning. A further innovation is the bit-wise allocation of variables. This means there is no rigid process image, instead the variables can be “mapped” individually, similar to the PC and CX.

Extended features

Smart system bus: The Smart System Bus (SSB) is a CANOpen-based sub-bus system for connecting CANOpen slave devices with the BX3100. In this way, the BK51xx CANOpen Bus Couplers or the AX2000 servo drives can be connected with the controller. For motion control applications it should be noted that the BX3100 has no NC functions. This means that only position data can be transmitted to the drive, which then independently moves to the associated position. The SSB sup-



Comparison of Profibus Bus Terminal Controllers

Technical Data	BC3100	BX3100
Programming/configuration	via TwinCAT and programming interface or fieldbus (both)	
Program memory	32/96 kbyte	256 kbyte
Data memory	32/64 kbyte	256 kbyte
Remanent data	512 byte	2 kbyte
Runtime system	1 PLC task	2 PLC tasks
Programming languages	IEC 61131-3 (AWL, KOP, FUP, AS, ST)	IEC 61131-3 (AWL, KOP, FUP, AS, ST)
Online Change	No	Yes
Up-/download code	No/No	Yes/Yes
PLC cycle time for 1000 commands (without I/O-cycle K-Bus)	approx. 3 ms	approx. 1 ms
Variable mapping	No	Yes
Number of Bus Terminals	64	64 (255 with K-bus extension)
Max. number of bytes, fieldbus	128 bytes input, 128 bytes output	244 bytes input, 244 bytes output
Max. number of bytes, terminals	512 bytes input, 512 bytes output	2048 bytes input, 2048 bytes output
Digital peripheral signals	512 inputs/outputs	2040 inputs/outputs
Analog peripheral signals	128 inputs/outputs	512 inputs/outputs
Baud rate	automatic detection up to max. 12 Mbaud (both)	
Bus connection	1 x D-sub plug, 9-pin	1 x D-sub plug, 9-pin
Serial interface	-	COM1: 1 x RS232, COM2: 1 x RS232 or RS485
SSB	-	CANopen-based sub-bus system for connecting further peripheral devices
Display	-	FSTN 2 x 16 lines display for diagnosis or own texts, illuminated
Switch	-	joystick switch for parameterization and diagnosis
Clock	-	battery-powered internal clock for time and date

ports a maximum of 8 slaves with a maximum of 32 TxPDOs and 32 RxPDOs. "Startup SDOs" can be parameterized. Guarding for node monitoring is supported. The SSB can be configured in such a way that a SYNC telegram is transmitted during each task cycle. Synchronous reading of data is thus permitted.

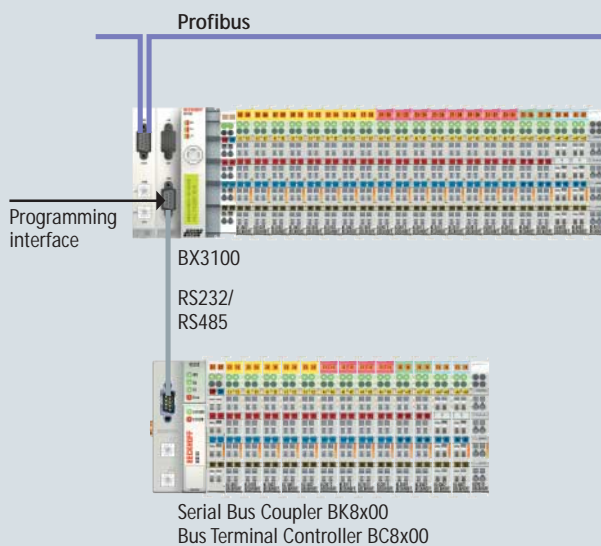
COM1 and COM2: The serial COM1 and COM2 interfaces are physically located on a D-Sub socket. The COM1 port (RS232) is available for programming,

the COM2 port (RS232 or RS485) for connecting serial devices. Various protocols can be implemented with the aid of function blocks, such as ModbusRTU, RK512 etc. or also own protocols. The baud rate, stop bits and parity are freely selectable. With a 512 byte FIFO buffer, the serial COM2 interface is significantly faster than a serial KL60x1 Bus Terminal. The maximum baud rate is 57600 baud (between BX and BX 115 kbaud). Furthermore, communi-

TwinCAT libraries

A wide range of libraries is available for the BX series Bus Terminal controllers. All libraries are saved with the extension ".lbc". The following functions are available in the form of libraries:

- | RTC block
- | Block for writing to the display
- | Block for reading the navigation switch
- | Block for addressing BK/BC8x00 from COM1 or COM2
- | COM interface simulation of a BK8x00, enabling communication between a PC and the BX via TwinCAT or KS8000
- | Blocks for converting Comlib, RK512, ModbusRTU etc. to the COM1 or COM2 interface of the BX
- | Block for utilising the COM port (creation of own protocols)
- | Data structure for recording the cycle time, the program name, the set task time, and of events where the pre-set task time is exceeded



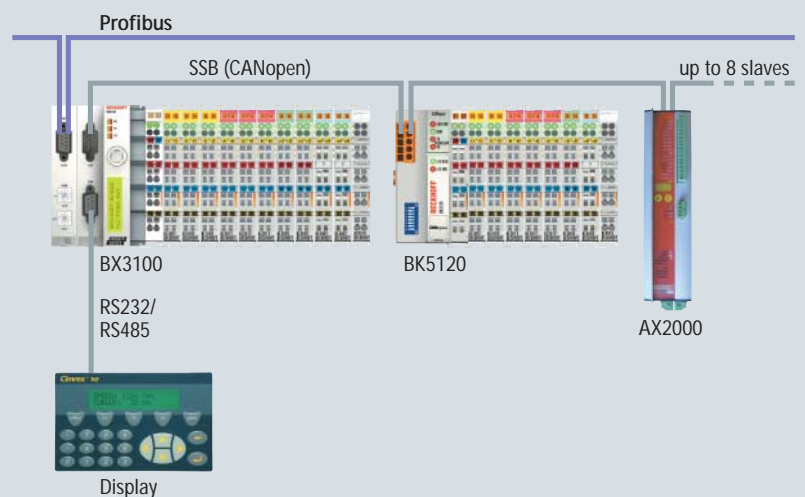
Application example: Integration of distributed Bus Couplers such as BK8x00 or BC8x00 | The serial COM2 interface of the BX3100 enables the serial Bus Couplers BK8000 (RS485) or BK8100 (RS232) to be connected. The maximum baud rate is 38400 kbaud. At a task time of 10 ms, data can be exchanged within 30 ms per slave. On the software side, the TwinCAT PLC library "TcComPortBX.lbc", which is included in the scope of supply, is used for programming.

communication libraries such as ModbusRTU, RK512 or the 3964 protocol can be integrated.

Real-time clock: A real-time clock (RTC) is suitable for decentralized time- or weekday-dependent applications. The clock has a backup battery and can be set via the TwinCAT system manager or via a function block. It is accurate to approx. 1 second per day and maintains its settings for approx. 3 months when the device is switched off.

LCD Display: The BX3100 includes an illuminated FSTN display with 2 x 16 rows for diagnostic purposes or own texts. The joystick can be used to switch to a menu that displays status messages and also enables certain settings to be made.

Navigation switch: This switch has 5 settings that can be read via a function that acts like an additional 5-bit input. Users can thus configure their own menu.



Application example: Integration of CANopen devices via SSB and communication with a display via COM2 | Input and output of distributed I/Os is via the SSB. In addition, axes can be addressed, e.g. via AX2000. The axis travels independently – only position and speed are specified. The return value is the actual position. A Cimrex panel is connected via the serial interface for setting parameters and other settings. Communication is via Modbus RTU.

Application examples

In principle, the BX3100 can be used as a Profibus DP slave, particularly wherever distributed intelligence is required. It is particularly suitable in applications:

- | Modular machines;
- | Interfacing to CANopen devices (such as drives etc.) through SSB;
- | Increased system availability (if the master fails, the BX can continue);
- | Increased system safety in the event of a master or bus failure. The BX can detect whether the master is still operational; if it has failed, the BX can respond accordingly.