X20(c)HB8880

1 General information

The X20 hub is a device that can be used universally in standard Ethernet networks or POWERLINK networks. It is suitable for 100 Mbit/s (Fast Ethernet) networks.

The bus modules expanded to the left allow connection of up to 2 hub expansion modules in addition to the hub base module. This means that a single base device provides up to 6 hub interfaces.

- 2x / 4x / 6x Fast Ethernet hub
- Modular construction
- · Easily expandable

2 Coated modules

Coated modules are X20 modules with a protective coating for the electronics component. This coating protects X20c modules from condensation and corrosive gases.

The modules' electronics are fully compatible with the corresponding X20 modules.

For simplification purposes, only images and module IDs of uncoated modules are used in this data sheet.

The coating has been certified according to the following standards:

- · Condensation: BMW GS 95011-4, 2x 1 cycle
- Corrosive gas: EN 60068-2-60, method 4, exposure 21 days







2.1 -40°C starting temperature

The starting temperature describes the minimum permissible ambient temperature when the power is switched off at the time the coated module is switched on. This is permitted to be as low as -40°C. During operation, the conditions as specified in the technical data continue to apply.

Information:

It is important to absolutely ensure that there is no forced cooling by air currents in a closed control cabinet, for example using a fan or ventilation slots.

3 Order data

Model number	Short description
	X20 hub system
X20HB8880	X20 base hub module, integrated 2-port hub, 2x RJ45
X20cHB8880	X20 base hub module, coated, integrated 2-port hub, 2x RJ45
	Required accessories
	System modules for bus controllers
X20BB80	X20 bus base, for X20 base module (BC, HB, etc.) and X20 power supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included
X20cBB80	X20 bus base, coated, for X20 base module (BC, HB, etc.) and X20 power supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included
	System modules for expandable bus controllers
X20BB81	X20 bus base, for X20 base module (BC, HB, etc.) and X20 power supply module, with one expansion slot for an X20 add-on module (IF, HB, etc.), X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included
X20BB82	X20 bus base, for X20 base module (BC, HB, etc.) and X20 power supply module, with 2 expansion slots for 2 X20 add-on modules (IF, HB, etc.), X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included
X20cBB81	X20 bus base, coated, for X20 base module (BC, HB, etc.) and X20 power supply module, with one expansion slot for an X20 add-on module (IF, HB, etc.), X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included
X20cBB82	X20 bus base, coated, for X20 base module (BC, HB, etc.) and X20 power supply module, with two expansion slots for two X20 add-on modules (IF, HB, etc.), X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included
	System modules for the X20 hub system
X20PS8002	X20 power supply module for standalone hub and compact link selector
X20cPS8002	X20 power supply module, coated, for standalone hub and compact link selector
	Terminal blocks
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed
	Optional accessories
	System modules for the X20 hub system
X20HB1881	X20 hub expansion module, integrated 1-port hub, for multimode fiber optic cable
X20HB1882	X20 hub expansion module, integrated 1-port hub, for monomode fiber optic cables
X20HB2880	X20 hub expansion module, integrated 2-port hub, 2x RJ45
X20HB2881	X20 hub expansion module, integrated 2-port hub, for fiber optic cable
X20cHB1881	X20 hub expansion module, coated, integrated 1-port hub, for fiber optic cable
X20cHB2880	X20 hub expansion module, coated, integrated 2-port hub, 2x RJ45
X20cHB2881	X20 hub expansion module, coated, integrated 2-port hub, for fiber optic cable

Table 1: X20HB8880, X20cHB8880 - Order data

4 Technical data

Model number	X20HB8880	X20cHB8880		
Short description				
Hub	Modular X20 hub with up to 2 s	slots for hub expansion modules:		
General information				
Status indicators	Module statu	s, bus function		
Diagnostics		.,		
Module status	Yes, using	status LED		
Bus function	-	status LED		
Power consumption		W		
Certifications		···		
CE	Y	······································		
ATEX				
THE A	IP20, Ta (see X2	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X		
UL		E115267 trol equipment		
HazLoc	Process cont for hazardo	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5		
DNV GL	Temperature Humidity: B Vibratio	a: B (0 - 55°C) (up to 100%) n: B (4 g) a and open deck)		
LR		VV1		
KR		vv i /es		
EAC		es ′es		
KC		es 		
	Yes	-		
Interfaces	I lists to an	a mandala		
Туре		e module		
Variant		ded RJ45		
Cable length		Max. 100 m between 2 stations (segment length)		
Transfer rate	100 Mbit/s			
Transfer				
Physical layer	100BA	100BASE-TX		
Half-duplex	Y	Yes		
Full-duplex	No			
Autonegotiation	Yes			
Auto-MDI/MDIX	Y	'es		
Hub propagation delay	0.96	to 1 µs		
Electrical properties				
Electrical isolation	Power supply isolated from	om Ethernet (IF1 and IF2)		
Operating conditions				
Mounting orientation				
Horizontal	Yes			
Vertical	Yes			
Installation elevation above sea level				
0 to 2000 m	No lim	No limitations		
>2000 m	Reduction of ambient temp	Reduction of ambient temperature by 0.5°C per 100 m		
Degree of protection per EN 60529	IF	IP20		
Ambient conditions				
Temperature				
Operation				
Horizontal mounting orientation	-25 to	-25 to 60°C		
Vertical mounting orientation		-25 to 50°C		
Derating	25 (<u> </u>		
Storage	-40 to	5 85°C		
Transport	-40 to 85°C			
Relative humidity	70 (
Operation	5 to 95%, non-condensing Up to 100%, condensing			
Storage	5 to 95%, non-condensing Up to 100%, condensing 5 to 95%, non-condensing			
Transport	5 to 95%, non-condensing			
Mechanical properties	5 to 95%, 110	an condensing		
Note	Order 1x X20TB12 terminal block separately Order 1x X20PS8002 pow-	Order 1x X20TB12 terminal block separately Order 1x X20cPS8002 pow-		
	er supply module separately Order 1x X20BB8x bus base separately	er supply module separately Order 1x X20cBB8x bus base separately		

Table 2: X20HB8880, X20cHB8880 - Technical data

X20(c)HB8880

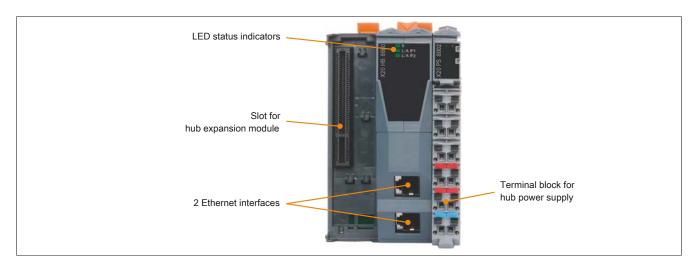
Model number	X20HB8880	X20cHB8880
Pitch 1)		
X20BB80	37.5 ^{+0.2} mm	
X20BB81	62.5 ^{+0.2} mm 62.5 ^{+0.2} mm	
X20BB82	87.5 ^{+0.2} mm	

Table 2: X20HB8880, X20cHB8880 - Technical data

5 LED status indicators

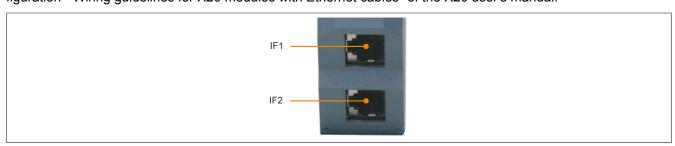
	Figure	LED	Color	Status	Description
		S	Green	On	Hub is active
-		L/A IFx	Green	On	A link to the remote station has been established.
X20 HB 8880	S L/A IF1 L/A IF2			Blinking	A link to the remote station has been established. Indicates Ethernet activity is taking place on the bus.

6 Operating and connection elements



7 Ethernet interface

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.



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

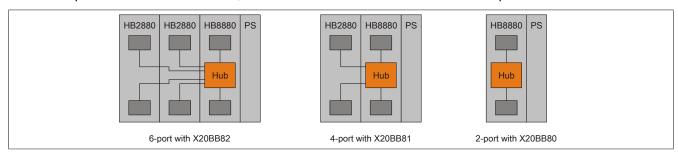
¹⁾ Spacing is based on the width of the X20BB80 bus base. Up to two X20HB2880 hub expansion modules and one X20PS8002 supply module are also always required for the hub.

8 Slot for hub expansion modules

Depending on the bus base, up to 2 hub expansion modules can be installed on the left side of the X20 hub:

Bus base	Slots for hub expansion modules	
X20BB81	1	
X20BB82	2	

The hub expansion module is a 2x hub, which allows the hub base module to be expanded into a 6x hub.



9 Network size and collision detection

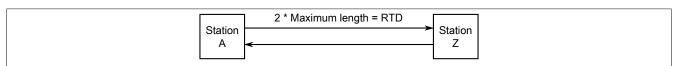
Information:

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 copper cables, the maximum distance is generally 100 m. Since there are often many different devices with different PHYs in a network, the propagation delay of the frames changes due to the different latency of each PHY. This also affects the network size, and collision detection can no longer be guaranteed at 100 m.

Example for calculating network size

The following parameters are specified for a network:

Transfer rate: 100 Mbit/sCable length: 100 mNumber of hubs: 2

- Hub propagation delay of a frame: 1 μs

- Minimum frame size in the Ethernet network: 72 bytes

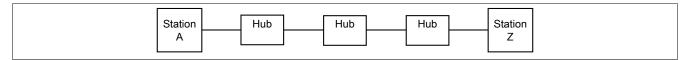
Calculation procedure

$\frac{12,500,000}{1} = \frac{1}{x}$ $x = \frac{1s}{12,500,000} = 80ns$
72 * 80ns = 5.76µs
2μs + 0.5μs = 2.5μs
2.5µs * 2 = 5µs

Result

Collision detection is possible since the total time of 5 μ s is less than the minimum Ethernet propagation delay of 5.76 μ s.

Example for calculating the network reach with devices between 2 stations



Corresponding to the previous example, the following situation occurs in a network with 3 hubs and 100 m cables:

• The transmission duration of a frame of minimum length is 5.76 μs.

Calculation procedure

1. Propagation delay in cable and hub		
– 100 m cable = 0.5 μs	3µs+0.5µs = 3.5µs	
- 3 hubs = 3 x 1 μs		
2. Calculation of total propagation delay	2 500 - 2 - 700	
 Outbound/Inbound propagation delay 	3.5µs * 2 = 7µs	

Result

Collision detection is not possible since the total time of 7 μ s is greater than the minimum Ethernet propagation delay of 5.76 μ s.

The ≈1.3 µs missing for collision detection can only be recovered by removing a hub.