X67BC6321.L12

1 General information

PROFIBUS DP is based on the physics of the RS485 interface. Data transfer is controlled using a hybrid bus access procedure: Active stations receive communication rights via a token passing procedure and can then access all stations on the network according to the master-slave principle. The maximum time of circulation for a token can be configured, which results in a defined cycle time.

Access represents various services for the user for both cyclic and for acyclic data transfer.

This bus controller makes it possible to connect X2X Link I/O nodes to PROFIBUS DP. It supports PROFIBUS DP with all of its options and other additional properties. In addition to the device, module and channel diagnostics provided in the PROFIBUS standard, it is also possible, for example, to switch to the slot diagnostics option in S7 format.

X67 or other modules based on X2X Link can be connected to the bus controller. The configuration of the modular system is optimally supported by PROFIBUS DP.

- Fieldbus: PROFIBUS DP
- Integrated Y-connector for fieldbus connection
- 16 digital channels, configurable as inputs or outputs
- M12 connections
- Simple I/O configuration via the fieldbus
- Integrated connection to local expansions via X2X Link for 63 additional modules
- Configurable I/O cycle (0.2 to 1 ms)

Information:

Only the standard function model (see the respective module description) is supported when the bus controller is used together with multi-function modules it has automatically configured itself.

2 Order data

Model number	Short description	Figure
	Bus controller modules	
X67BC6321.L12	X67 bus controller, 1 PROFIBUS DP interface, X2X Link power supply 15 W, 16 digital channels configurable as inputs or outputs, 24 VDC, 0.5 A, configurable input filter, 2 event counters 50 kHz, M12 connectors, high-density module	

Table 1: X67BC6321.L12 - Order data

Required accessories
See "Required cables and connectors" on page 7. For a general overview, see section "Accessories - General overview" of the X67 system user's manual.

3 Technical data

Model number	X67BC6321.L12
Short description	
Bus controller	PROFIBUS DP V0
General information	
Inputs/Outputs	16 digital channels, configurable as inputs or outputs using software, inputs with additional functions
Isolation voltage between channel and bus	500 V_{Eff}
Nominal voltage	24 VDC
B&R ID code	
Bus controller	0x1AEC
Internal I/O module	0x1A1D
Sensor/Actuator power supply	0.5 A summation current
Status indicators	I/O function for each channel, supply voltage, bus function
Diagnostics	
Outputs	Yes, using status LED and software
I/O power supply	Yes, using status LED and software
Connection type	
Fieldbus	M12, B-keyed
X2X Link	M12, B-keyed
Inputs/Outputs	8x M12, A-keyed
I/O power supply	M8, 4-pin
Power output	15 W X2X Link supply for I/O modules
Power consumption	
Fieldbus	3.25 W
Internal I/O	2.04 W
X2X Link power supply	23.63 W at maximum power output for connected I/O modules
Certifications	
CE	Yes
KC	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5
ATEX	Zone 2, II 3G Ex nA IIA T5 Gc IP67, Ta = 0 - Max. 60°C TÜV 05 ATEX 7201X
Interfaces	
Fieldbus	PROFIBUS DP V0
Variant	2x M12 interface for the Y-connector integrated in the module
Max. distance	1200 m
Transfer rate	Max. 12 Mbit/s
Default transfer rate	Automatic transfer rate detection
Min. cycle time [1]	
Fieldbus	No limitations
X2X Link	400 µs
Synchronization between bus systems possible	No
PROFIBUS DP ID	0xBC61
Terminating resistor	Can be optionally screwed onto the integrated Y-connector
I/O power supply	
Nominal voltage	24 VDC
Voltage range	18 to 30 VDC
Integrated protection	Reverse polarity protection
Power consumption	
Sensor/Actuator power supply	Max. 12 W [2]
Sensor/Actuator power supply	
Voltage	I/O power supply minus voltage drop for short circuit protection
Voltage drop for short-circuit protection at 0.5 A	Max. 2 VDC
Summation current	Max. 0.5 A
Short-circuit proof	Yes
Digital inputs	
Input voltage	18 to 30 VDC
Input current at 24 VDC	Typ. 4 mA
Input characteristics per EN 61131-2	Type 1
Input filter	
Hardware	≤10 µs (channels 1 to 4) / ≤70 µs (channels 5 to 16)
Software	Default 0 ms, configurable between 0 and 25 ms in 0.2 ms intervals
Input circuit	Sink
Additional functions	50 kHz event counting, gate measurement
Input resistance	Typ. 6 kΩ

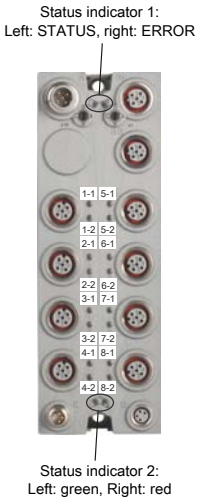
Table 2: X67BC6321.L12 - Technical data

Model number	X67BC6321.L12
Switching threshold	
Low	<5 VDC
High	>15 VDC
Event counter	
Quantity	2
Signal form	Square wave pulse
Evaluation	Each falling edge, cyclic counter
Input frequency	Max. 50 kHz
Counter 1	Input 1
Counter 2	Input 3
Counter frequency	Max. 50 kHz
Counter size	16-bit
Gate measurement	
Quantity	1
Signal form	Square wave pulse
Evaluation	Rising edge - Falling edge
Counter frequency	
Internal	48 MHz, 3 MHz, 187.5 kHz
Counter size	16-bit
Length of pause between pulses	≥100 µs
Pulse length	≥20 µs
Supported inputs	Input 2 or input 4
Digital outputs	
Variant	FET positive switching
Switching voltage	I/O power supply minus residual voltage
Nominal output current	0.5 A
Total nominal current	8 A
Output circuit	Source
Output protection	Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances, reverse polarity protection for output power supply
Diagnostic status	Output monitoring with 10 ms delay
Leakage current when switched off	5 µA
Switching on after overload shutdown	Approx. 10 ms (depends on the module temperature)
Residual voltage	<0.3 V at 0.5 A rated current
Peak short-circuit current	<12 A
Switching delay	
0 → 1	<400 µs
1 → 0	<400 µs
Switching frequency	
Resistive load	Max. 100 Hz
Inductive load	See section "Switching inductive loads"
Braking voltage when switching off inductive loads	50 VDC
Electrical properties	
Electrical isolation	Channel isolated from PROFIBUS and bus PROFIBUS not isolated from bus and channel not isolated from channel
Operating conditions	
Mounting orientation	
Any	Yes
Installation elevation above sea level	
0 to 2000 m	No limitations
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m
Degree of protection per EN 60529	IP67
Ambient conditions	
Temperature	
Operation	-25 to 60°C
Derating	-
Storage	-40 to 85°C
Transport	-40 to 85°C
Mechanical properties	
Dimensions	
Width	53 mm
Height	155 mm
Depth	42 mm
Weight	375 g
Torque for connections	
M8	Max. 0.4 Nm
M12	Max. 0.6 Nm

Table 2: X67BC6321.L12 - Technical data

1) The minimum cycle time defines how far the bus cycle can be reduced without communication errors occurring.
2) The power consumption of the sensors and actuators connected to the module is not permitted to exceed 12 W.

4 LED status indicators

Figure	LED	Color/Status		Description
	**Status indicator 1**: Status indicator for PROFIBUS DP bus controller.			
	Left/Right	**STATUS (green)**	**ERROR (red)**	**Description**
		Off	Off	HARDWARE FAULT / POWER FAILURE
		On	On	BUS OFF
		On	Blinking	WAIT FOR CONFIG
		Blinking	Off	DATA EXCHANGE - DIAGNOSTICS
		On	Off	DATA EXCHANGE - NO ERROR
		Blinking	Blinking	CONFIG ERROR
		Off	Blinking	SERVICE MODE - BOOT
		Single flash	Single flash	HARDWARE FAULT
		For a more detailed description see section "State diagnostics via the Status/Error LEDs" on page 4.		
	I/O LEDs			
	1-1/2 to 8-1/2	**Color**	**Status**	**Description**
		Orange	-	Input/Output status of the corresponding channel
	Status indicator 2: Status indicator for module function			
	Left	**Color**	**Status**	**Description**
		Green	Off	No power to module
			Single flash	RESET mode
			Blinking	PREOPERATIONAL mode
			On	RUN mode
	Right	**Color**	**Status**	**Description**
		Red	Off	No power to module or everything OK
			On	Error or reset status
			Single flash	Warning/Error on an I/O channel. Level monitoring for digital outputs has been triggered.
			Double flash	Supply voltage not in the valid range

4.1 State diagnostics via the Status/Error LEDs

The condition of the PROFIBUS DP bus controller is diagnosed using the LED status indicators "STATUS" and "ERROR".

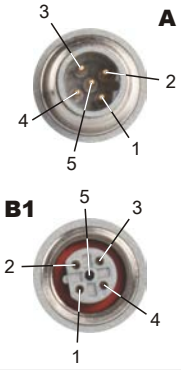
STATUS (green)	ERROR (red)	Function	Solution
Off	Off	HARDWARE FAULT / POWER FAILURE	• Check wiring of supply voltage.
On	On	BUS OFF • Baud rate not detected • No connection to the DP master • DP master not active	• Check the PROFIBUS network • Check the PROFIBUS master
On	Blinking	WAIT FOR CONFIG • Transfer rate has been detected, but the PROFIBUS master has not yet configured the bus controller	• Check the node number switch • Check the slave address in the master configuration
Blinking	Off	DATA EXCHANGE - DIAGNOSTICS • The bus controller is still initializing the I/O modules • The I/O modules configured by the master cannot be found • An error has occurred on one or more I/O modules (short circuit, etc.)	• Initialization can take a few seconds depending on the number of I/O modules connected • Check the wiring and power supply for the I/O modules • Read diagnostic messages in the respective PROFIBUS master's engineering tool
On	Off	DATA EXCHANGE • Cyclic data exchange with the PROFIBUS DP master	
Blinking	Blinking	CONFIG ERROR • One or more I/O modules found do not match with the configuration of the PROFIBUS DP master • The configuration received from the PROFIBUS master is invalid	• Check the wiring of the X2X Link and the order of I/O modules • Check configuration of the PROFIBUS master • Read diagnostic messages in the respective PROFIBUS master's engineering tool • Check the configuration being used - it is possible that the number of configured I/O modules is too high
Off	Blinking	SERVICE MODE - BOOT • The bus controller's node number has been set to 255 (0xFF) - after 2 s the bus controller starts in service mode	• Set a valid node number
Single flash	Single flash	HARDWARE FAULT	

5 Operating and connection elements

6 PROFIBUS DP interface

The bus controller is connected to the fieldbus using pre-assembled cables. The connection is made using M12 circular connectors.

The Y-connector for PROFIBUS DP is already integrated in this module.

Connection	Pinout			
	**Pin**	**PROFIBUS DP**		
	1	+5 V[1)]	-	-	-
	2	A	RxD/TxD-N	Data\	Green
	3	GND[1)]	-	-	-
	4	B	RxD/TxD-P	Data	Red
	5	Shield[1)]	-	-	-
	1) Shield connection also made via threaded insert in the module A → B-keyed (male), input B1 → B-keyed (female), output			

1) Supply for terminating resistor (PROFIBUS DP standard) generated internally by the bus controller. These pins are irrelevant for wiring.

6.1 PROFIBUS DP node number

The PROFIBUS DP node number is configured using both number switches of the bus controller.

Node number 0xFF enables service mode. Modus. The bus controller starts with PROFIBUS DP address 2. A firmware update is possible in service mode. The I/Os cannot be operated.

6.2 Automatic transfer rate detection

After booting or after a communication timeout, the bus controller goes into the status "Baud Search". This means the bus controller behaves passively on the bus.

The bus controller always begins the search for the configured transfer rate with the highest transfer rate. If a complete error-free telegram is not received during monitoring time, then the search is continued using the next lowest transfer rate.

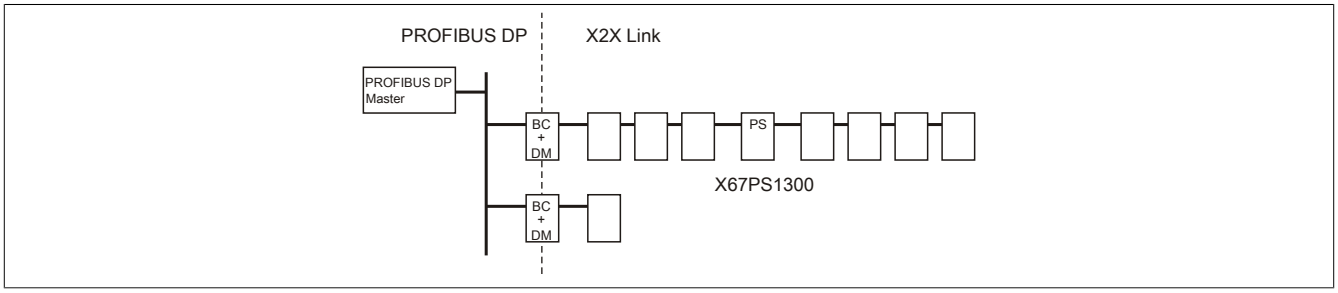
Transfer rate
12 Mbit/s
6 Mbit/s
3 Mbit/s
1.5 Mbit/s
500 kbit/s
187.5 kbit/s
93.75 kbit/s
45.45 kbit/s
19.2 kbit/s
9.6 kbit/s

6.3 System configuration

The maximum possible number of I/O modules that can be connected to the PROFIBUS DP bus controller can be determined using the design tool.

This tool and the associated device description file (GSD file) is available in the Downloads section of the B&R website (www.br-automation.com).

A digital mixed module is already integrated in the bus controller.

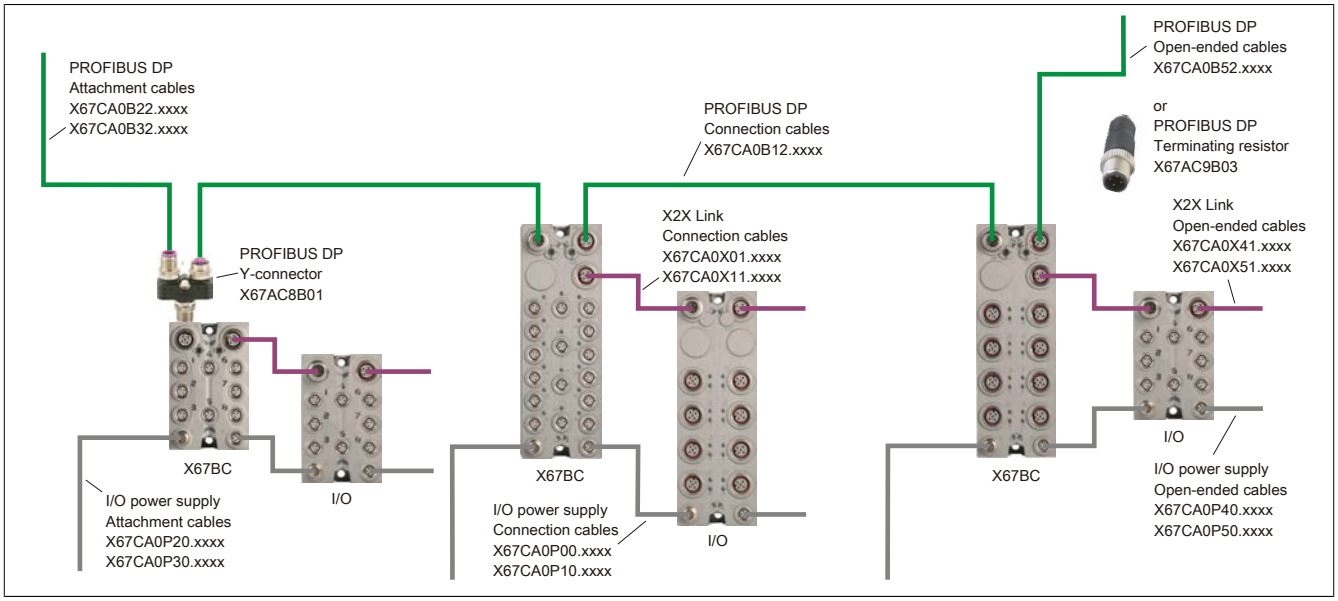


Information:

15 W are provided by the bus controller for additional X67 modules or other X2X Link-based modules.

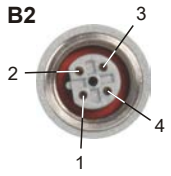
System supply module X67PS1300 is needed for additional power. This system supply module provides 15 W for additional modules. Each one should be mounted in the middle of the modules that are to be supplied with power.

6.4 Required cables and connectors



7 X2X Link

Additional modules can be connected to the bus controller via X2X Link using pre-assembled cables. The connection is made using an M12 circular connector.

Connection	Pinout	
	Pin	**Name**
	1	X2X+
	2	X2X
	3	X2X⊥
	4	X2X\
	Shield connection made via threaded insert in the module	
	B2 → B-keyed (female), output	

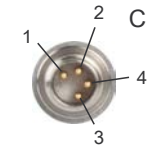
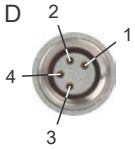
8 24 VDC I/O power supply

The I/O power supply is connected via M8 connectors C and D. The power supply is connected via connection C (male). Connector D (female) is used to route the power supply to other modules.

The fieldbus / X2X Link power supply and I/O power supply are supplied separately via pins 1 and 2.

Information:

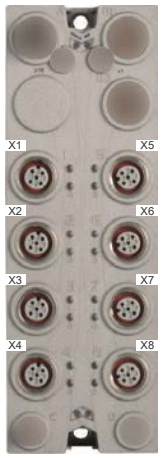
The maximum permissible current for the I/O power supply is 8 A (4 A per pin).

Connection	Pinout		
	Pin	**Connector C (male)**	**Connector D (female)**
	1	24 VDC fieldbus / X2X Link	24 VDC I/O
	2	24 VDC I/O	24 VDC I/O
	3	GND	GND
	4	GND	GND
	C → Connector (male) in module, feed for I/O power supply D → Connector (female) in module, routing of I/O power supply		

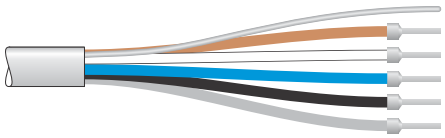
9 Integrated digital mixed module

1 additional mixed module can be saved by the digital mixed module integrated in the bus controller.

9.1 Pinout



X1 to X8
M12 ①



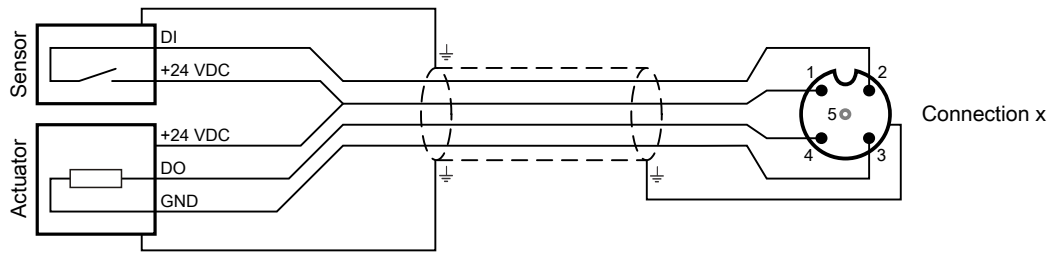
SHLD	
1	+24 VDC
2	DI/DO x-1
3	GND
4	DI/DO x-2
5	NC

① X67CA0A41.xxxx: M12 sensor cable, straight
X67CA0A51.xxxx: M12 sensor cable, angled

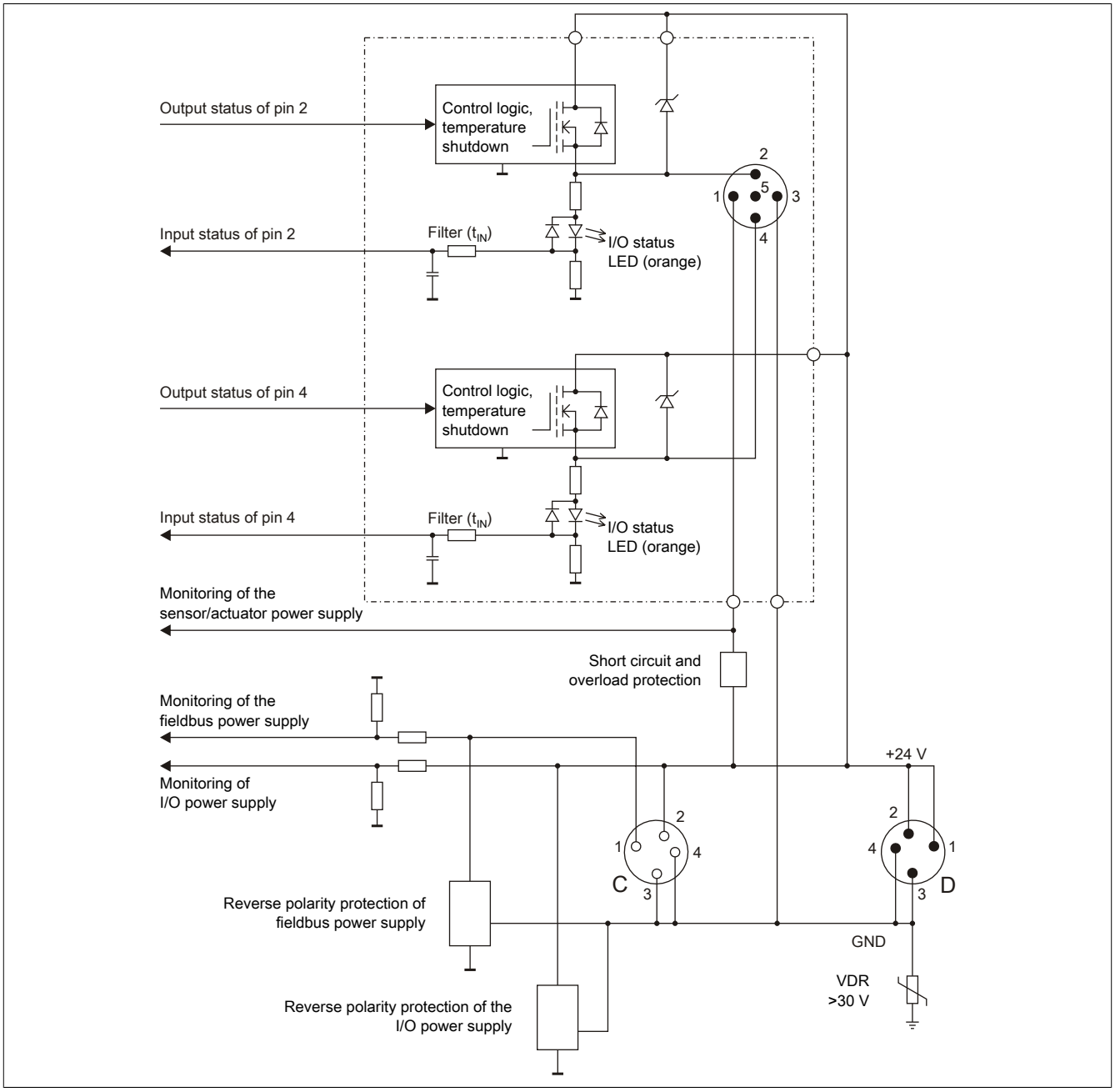
9.2 Connection X1 to X8

M12, 5-pin	Pinout	
Connection 1 to 4	**Pin**	**Name**
	1	24 VDC sensor/actuator power supply[1)]
	2	Input/Output x-1
	3	GND
	4	Input/Output x-2
	5	NC
	Shield connection made via threaded insert in the module. 1) Sensors/Actuators are not permitted to be supplied externally. X1 to X8 → A-keyed (female), input/output	
Connection 5 to 8		

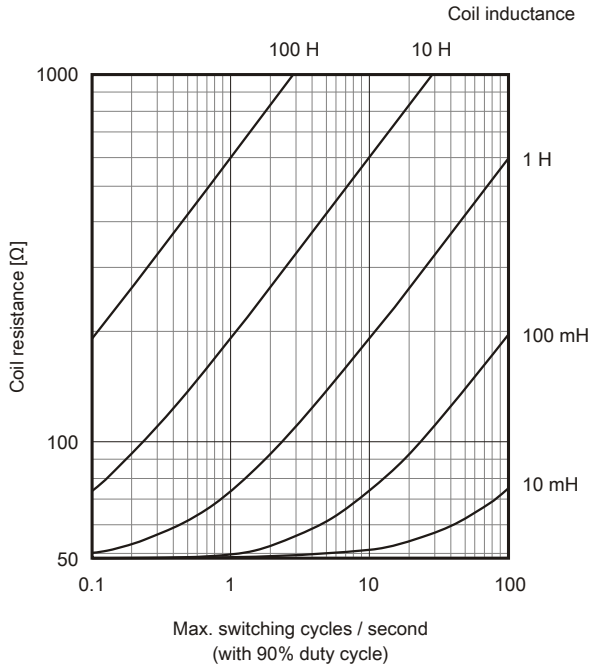
9.3 Connection example



9.4 Input/Output circuit diagram



9.5 Switching inductive loads



10 Additional documentation and import files (GSD)

Additional documentation about PROFIBUS DP bus controller functions as well as the necessary import files for the master engineering tool are available for download from the Downloads section of the B&R website (www.br-automation.com).

11 Register description

11.1 General data points

In addition to the registers listed in the register description, the module also has other more general data points. These registers are not specific to the module but contain general information such as serial number and hardware version.

These general data points are listed in section "Additional information - General data points" of the X67 system user's manual.

11.2 Function model 2 - Standard

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
Configuration						
16	ConfigIOMask01	USINT				•
17	ConfigIOMask02	USINT				•
18	ConfigOutput03 (input filter)	USINT				•
Communication						
0	Input state of digital inputs 1 to 16	UINT	•			
	DigitalInput01	Bit 0				
	...	...				
	DigitalInput16	Bit 15				
2	Switching state of digital outputs 1 to 16	UINT			•	
	DigitalOutput01	Bit 0				
	...	...				
	DigitalOutput16	Bit 15				
30	Status of digital outputs 1 to 16	UINT	•			
	StatusDigitalOutput01	Bit 0				
	...	...				
	StatusDigitalOutput16	Bit 15				
26	Input latch - Rising edges 1 to 8	USINT	•			
	InputLatch01	Bit 0				
	...	...				
	InputLatch08	Bit 7				
27	Input latch - Rising edges 9 to 16	USINT	•			
	InputLatch09	Bit 0				
	...	...				
	InputLatch16	Bit 7				
28	Acknowledgment - Input latch 1 to 8	USINT			•	
	QuitInputLatch01	Bit 0				
	...	...				
	QuitInputLatch08	Bit 7				
29	Acknowledgment - Input latch 9 to 16	USINT			•	
	QuitInputLatch09	Bit 0				
	...	...				
	QuitInputLatch16	Bit 7				
8192	asy_ModulID	UINT		•		
8196	asy_SupplyStatus	USINT		•		
8208	asy_SupplyInput	USINT		•		
8210	asy_SupplyOutput	USINT		•		

11.3 Function model 1 - Counter

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
Configuration						
16	ConfigIOMask01	USINT				•
17	ConfigIOMask02	USINT				•
20	ConfigOutput01 (counter channel 1)	USINT				•
22	ConfigOutput02 (counter channel 2)	USINT				•
18	ConfigOutput03 (input filter)	USINT				•
Communication						
0	Input state of digital inputs 1 to 16	UINT	•			
	DigitalInput01	Bit 0				
	...	...				
	DigitalInput16	Bit 15				
2	Switching state of digital outputs 1 to 16	UINT			•	
	DigitalOutput01	Bit 0				
	...	...				
	DigitalOutput16	Bit 15				
30	Status of digital outputs 1 to 16	UINT	•			
	StatusDigitalOutput01	Bit 0				
	...	...				
	StatusDigitalOutput16	Bit 15				
26	Input latch - Rising edges 1 to 8	USINT	•			
	InputLatch01	Bit 0				
	...	...				
	InputLatch08	Bit 7				
27	Input latch - Rising edges 9 to 16	USINT	•			
	InputLatch09	Bit 0				
	...	...				
	InputLatch16	Bit 7				
28	Acknowledgment - Input latch 1 to 8	USINT			•	
	QuitInputLatch01	Bit 0				
	...	...				
	QuitInputLatch08	Bit 7				
29	Acknowledgment - Input latch 9 to 16	USINT			•	
	QuitInputLatch09	Bit 0				
	...	...				
	QuitInputLatch16	Bit 7				
4	Counter01	UINT	•			
6	Counter02	UINT	•			
20	Reset counter 1	USINT			•	
	ResetCounter01	Bit 5				
22	Reset counter 2	USINT			•	
	ResetCounter02	Bit 5				
8192	asy_ModulID	UINT		•		
8196	asy_SupplyStatus	USINT		•		
8208	asy_SupplyInput	USINT		•		
8210	asy_SupplyOutput	USINT		•		

11.4 Function model 254 - Bus controller

Register	Offset[1]	Name	Data type	Read		Write	
				Cyclic	Acyclic	Cyclic	Acyclic
Configuration							
16	-	ConfigIOMask01	USINT				•
17	-	ConfigIOMask02	USINT				•
20	-	ConfigOutput01 (counter channel 1)	USINT				•
22	-	ConfigOutput02 (counter channel 2)	USINT				•
18	-	ConfigOutput03 (input filter)	USINT				•
Communication							
0	0	Input state of digital inputs 1 to 16	UINT	•			
		DigitalInput01	Bit 0				
		...	...				
		DigitalInput16	Bit 15				
2	2	Switching state of digital outputs 1 to 16	UINT			•	
		DigitalOutput01	Bit 0				
		...	...				
		DigitalOutput16	Bit 15				
30	-	Status of digital outputs 1 to 16	UINT	•			
		StatusDigitalOutput01	Bit 0				
		...	...				
		StatusDigitalOutput16	Bit 15				
26	-	Input latch - Rising edges 1 to 8	USINT	•			
		InputLatch01	Bit 0				
		...	...				
		InputLatch08	Bit 7				
27	-	Input latch - Rising edges 9 to 16	USINT	•			
		InputLatch09	Bit 0				
		...	...				
		InputLatch16	Bit 7				
28	-	Acknowledgment - Input latch 1 to 8	USINT			•	
		QuitInputLatch01	Bit 0				
		...	...				
		QuitInputLatch08	Bit 7				
29	-	Acknowledgment - Input latch 9 to 16	USINT			•	
		QuitInputLatch09	Bit 0				
		...	...				
		QuitInputLatch16	Bit 7				
4	-	Counter01	UINT		•		
6	-	Counter02	UINT		•		
20	-	Reset counter 1	USINT			•	
		ResetCounter01	Bit 5				
22	-	Reset counter 2	USINT			•	
		ResetCounter02	Bit 5				
8192	-	asy_ModulID	UINT		•		
8196	-	asy_SupplyStatus	USINT		•		
8208	-	asy_SupplyInput	USINT		•		
8210	-	asy_SupplyOutput	USINT		•		

1) The offset specifies the position of the register within the CAN object.

11.4.1 Using the module on the bus controller

Function model 254 "Bus controller" is used by default only by non-configurable bus controllers. All other bus controllers can use additional registers and functions depending on the fieldbus used.

For detailed information, see section "Additional information - Using I/O modules on the bus controller" of the X67 user's manual (version 3.30 or later).

11.4.2 CAN I/O bus controller

The module occupies 2 digital logical slots on CAN I/O.

11.5 Configuration

11.5.1 I/O mask 1 to 8

Name:
ConfigIOMask01

Channels are configured as inputs/outputs in this register. It also determines whether output monitoring or filtering is applied to the channels. Outputs are monitored but not filtered.

> **Information:**
>
> **In counter operation, channels 1 to 4 can only be configured as inputs.**

Data type	Values	Bus controller default setting
USINT	See bit structure.	0

Bit structure:

Bit	Description	Value	Information
0	Channel 1 configured as input/output	0	Configured as input (bus controller default setting)
		1	Configured as output
...		...	
7	Channel 8 configured as input/output	0	Configured as input (bus controller default setting)
		1	Configured as output

11.5.2 I/O mask 9 to 16

Name:
ConfigIOMask02

Channels are configured as inputs/outputs in this register. It also determines whether output monitoring or filtering is applied to the channels. Outputs are monitored but not filtered.

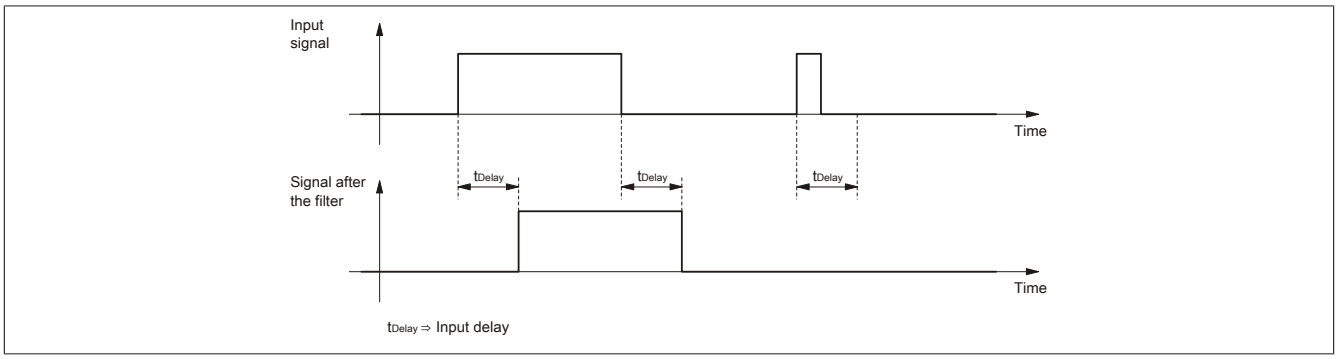
Data type	Values	Bus controller default setting
USINT	See bit structure.	0

Bit structure:

Bit	Description	Value	Information
0	Channel 9 configured as input/output	0	Configured as input (bus controller default setting)
		1	Configured as output
...		...	
7	Channel 16 configured as input/output	0	Configured as input (bus controller default setting)
		1	Configured as output

11.5.3 Input filter

An input filter is available for each input. The input delay can be set using register "ConfigOutput03" on page 15. Disturbance pulses which are shorter than the input delay are suppressed by the input filter.



11.5.3.1 Digital input filter

Name:
ConfigOutput03

This register can be used to specify the filter value for all digital inputs.

The filter value can be configured in steps of 100 µs. It makes sense to enter values in steps of 2, however, since the input signals are sampled every 200 µs.

Data type	Value	Filter
USINT	0	No software filter (bus controller default setting)
	2	0.2 ms
	...	...
	250	25 ms - Higher values are limited to this value

11.5.4 Configuration of Counter Channels 1 and 2

Name:
ConfigOutput01 to ConfigOutput02
ResetCounter01 to ResetCounter02

Counter channels 1 and 2 are configured in this register.

Data type	Values	Bus controller default setting
USINT	See bit structure.	0

Bit structure:

Bit	Description	Value	Information
0 - 2	Configuration of the counter frequency (only with gate measurement)	000	Counter frequency = 48 MHz (bus controller default setting)
		001	Counter frequency = 3 MHz
		010	Counter frequency = 187.5 kHz
		011 to 111	Reserved
3 - 4	Reserved	0	
5	ResetCounter0x	0	No affect on counter (bus controller default setting)
		1	Delete counter
6 - 7	Configuration of the operating mode	0	Event counter operation (Bus controller default setting)
		1	Gate measurement

Event counter operation

The falling edges are registered on the counter input.

The counter status is collected with a fixed offset to the network cycle and transferred in the same cycle.

Gate measurement

> **Information:**
>
> **Only one of the counter channels at a time can be used for gate measurement.**

The time of rising to falling edges for the gate input is registered using an internal frequency. The result is checked for overflow (0xFFFF).

The recovery time between measurements must be >100 µs.

The measurement result is transferred with the falling edge to the result memory.

11.6 Communication

11.6.1 Digital inputs

Unfiltered

The input state is collected with a fixed offset to the network cycle and transferred in the same cycle.

Filtered

The filtered status is collected with a fixed offset to the network cycle and transferred in the same cycle. Filtering takes place asynchronously to the network in multiples of 200 µs with a network-related jitter of up to 50 µs.

11.6.1.1 Input state of digital inputs 1 to 16

Name:
DigitalInput01 to DigitalInput16

This register indicates the input state of digital inputs 1 to 16.

Data type	Values
UINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	DigitalInput01	0 or 1	Input state - Digital input 1
...		...	
15	DigitalInput16	0 or 1	Input state - Digital input 16

11.6.2 Digital outputs

The output status is transferred to the output channels with a fixed offset in relation to the network cycle (SyncOut).

11.6.2.1 Switching state of digital outputs 1 to 16

Name:
DigitalOutput01 to DigitalOutput16

This register is used to store the switching state of digital outputs 1 to 16.

Data type	Values
UINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	DigitalOutput01	0	Digital output 01 reset
		1	Digital output 01 set
...		...	
15	DigitalOutput16	0	Digital output 16 reset
		1	Digital output 16 set

11.6.3 Monitoring status of the digital outputs

On the module, the output states of the outputs are compared to the target states. The control of the output driver is used for the target state.

A change in the output state resets monitoring for that output. The status of each individual channel can be read. A change in the monitoring status generates an error message.

11.6.3.1 Status of digital outputs 1 to 16

Name:
StatusDigitalOutput01 to StatusDigitalOutput16

This register is used to indicate the status of digital outputs 1 to 16.

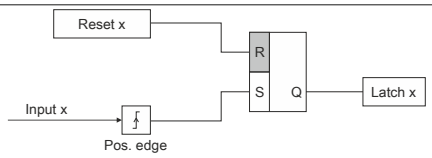
Data type	Values
UINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	StatusDigitalOutput01	0	Channel 01: No error
		1	Channel 01: Short circuit or overload
...		...	
15	StatusDigitalOutput16	0	Channel 16: No error
		1	Channel 16: Short circuit or overload

11.6.4 Input latch

It works in the same way as a dominant reset RS flip-flop.



R	S	Q	State
0	0	x	Do not change
0	1	1	Set
1	0	0	Reset
1	1	0	Reset

11.6.4.1 Input latch - Rising edges 1 to 8

Name:
InputLatch01 to InputLatch08

The rising edges of the input signal can be latched with a resolution of 200 µs in this register. The input latch is either reset or prevented from latching with register "QuitInputLatch0x" on page 18.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	InputLatch01	0	Do not latch input 1
		1	Latch input 1
...		...	
7	InputLatch08	0	Do not latch input 8
		1	Latch input 8

11.6.4.2 Input latch - Rising edges 9 to 16

Name:
InputLatch09 to InputLatch16

The rising edges of the input signal can be latched with a resolution of 200 µs in this register. The input latch is either reset or prevented from latching with register "QuitInputLatchxx" on page 18.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	InputLatch09	0	Do not latch input 9
		1	Latch input 9
...		...	
7	InputLatch16	0	Do not latch input 16
		1	Latch input 16

11.6.4.3 Acknowledgment - Input latch 1 to 8

Name:
QuitInputLatch01 to QuitInputLatch08

This register is used to reset the input latch by channel.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	QuitInputLatch01	0	Do not reset input 1
		1	Reset input 1
...		...	
7	QuitInputLatch08	0	Do not reset input 8
		1	Reset input 8

11.6.4.4 Acknowledgment - Input latch 9 to 16

Name:
QuitInputLatch09 to QuitInputLatch16

This register is used to reset the input latch by channel.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	QuitInputLatch09	0	Do not reset input 9
		1	Reset input 9
...		...	
7	QuitInputLatch16	0	Do not reset input 16
		1	Reset input 16

11.6.5 Event counter / Gate measurement

Name:
Counter01 and Counter02

Depending on the mode, this register contains the counter value or gate time of channel 1 and channel 2.

Data type	Values
UINT	0 to 65535

11.6.6 Reading the module ID

Name:
asy_ModulID

This register offers the possibility to read the module ID.

Data type	Values
UINT	Module ID

11.6.7 Operating limit status registers

Name:
asy_SupplyStatus

This register can be used to read the status of the operating limits.

Data type	Value
USINT	See bit structure.

Bit structure:

Bit	Description	Value	Information
0	Input supply within / outside of the warning limits	0	Within the warning limits (18 to 30 V)
		1	Outside of the warning limits (<18 V or >30 V)
1	Reserved	0	
2	Output supply within / outside of the warning limits	0	Within the warning limits (18 to 30 V)
		1	Outside of the warning limits (<18 V or >30 V)
3 - 7	Reserved	0	

11.6.8 I/O supply voltage

Name:
asy_SupplyInput

This register contains the I/O supply voltage measured by the module.

Data type	Values	Information
USINT	0 to 255	Resolution 1 V

11.6.9 Output supply voltage

Name:
asy_SupplyOutput

This register contains the output supply voltage measured by the module.

Data type	Values	Information
USINT	0 to 255	Resolution 1 V

11.7 Minimum I/O update time

The minimum I/O update time defines how far the bus cycle can be reduced while still allowing an I/O update to take place in each cycle.

	Minimum I/O update time
Without filtering	150 µs
With filtering	200 µs
Counter operation	250 µs

11.8 Minimum cycle time

The minimum cycle time specifies the time up to which the bus cycle can be reduced without communication errors occurring. It is important to note that very fast cycles reduce the idle time available for handling monitoring, diagnostics and acyclic commands.

	Minimum cycle time
Without filtering	150 µs
With filtering	200 µs
Counter operation	250 µs