X20HB1882

1 General information

POWERLINK bus controllers X20BC8083 and X20BC8084 (revision D0 and later) and standalone hub X20HB8880 are equipped with a modular hub expansion. An additional 1 or 2 slots are available depending on the bus base being used. Hub expansion module X20HB1882 can be operated in these slots. Note that the hardware revision of the X20BC8083 and X20HB8880 must be ≥F0.

The hub expansion module is designed as a 1-port hub. The Ethernet connection is made using $9/125 \mu m$ single-mode glass fiber cables with a duplex LC connector. The module state and network status are indicated using LEDs.

- · Hub expansion module
- 1-port hub, 100BASE-FX
- · Single-mode glass fiber cables
- Range up to 50 km
- · Hot-swappable

Information:

This module is not suitable for POWERLINK ring redundancy applications.

2 Order data

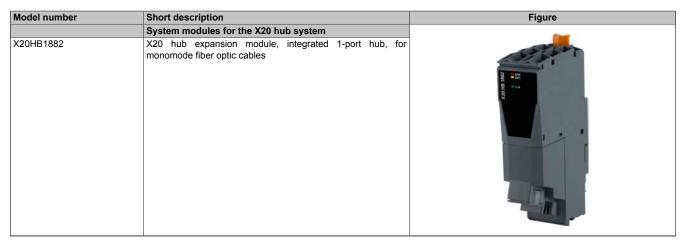


Table 1: X20HB1882 - Order data

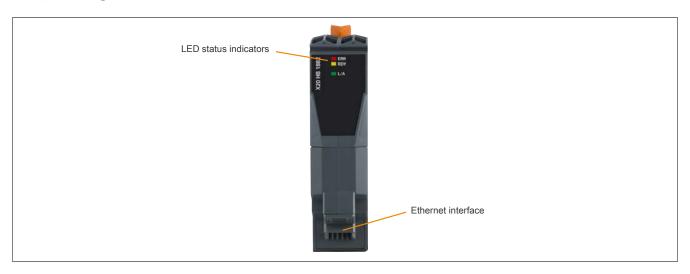
3 Technical data

Short description Hub	Model number	X20HB1882
Senset Information	Short description	
Slatus indicators Module status, bus function	Hub	1 Fast Ethernet interface for single-mode fiber optic cables for hub expansion
Diagnostics West part LED status indicator	General information	
Module status Yes, using LED status indicator Yes	Status indicators	Module status, bus function
Bus function	Diagnostics	
Power consumption	Module status	Yes, using LED status indicator
Additional power dissipation caused by actuators (resistive) [W] Certifications CE ATEX	Bus function	Yes, using LED status indicator
(resistive)	Power consumption	1.65 W
Certifications	Additional power dissipation caused by actuators	-
ATEX	(resistive) [W]	
ATEX	Certifications	
Pizz, Tai (see X20 user's manual) FEZU 09 ATEX 0083X UL	CE	Yes
FTZÜ 09 ATEX 0063X	ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc
Label		
Industrial control equipment		
EAC Yes Hub expansion module	UL	
New		
Type		Yes
Variant 1x female duplex LC Transfer rate 100 Mbit/s Transfer Physical layer 100 Mbit/s Priscal layer 100 Mbit/s Fall-duplex Yes Full-duplex No Autonegotiation No Auto-MDIMDIX No Hub propagation delay 0.96 to 1 µs Wave length Typ. 1300 nm Rx range: 1270 to 1380 nm Cable fiber type Single-mode fiber with 9/125 µm core diameter Optical power budget 30 dB Cable length Max. 175 m between 2 stations (segment length) POWERLINK Max. 50 km between 2 stations (segment length) POWERLINK Max. 50 km between 2 stations (segment length) POWERLINK Max. 50 km between 2 stations (segment length) POWERLING Power supply isolated from Ethernet Operating conditions Power supply isolated from Ethernet Operating conditions Power supply isolated from Ethernet Operation Power supply isolated from Ethernet Operation Power supply isolated from Ethernet Operation Power supply isolated from Ethernet		
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Transfer		·
Physical layer		100 Mbit/s
Half-duplex		
Full-duplex	Physical layer	100BASE-FX
Autonegotiation	Half-duplex	Yes
Auto-MDI/MDIX	Full-duplex	No
Hub propagation delay 0.96 to 1 µs	Autonegotiation	No
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Tx range: 1270 to 1380 mm	Wave length	
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Slot Hub expansion for X20BC8083, X20BC8084 and X20HB8880 ¹⁾		Hub expansion for Y20BC8083, Y20BC9094 and Y20HB9990 1)

Table 2: X20HB1882 - Technical data

¹⁾ The hardware revision of X20BC8083 and X20HB8880 must be ≥F0, and the hardware revision of X20BC8084 must be ≥D0.

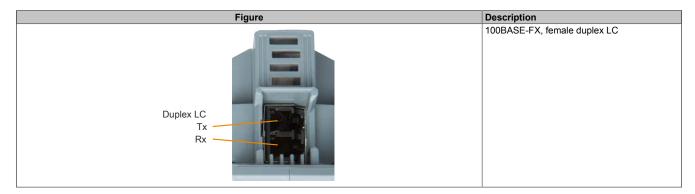
4 Operating and connection elements



4.1 LED status indicators

Figure	LED	Color	Status	Description
	ERR	Red	On	Slot not detected
	RDY	Orange	On	Slot detected, module active
	L/A	Green	On	Link to remote station established
X20 HB 1882			Blinking	Link to remote station established. The LED blinks if Ethernet activity is taking place on the bus.

4.2 Ethernet interface



4.2.1 Cabling guidelines for X20 modules with fiber optic cables

The following cabling guidelines must be observed:

- Cable fiber type: Single-mode fiber with 9/125 µm core diameter
- · On both sides: Male duplex LC connector
- Observe the minimum cable bend radius (see data sheet for the cable).

5 Network size and collision detection

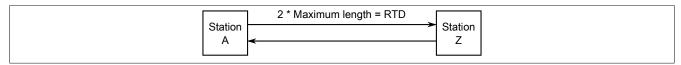
Information:

This section applies to the use of Ethernet networks, not POWERLINK networks.

According to Ethernet specification IEEE 802.3, the transmission duration of a frame of minimum length must always be greater than the round-trip delay time (RTD). RTD is the time needed by a data packet to travel from one end of the network to the other.

If this is not observed, collision detection can no longer be guaranteed.

Illustration of RTD



When using fiber optic cables, the default maximum size is 175 m. Since there are often different devices in a network using different PHYs, the propagation delay of the frames changes since each PHY has different latency. This also affects the network size, and collision detection can no longer be guaranteed at 175 m.

For this reason, it is necessary to re-check whether the transmission duration of a frame of minimum length is actually greater than the maximum RTD.

Example for calculating network size

- Transfer rate: 100 Mbit/s

- Length of the fiber optic cable: 175 m

Number of hubs: 2

Hub propagation delay of a frame: 1 μs

Minimum frame size in the Ethernet network: 72 bytes

Calculation procedure

1. How long does 1 byte need at 100 Mbit? – 100 Mbit/s / 8 = 12.5 MB/s	$\frac{12,500,000}{1} = \frac{1}{x}$ $x = \frac{1s}{12,500,000} = 80ns$
Propagation delay of minimum Ethernet frame Minimum frame in Ethernet network: 72 bytes	72 * 80ns = 5.76µs
3. Propagation delay in cable and hub (100 m cable = 0.5 μs) - 175 m cable = 1.75 x 0.5 μs - 2 hubs = 2 x 1 μs	175 100 m * 0.5μs + 2μs = 2.875μs
Calculation of total propagation delay Outbound/Inbound propagation delay	2.875µs * 2 = 5.75µs

Result

Collision detection is possible since the total time of 5.75 µs is less than the minimum Ethernet propagation delay of 5.76 µs.

With a longer cable or device with different latency, collision detection would no longer exist.