1.1 EX290

1.1.1 General Information

The EX290 bus controller is the communication interface between the X2X Link and the I/O system. It is not hung in the module rack, instead it is screwed to the left side of the module rack.

The following tasks are completed by the EX290:

- Initialization -- from power-on to active operation on the X2X link
- Evaluating and sending input states
- Receiving and switching outputs
- Defined error behavior for X2X link crashes and local problems

1.1.2 Order Data

Model Number	Short description	Image
	Bus Controller	
7EX290.50-1	2003 X2X Link bus controller, 24 VDC, 3.2 W supply, 1 X2X Link interface, electrically isolated, 1 x TB712 terminal block sold separately	
	Required Accessory	
7TB712.9	Accessory terminal block, 12-pin, screw clamp, 1.5 mm²	
7TB712.91	Accessory terminal block, 12-pin, cage clamp, 1.5 mm²	

Table 1: EX290 Order Data

1.1.3 Technical Data

Product ID	EX290
Short Description	
Bus Controller	X2X Link Slave
Peripheral	
I/O Bus Interface	9-pin DSUB socket
Interfaces	
Type	X2X Link Slave
Design	12-pin multipoint connector
Power Supply	
Input Voltage	24 VDC
Voltage Range	18 VDC to 30 VDC
Power Input	5.0 W
Output power for I/O modules and screw-in modules	3.2 W
Voltage Monitoring	The power supply is only enabled starting with an input voltage of approx. +15 V. Therefore, the DC OK status LED is not necessary.
General Information	
Status Display	Module status
Diagnostics Module Status	 Yes, with status LED
Certification	CE, C-UL-US (in development), GOST-R
Maximum Number of Logical Module Slots	4
Maximum Number of Analog Module Slots	2
Possible module addresses for analog modules	1 - 4, for description see section "Module Slot Rules" im the System 2003 User's Manual or product catalog
Electrical Isolation I/O - X2X Link	 Yes
Mechanical Characteristics	
Module Width	20 mm
Installation	The controller is screwed onto the module rack instead of the left side plate
Protection	IP20
Operating Temperature Horizontal Installation Vertical Installation	 0 °C to +60 °C 0 °C to +50 °C
Storage Temperature	-25 °C to +70 °C
Humidity	5 to 95% (non-condensing)
Note	1 x TB712 terminal block sold separately

Table 2: EX290 Technical Data

1.1.4 Further Technical Data

Product ID	EX290
General Information	
B&R ID Code	$1878

Table 3: EX290 Further Technical Data

1.1.5 Status Display

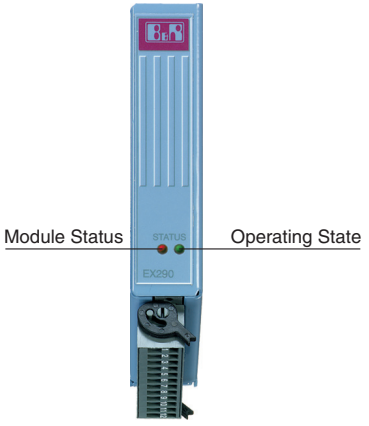
Image	Module status (red)	Operating Status (green)	Description
	Done	Done	Module not supplied
	Done	Blinking	Module supply, but no X2X communication, I/O OK
	Blinking	On	X2X communication OK, module not configured
	Done	On	X2X communication OK, I/O function OK
	On	On	X2X communication OK, I/O function not OK

Table 4: EX290 Status Display

1.1.6 Pin Assignments

The voltage supply and the X2X link connections are made using a 12-pin terminal block.

The I/O system and the X2X link on the bus controller are supplied with power (24 VDC) from terminals 11 and 12.

X2X+ connections are situated on terminals 1 and 2 to make wiring easier. They are linked with each other internally, which makes it easy to connect the I/O system to the X2X link.

When wiring the X2X link, it is important that the incoming cable is connected to the terminal labled "X2X In". The outgoing cable should be connected to the terminal labled "X2X Out" (see Section 1.1.7 "Connection Example", on Page 6).

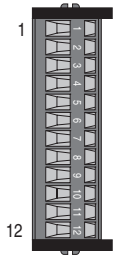
12-Pin Terminal Block	Terminal	Assignment
 TB712	1	X2X In: X2X+ (optional)
	2	X2X Out: X2X+ (optional)
	3	X2X In: X2X
	4	X2X In: X2X⊥
	5	X2X In: X2X\
	6	Shield
	7	X2X Out: X2X
	8	X2X Out: X2X⊥
	9	X2X Out: X2X\
	10	Shield
	11	+24 VDC Supply
	12	Power Supply ⊥

Table 5: EX290 Status Display

1.1.7 Connection Example

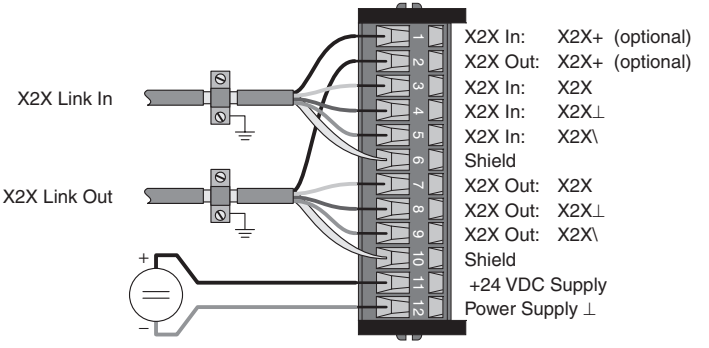


Figure 1: EX290 Connection Example

1.1.8 General Behavior as X2X Slave

Operating Mode Configuration

The operating mode can be configured as syncronous or asyncronous by selecting the function model:

0 ... Asynchronous (default)
1 ... Synchronous

Syncronous Operation

For every X2X cycle, a 2003 bus cycle is requested. If the previous 2003 bus cycle is still running, a new one is not started.

In each 2003 bus cycle all digital data points, but only one analog data point, are transfered. When the next 2003 bus cycle is started, another analog data point is transfered.

Asynchronous Operation

The 2003 bus cycle runs at maximum speed when running asynchronous to the X2X link. All I/O data points are transfered in the course of each 2003 bus cycle.

Information:

Although the I/O data is exchanged with the EX290 in every X2X cycle, the actual refresh rate of the I/O data points depends on the 2003 bus cycle. Depending on the hardware configuration, this can result in longer cycle times.

1.1.9 Register Bank 32

Register bank 32 contains the standard register of the X2X slave.

Register	Description	Configuration					
		Data type	Length	Read	Write	Synchronous	Asynchronous
Bank 32							
0	B&R ID Code	UINT	1	●			●
4	Status operating limits	USINT	1	●			●

Table 6: EX290 Register Bank 32

B&R ID Code

Code for module identification ($1878).

Status Register Operating Limits

Bit	Description
0	0 ... Module supply within the warning limits (18 V to 30 V) 1 ... Module supply outside the warning limits (<18 V or >30 V)
1 - 7	0