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IBS ISA FC/486DX/I-T

Field Controller With Coprocessor for PC Systems

Data Sheet 5326G 12/2002

Product Description

Generation 4 Field Controllers with a PC/104 coprocessor board for IBM-compatible PCs with integrated ISA bus (16-bit slot).

Features

- Configuration and parameterization via PC WORX
- Automation and control functions according to IEC 61131
- INTERBUS protocol (IEC 61158)
- Complete Generation 4 functionality:
  - Up to 255 bus segments
  - Up to 16 device levels
  - Up to 512 devices
  - Up to 4096 I/O points
  - Up to 62 PCP devices
  - Synchronous operation
- Support of INTERBUS Loop devices
- User-defined addressing
- Firmware bootable via RS-232 interface
- Electrical isolation between remote bus connection and host PC

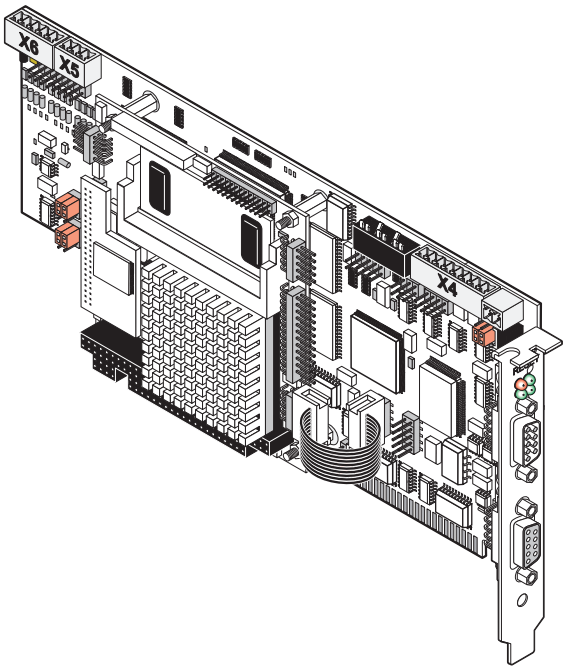


Figure 1 IBS ISA FC/486DX/I-T

Applications

Processing of control applications on the Field Controller independent of the host PC. In this way, the host PC is free for other tasks, e.g., visualization.

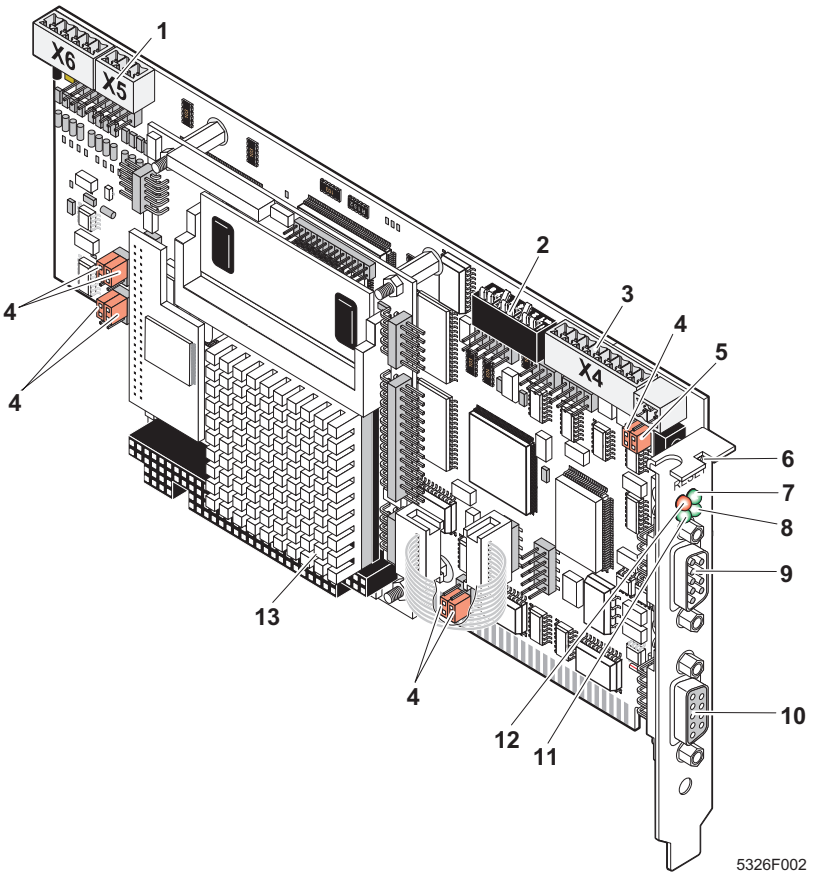


Figure 2 Structure of the IBS ISA FC/486DX/I-T Field Controller

The following components are located on the Field Controller:

1. Digital inputs
2. DIP switch, I/O address of the host
3. System interface (external power supply and external reset button)
4. Jumper to select the internal or external power supply
5. Jumper to select the reset behavior
6. Reset button
7. LED 2 - IBS RDY RUN
8. LED 4
9. RS-232 interface (9-pos. D-SUB male connector)
10. INTERBUS remote bus interface (9-pos. D-SUB female connector)
11. LED 3 - UL
12. LED 1 - FAIL
13. Coprocessor board

Indicators and Interfaces of the Field Controller

ISA Bus Slot

The Field Controller requires a long ISA bus slot (2 slots wide) in the host PC.

The Field Controller may use the interrupt lines 2, 3, 5, 7, 10, 11, 12 and 15.



Please ensure that no other expansion board in the host PC uses the same interrupt line.

Meaning of the Status LEDs

Designation	Color	Status	Meaning
UL (3)	Green	ON	The Field Controller is not in the RESET state.
		OFF	The Field Controller is in RESET state.
IBS RDY RUN (2)	Green	ON	INTERBUS is in RUN state.
		FLASHING	INTERBUS is in READY or ACTIVE state.
		OFF	No configuration loaded or an error occurred
FAIL (1)	Red	ON	If the IB RDY RUN LED is off at the same time, an INTERBUS error occurred.
		ON	If the FC RDY RUN LED is off at the same time, an error occurred on the coprocessor board.
		ON	If the IBS RDY RUN LED and the FC RDY RUN LED are off at the same time, an INTERBUS error and an error on the coprocessor board occurred.
		OFF	No error occurred

Remote Bus Interface

The remote bus interface connects the Field Controller with the INTERBUS devices. The remote bus interface on the cover plate of the Field Controller has been designed as a 9-pos. D-SUB female connector. Phoenix Contact provides pre-assembled remote bus cables. The design of the remote bus cable is shown in the figure below:

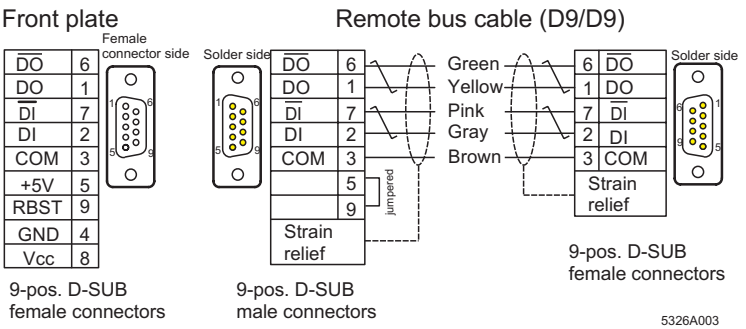


Figure 3 Remote bus interface and example of a remote bus cable (cable type D9/D9)

Using the IBS OPTOSUB MA/M/L-LK interface connector (Order No.: 27 50 11 2), your INTERBUS system can support fiber optic data transmission. The outputs of the interface converter are angled to support different mounting positions (see "Ordering Data" on page 14).

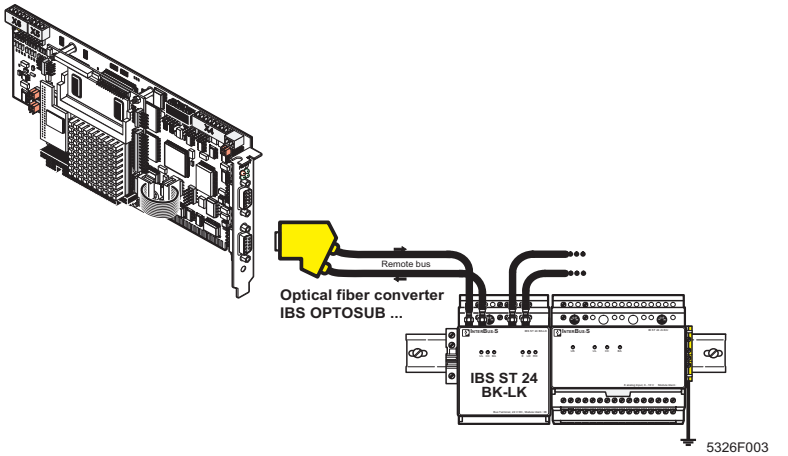


Figure 4 INTERBUS system with fiber optics

RS-232 Interface (Serial)

The RS-232 interface of the Field Controller connects an IBM-compatible PC with the PC WORX software. This software can be used to configure, parameterize and diagnose INTERBUS, and to program the automation and control applications according to IEC 61131. Using PC WORX, parameterization and configuration for booting can be permanently stored in a Flash EPROM on the Field Controller.

It is possible to download the firmware of the Field Controller. In this way, it is possible to meet future system requirements by means of updates.

The RS-232 interface on the front plate of the Field Controller has been designed as a 9-pos. D-SUB male connector. The Field Controller is connected to the PC via the IBS PRG CAB connecting cable (Order No. 28 06 86 2) shown in Figure 5.

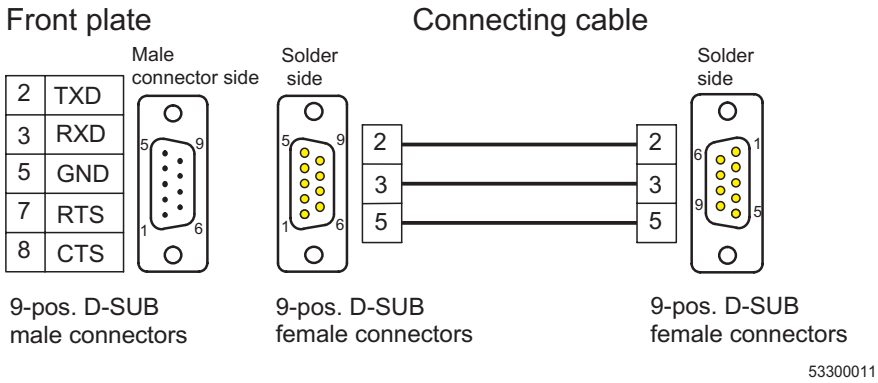


Figure 5 Diagnostic interface and RS-232 cable for the connection with a PC

DIP Switches for Setting the I/O Addresses

The DIP switches for setting the I/O addresses are located at the top of the board and in such a way that they can be set when the Field Controller has been inserted in the PC. The start address can be set to any value that is divisible by 8 in the range from 100_{hex} to $3F8_{hex}$. The default setting (default upon delivery) is 120_{hex}. Eight consecutive addresses in the I/O channel are used.

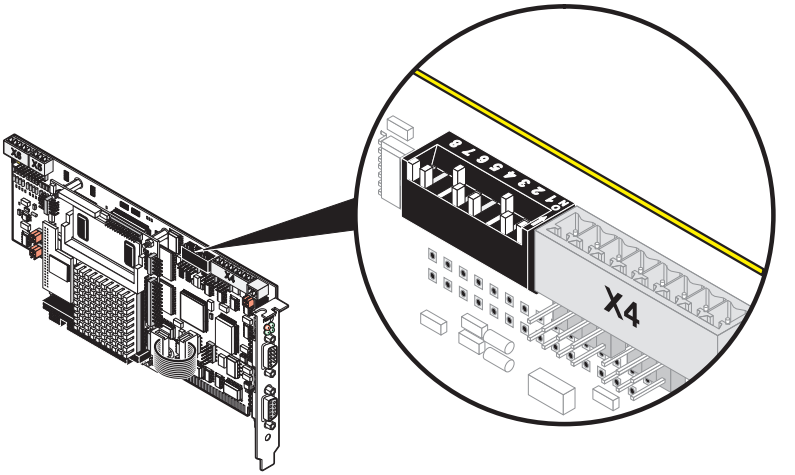


Figure 6 Default setting of DIP switches (I/O address 120_{hex})

DIP Switches	2	3	4	5	6	7	8	
Value	200_{hex}	100_{hex}	80_{hex}	40_{hex}	20_{hex}	10_{hex}	8_{hex}	
I/O address								
100	OFF	ON	OFF	OFF	OFF	OFF	ON	
108	OFF	ON	OFF	OFF	OFF	ON	OFF	
110	OFF	ON	OFF	OFF	OFF	ON	ON	
118	OFF	ON	OFF	OFF	OFF	ON	ON	
120	**OFF**	**ON**	**OFF**	**OFF**	**ON**	**OFF**	**OFF**	**Default**
128	OFF	ON	OFF	OFF	ON	OFF	ON	
...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	
3F8	ON	ON	ON	ON	ON	ON	ON	

Switch 1 enables the test mode. When the Field Controller is restarted with test activated, it starts the INTERBUS system with physical addressing, and initializes it. During test mode the Field Controller does not respond to instructions of the host system (PC). Any parameterization stored on the Field Controller is not read in. The Field Controller initializes and starts up the INTERBUS system independently. Outputs are not set.

Test mode is not intended for normal operation of the Field Controller. Set switch 1 to OFF to deactivate test mode.

System Interface

An external reset button and an external 5 V voltage supply can be connected to the Field Controller via an 8-pos. MINI-COMBICON connector. Phoenix Contact offers an 8-pos. MINI-COMBICON connector for system interfaces (Designation: MC 1,5/8-ST-3,81, Order No. 18 03 63 3). The assignment of the connector is shown in Figure 7.

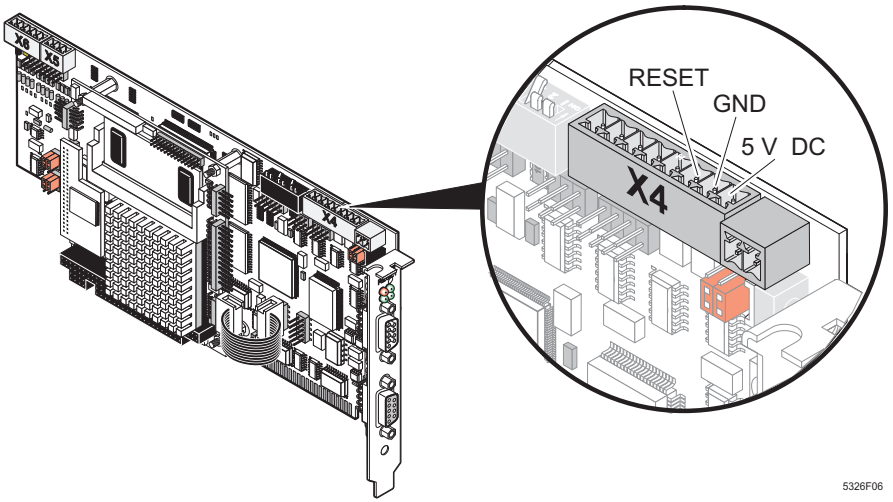


Figure 7 System interface with 8-pos. MINI-COMBICON connector

Voltage Supply

There are two ways of supplying the Field Controller with voltage:

1. The Field Controller is powered through the host PC. In this case the entire board is supplied with voltage (INTERBUS master, PC/104 slot and MPM). If the voltage supply of the host PC fails, the Field Controller will be switched off. The jumpers must be used according to the tables on page 9 and Figure 8 on page 9.
2. Connection of an external 5 V supply to the system interface (8-pos. MINI-COMBICON female connector) on the top right of the board. This voltage can be provided by a corresponding external power supply unit. When the 5 V are connected, the jumpers J5, J6 and J7 must be re-jumpered (see Figure 8 and tables on page 9). Otherwise, the Field Controller will still be supplied by the host PC. If the voltage supply of the host PC fails, the Field Controller continues to operate and the host interface is switched with high-resistance so that the host PC is no longer supplied by the Field Controller.



By default, the jumpers J5, J6 and J7 are set to position 1-2, internal voltage supply (operating mode C).



Take care that the external voltage supply has the correct polarity, as there is no polarity reversal protection provided on the Field Controller. The wrong connection of the external voltage supply could damage on the Field Controller.



No measures for filtering high-frequency interference voltages are provided on the Field Controller. Make sure that only undisturbed voltages are fed to the PC (ambient class 1, well-protected environment).

Effects of a Host PC Reset

By means of jumpers J1 to J4 (see Figure 8 and the tables on page 9) the voltage monitoring on the Field Controller can be activated and deactivated, and the effects of the host PC reset can be determined. In the B and D operating modes (see table "Jumper Position Meanings" on page 9), only the host interface registers are reset. Bus operation is not affected. During a reset of the host PC in the operating modes A, C and E, the Field Controller will also be reset.

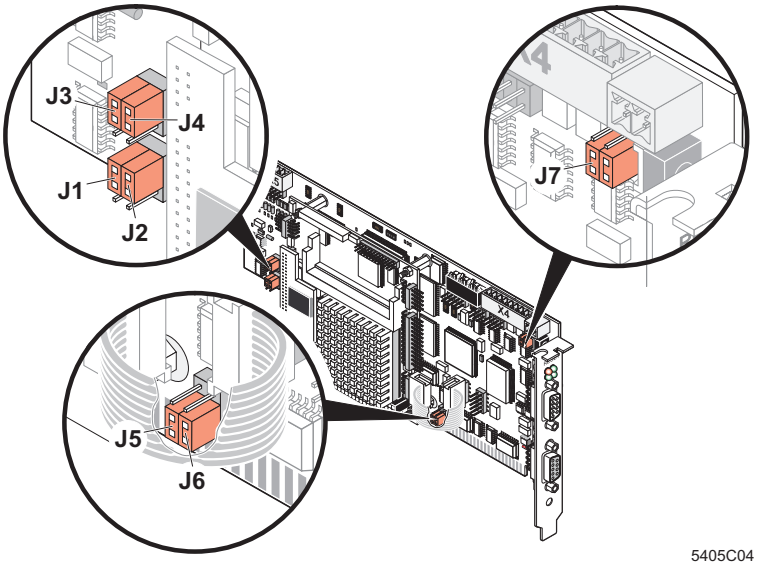


Figure 8 Jumper settings for voltage supply

Operating Mode	Jumper Position Meanings
A	Internal voltage supply without voltage monitoring with host PC reset
B	Internal voltage supply without voltage monitoring without host PC reset
C	**Internal voltage supply with voltage monitoring with host PC reset (default upon delivery)**
D	External voltage supply without host PC reset
E	External voltage supply with host PC reset

	Jumper Positions						
Operating Mode	**J1**	**J2**	**J3**	**J4**	**J5**	**J6**	**J7**
A	1-2	1-2	1-2	1-2	1-2	1-2	1-2
B	2-3	2-3	1-2	2-3	1-2	1-2	1-2
C	**2-3**	**2-3**	**2-3**	**2-3**	**1-2**	**1-2**	**1-2**
D	2-3	2-3	1-2	2-3	2-3	2-3	2-3
E	2-3	2-3	2-3	2-3	2-3	2-3	2-3

Digital Status Inputs

Two digital inputs can be connected to the Field Controller via a 3-pos. MINI-COMBICON connector. The inputs operate on a 24 V level and are electrically isolated from the Field Controller. This enables the connection of standard industrial switches and voltages, the states of which can be requested from and linked to the application program. Phoenix Contact offers a 3-pos. MINI-COMBICON connector for digital inputs (Designation: MC 1,5/3-ST-3,81; Order No. 18 03 58 1).

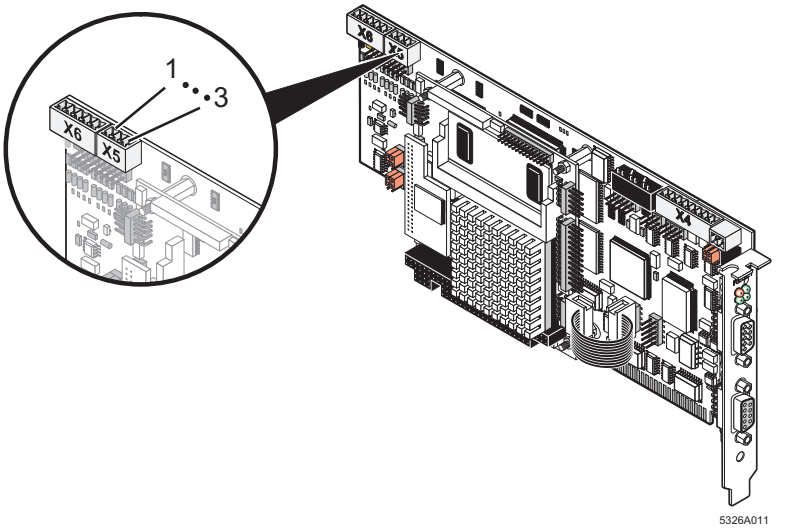


Figure 9 Digital input positions on the Field Controller

No.	Signal Name	Input Meanings (X5)
1	GND IN (24 V)	Ground contact (24 V)
2	DIGI IN 1	Digital input 1
3	DIGI IN 2	Digital input 2

Reset Button

The reset button is covered by a mounting plate and can only be operated with a pin. In this way, it is protected against accidental activation. By default, the button is enabled, and evaluated by the Field Controller. In order to avoid accidental activation the reset button can be disabled by means of jumper 8. For this, insert jumper 8 in the upper position (see Figure 10 on page 11). By default, jumper 8 is in the lower position. Another reset button can be connected on the top right of the board using the 8-pos. system interface (X4) (see Figure 7 on page 7). There is no need to enable the external reset button by a jumper.

Pressing the reset buttons will reset the Field Controller. The host PC is not affected by the reset.

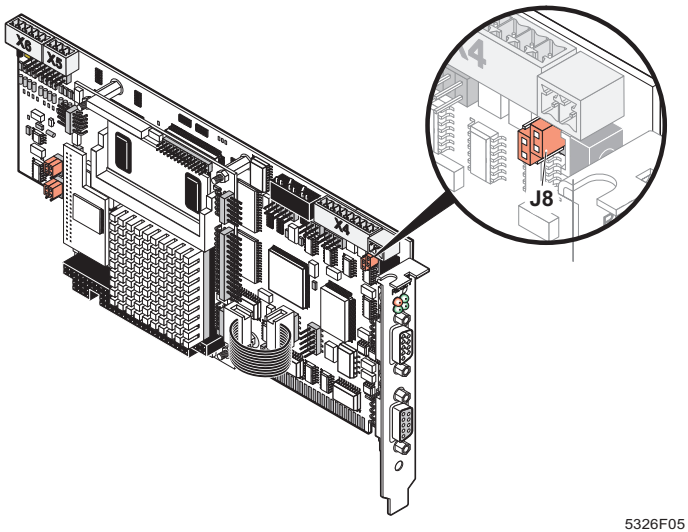


Figure 10 Jumper to select the reset behavior

Technical Data

General Data	
Designation	IBS ISA FC/486DX/I-T
Order No.	27 22 08 5
Dimensions	222 mm x 99 mm x 35 mm (2 slots) (8.740 in. x 3.898 x 1.378 in.)
Weight	350 g, approximately

Voltage Supply	
V_S, board (PC supply)	5 V DC ±5%
Power consumption	Approximately 12.5 W, typical
Maximum start current	6 A

Host Interface	
Connection method	Direct plug-in connection like ISA PC AT
Bus system	ISA AT according to IEEE P996
Data width	16 bits
Address area	8 addresses in the I/O channel; 4 kbytes in the memory address area
Interrupts	Selectable between IRQ 2, 3, 5, 7, 10, 11, 12, and 15

Master Interface	
Bus connection	REMOTE OUT
INTERBUS interface	9-pos. D-SUB female connector
Interface type	RS-422
Electrical isolation	500 V AC test voltage

RS-232 Interface	
Connection method	9-pos. D-SUB male connector
Interface type	RS-232
Transmission rate	9600 baud
Electrical isolation	No

IEC 61131 Runtime System	
Speed	0.1 ms for 1 K instructions, typical
Shortest cycle time	1 ms on the COP
Program memory	1 Mbyte (86 kbytes instruction in IL, typical)
Data memory	2 Mbytes
Number of control tasks	16
Memory for retentive data	16 kbytes NV RAM

Environmental Conditions	
Temperature (according to EN 60204-1)	Operation: 10°C to 55°C (50°F to 131°F)
	Storage and transport: -25°C to 75°C (-13°F to +167°F)
Humidity (according to EN 60.204-1)	Storage and operation: 75% on average, 85% occasionally (DIN 40040); no condensation
Air pressure	Operation: 800 hPa to 1080 hPa (up to 2000 m [6562 ft.] above sea level)
	Storage and transport: 700 to 1080 hPa (up to 3000 m [9843 ft.] above sea level)
Vibration	Operation: 2g, criterion 1 according to IEC 60068-2-6 (with additional mechanical fixing at the back of the board)
	Storage: 2g according to IEC 60068-2-6

Conformance With EMC Directive 89/336/EEC

Noise Immunity Test According to EN 50082-2		
Electrostatic discharge (ESD)	IEC 61000-4-2	Criterion B 4 kV contact discharge 8 kV air discharge
Electromagnetic fields	IEC 61000-4-3	Criterion A; field strength: 10 V/m
Fast transients (burst)	IEC 61000-4-4	Criterion B; Signal/data lines: 2 kV
Surge voltage	EN 61000-4-5/	Criterion B

Noise Immunity Test According to EN 50082-2		
Surge test	EC 61000-4-5 EC 61000-4-6	Signal lines: 0.5 kV/1.0 kV (symm./asymm.)
Conducted interference	IEC 61000-4-6	Criterion A; test voltage 10 V

Noise Emission Test acc. to EN 55011		
Noise emission of housing	EN 55011	Class A, Gr. 1

Ordering Data

Description	Designation	Order No.
Field Controller	IBS ISA FC/486DX/I-T	27 22 08 5
The following items are are available as an ACCESSORY		
PC WORX software	IBS PC WORX E	27 29 41 5
"Configuring and Installing INTERBUS" User Manual	IBS SYS PRO INST UM E	27 43 80 2
RS-232 cable	IBS PRG CAB	28 06 86 2
3-pos. MINI-COMBICON connector for digital inputs	MC 1,5/ 3-ST-3,81	18 03 58 1
8-pos. MINI-COMBICON connector for the system interface	MC 1,5/ 8-ST-3,81	18 03 63 3
Interface converter, fiber optic output left	IBS OPTOSUB MA/M/L-LK	27 50 11 2

Documentation is available at www.phoenixcontact.com. It can be downloaded free of charge.

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