X67BC5321

1 General information

DeviceNet was developed by Allen-Bradley as a CAN bus based automation network. It is based on a producer/consumer protocol. From the user's point of view, all data is handled completely separately from the features of the CAN bus (e.g. longer data packets are fragmented automatically by DeviceNet). I/O messages with defined characteristics are used for access.

This bus controller makes it possible to connect X2X Link I/O nodes to DeviceNet. It has automatic transfer rate detection, auto scan, automatic mapping and automatic configuration of the I/O modules. Explicit messaging, change of state, cyclic, polled and bit strobe are supported as transfer modes.

In addition to the standard communication objects, there are also vendor-specific objects used to represent the modular X67 system in the best manner possible. X67 and other modules that are based on X2X Link can be connected to the bus controller.

The entire configuration of this type of modular system is supported by the DeviceNet standard. Allen Bradley developed the modular I/O configuration to simplify the necessary configuration steps. The DeviceNet bus controllers from B&R also support this type of configuration.

- Fieldbus: DeviceNet
- 8 digital channels, configurable as inputs or outputs
- Simple I/O configuration via the fieldbus
- Support of both linear and modular (Allen Bradley) configuration systems
- Auto scan, automatic I/O mapping of the I/Os
- Automatic I/O configuration
- Integrated connection to local expansion via X2X Link for 39 additional modules (including up to 16 analog modules)
- 1 ms cycle time for local expansion

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	
X67BC5321	X67 bus controller, 1 DeviceNet interface, X2X Link power supply 3 W, 8 digital channels configurable as inputs or outputs, 24 VDC, 0.5 A, configurable input filter, 2 event counters 50 kHz	

Table 1: X67BC5321 - 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	X67BC5321
Short description	
Bus controller	DeviceNet adapter
General information	
Inputs/Outputs	8 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	0x17D5
Internal I/O module	0x1311
Sensor/Actuator power supply	0.5 A summation current
Status indicators	I/O function for each channel, supply voltage, bus function
Diagnostics	
24 V DeviceNet voltage	Yes, with LED status indicators (MOD and NET)
Outputs	Yes, using status LED and software
I/O power supply	Yes, using status LED and software
Connection type	
Fieldbus	M12, A-keyed
X2X Link	M12, B-keyed
Inputs/Outputs	8x M8, 3-pin
I/O power supply	M8, 4-pin
Power output	3 W X2X Link power supply for I/O modules
Power consumption	
Fieldbus	2.7 W
Internal I/O	2 W
X2X Link power supply	6.6 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	DeviceNet adapter
Variant	M12 interface (male connector on the module)
Max. distance	500 m
Transfer rate	Max. 500 kbit/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
Terminating resistor	Can be optionally screwed onto the 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 8)
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: X67BC5321 - Technical data

Model number	X67BC5321
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	4 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 DeviceNet and bus DeviceNet 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	85 mm
Depth	42 mm
Weight	200 g
Torque for connections	
M8	Max. 0.4 Nm
M12	Max. 0.6 Nm

Table 2: X67BC5321 - Technical data

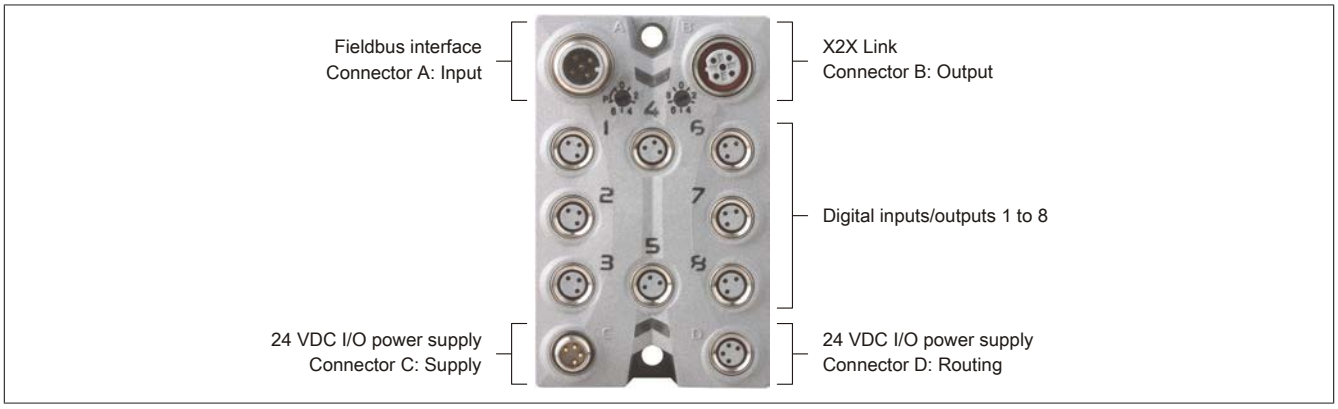
1) The minimum cycle time defines how far the bus cycle can be reduced without communication errors occurring.
2) The power consumption of the sensors and actuators connected to the module is not permitted to exceed 12 W.

4 LED status indicators

Figure	LED	Color	Status	Description
Status indicator 1: Left: MOD, Right: NET  Status indicator 2: Left: green; Right: red	**Status indicator 1**: Status indicator for DeviceNet bus controller			
	MOD[1]	Green	Off	No power supply or offline • Bus sense error: If LED "MOD" is also off, then there is no 24 V DeviceNet voltage. • No transfer rate[2]
			On	RUN mode The 24 V DeviceNet voltage is OK, and the module is operating under normal conditions.
			Blinking	Mode STANDBY Configuration is missing, incomplete or incorrect.
		Red	Blinking	Mode RECOVERABLE FAULT
		Green/Red	Blinking	Module is performing a self-test.
	NET[1]	Green	Off	No power supply or offline: • Bus sense error: If LED "MOD" is also off, then there is no 24 V DeviceNet voltage. • No transfer rate[2] • Module has not yet completed a duplicate MAC ID test.
			Blinking	Online, not connected: • The module has carried out the duplicate MAC- D test and is online. • There is no established connection to a master/scanner.
			On	A connection to the master/scanner (explicit or I/O) has been established.
		Red	Blinking	A timeout for an I/O connection has occurred.
			On	Critical connection error, fieldbus communication no longer possible: • Duplicate MAC ID error • Bus off • Receive/Transmit overflow
	I/O LEDs: Status indicators for I/O channels			
	1 - 8	Orange	-	Input/Output status of the corresponding channel
	Status indicator 2: Status indicator for module function			
	Left	Green	Off	No power to module
			Single flash	RESET mode
			Blinking	PREOPERATIONAL mode
			On	RUN mode
	Right	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

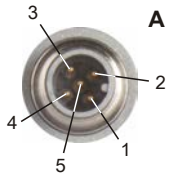
1) The "MOD" and "NET" LEDs are green/red dual LEDs.
2) If an LED of status indicator 2 is active (PREOPERATIONAL or RUN mode), the automatic transfer rate detection is still running or no transfer rate could be detected.

5 Operating and connection elements



6 Fieldbus interface

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

Connection	Pinout	
	**Pin**	**Description**
	1	Shield[1)]
	2	5 V bus power supply
	3	CAN⊥
	4	CAN_High
	5	CAN_Low
	1) Shield also provided by threaded insert in module. A → A-coded (male), input	

6.1 Node number

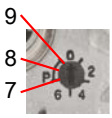
The MAC ID is set using both address switches on the bus controller.

The configurable range is between 0 and 63. This range of values is specified in the DeviceNet specification for a DeviceNet device.

x 10 x 1

Switch position	MAC ID
00 to 63	0 to 63
64	MAC ID setting made via the software configuration
65 to 89	Not permitted
90	"Clearing parameters" on page 6
91 to 94	Not permitted
95	"Automatic configuration of the I/O modules" on page 7
96 to 99	Not permitted

Number position in switch position "P"



Special function

Position of the address switch	Special function
64	With this setting of the address switches, the MAC ID can be set by the master/scanner using software.
90	Deletes the parameters stored in the bus controller's flash memory. The bus controller is reset back to its factory settings.
95	Completely deletes the old configuration data and overwrites it automatically with the new values of the connected I/O modules.

6.1.1 Automatic transfer rate detection

After booting, the bus controller goes into "Listen only" mode. This means the bus controller behaves passively on the bus and only listens.

The bus controller attempts to receive valid objects. If receive errors occur, the controller switches to the next transfer rate in the lookup table.

If no objects are received, all transfer rates are tested cyclically. This procedure is repeated until valid objects are received, indicating that the correct transfer rate has been determined. Only transfer rates permitted by the DeviceNet specification are tested.

Lookup table

The controller tests the transfer rate according to this table. Beginning with the starting transfer rate (500 kbit/s), the controller switches to the next lower transfer rate. At the end of the table, the bus controller restarts the search from the beginning.

Transfer rate
500 kbit/s
250 kbit/s
125 kbit/s

Information:

While automatic transfer rate recognition is running, both DeviceNet LEDs (MOD, NET) are switched off (since there is no LED status definition in the DeviceNet specifications for this status).

To ensure that the module has also been supplied with power and booted, this vendor-specific status definition requires that one of the two module I/O status LEDs is active.

6.1.2 Clearing parameters

Various parameters can be stored in the bus controller's flash memory. Deleting these parameters using switch position 90 returns the bus controller to its factory settings.

Deleting the parameters

1. Turn off the power supply to the bus controller.
2. Set the node number to 90
3. Turn on the power supply to the bus controller.
4. Wait until the "MOD" LED flashes green for 5 s (3 ms on / 500 ms off). The node number switch "x10" must be set to 0 and then back to 9 within this time window.
5. Wait until the "MOD" LED blinks with a red double-flash (parameters have been cleared).
6. Turn off the power supply to the bus controller.
7. Set the desired node number (00 to 63).
8. Turn on the power supply to the bus controller.
9. The bus controller boots with the set node number and automatic transfer rate detection.

6.1.3 Automatic configuration of the I/O modules

The automatic configuration of the connected I/O modules by the bus controller is supported starting with Rev. D0 (firmware ≥V1.23) of the bus controller.

To prevent the configuration data from being accidentally overwritten on the bus controller, the procedure described below must be followed when creating the configuration data. When doing this, it is important that all required I/O modules are also started when booting the bus controller (i.e. supplied with power). This is especially important when using potential groups (E-stop switches).

The automatic configuration sets the following attributes of class 0x65 on the individual I/O modules:

- Module type (0x01)
- Input length (0x03)
- Output length (0x05)

Additional parameters are not set. That means that the connected modules are configured with their standard settings and standard I/O lengths. This can be changed by editing the parameters in the respective master engineering tool.

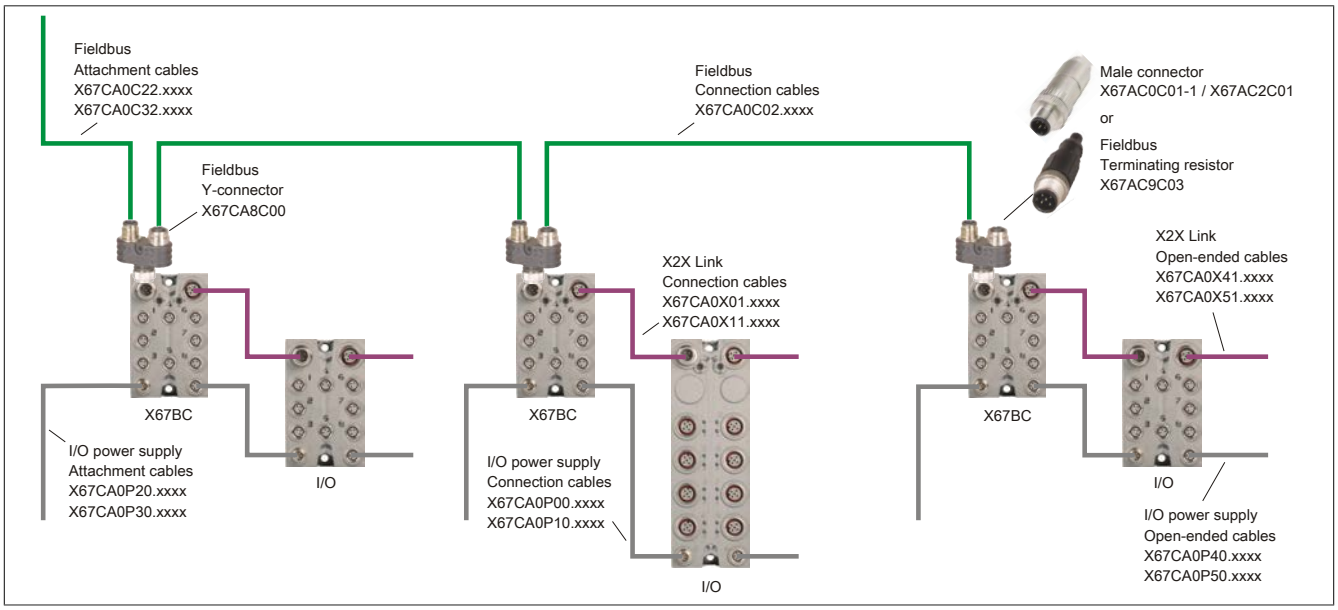
Automatic configuration

1. Turn off the power supply to the bus controller.
2. Set node number switch to 95 (this is done by turning switch "x10" to position 9 and switch "x1" to 5).
3. Turn on the power supply to the bus controller.
4. Wait until the "MOD" LED starts blinking green (3 ms on / 500 ms off). This phase of green blinking lasts 5 s. The node number "x10" switch must be set to 0 within this time frame and then set back to 9.
5. Wait until the "MOD" LED blinks (4 red flashes). The old configuration data is now deleted completely and overwritten with the new values from the connected I/O modules.
6. Turn off the power supply to the bus controller.
7. Set the desired node number (00 to 63).
8. Turn on the power supply to the bus controller.
9. The bus controller boots using the set node number, automatic transfer rate recognition and standard settings from the connected I/O modules.

6.2 Required cables and connectors

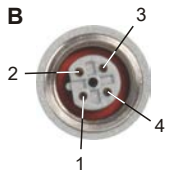
The bus controller is connected to the fieldbus using a Y-connector. This allows the bus controller to be exchanged without interrupting fieldbus communication.

The bus terminating resistor is housed in a connector and screwed onto the Y-connector when needed.



7 X2X Link

Additional modules are connected to the bus controller via X2X Link using pre-assembled cables. The connection is made using M12 circular connectors.

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

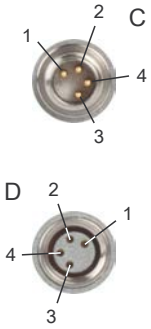
8 24 VDC I/O power supply

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
M8 ①

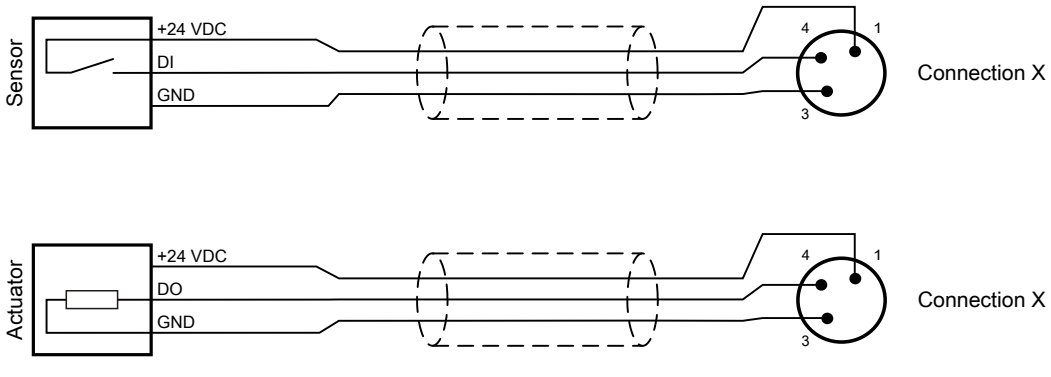
1	+24 VDC
3	GND
4	DI/DO x

① X67CA0D40.xxxx: M8 sensor cable, straight
X67CA0D50.xxxx: M8 sensor cable, angled

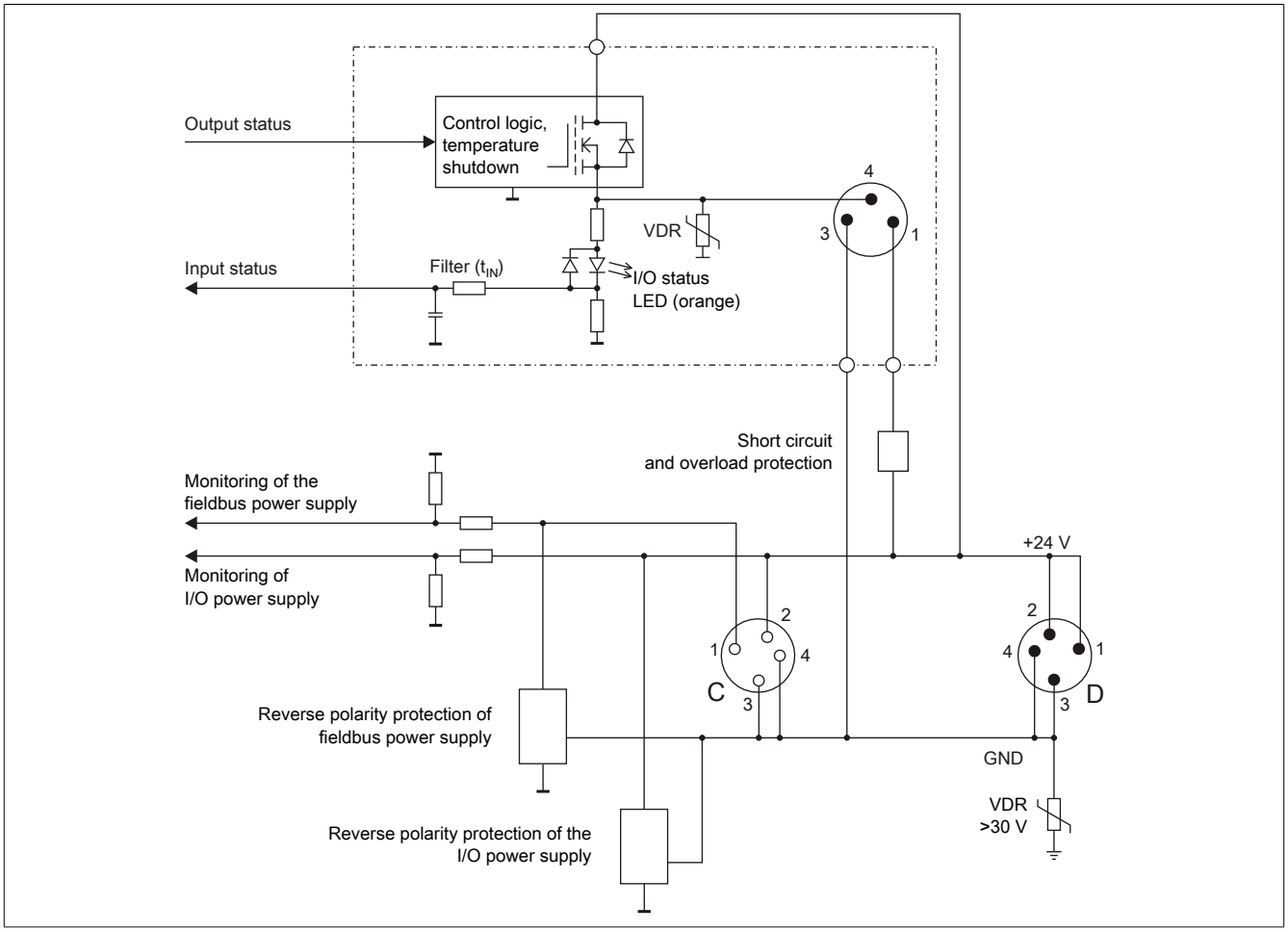
9.2 Connections X1 to X8

M8, 3-pin	Pinout	
	**Pin**	**Name**
	1	24 VDC sensor/actuator power supply[1)]
	3	GND
	4	Inputs/Outputs
	1) Sensors/Actuators are not permitted to be supplied externally.	
	Connections (female), input/output	

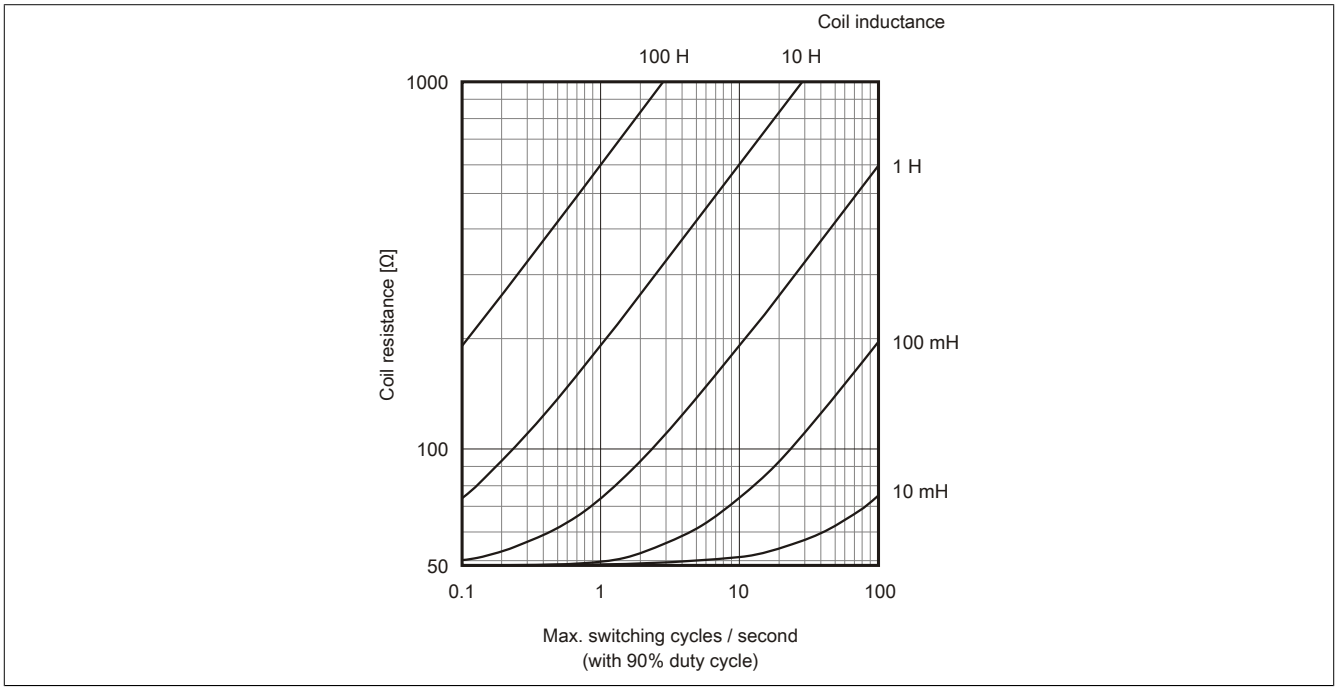
9.3 Connection examples



9.4 Input/Output circuit diagram



9.5 Switching inductive loads



10 Additional documentation and import files (EDS)

Additional documentation about 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				•
18	ConfigOutput03 (input filter)	USINT				•
Communication						
0	Input state of digital inputs 1 to 8	USINT	•			
	DigitalInput01	Bit 0				
	...	...				
	DigitalInput08	Bit 7				
2	Switching state of digital outputs 1 to 8	USINT			•	
	DigitalOutput01	Bit 0				
	...	...				
	DigitalOutput08	Bit 7				
30	Status of digital outputs 1 to 8	USINT	•			
	StatusDigitalOutput01	Bit 0				
	...	...				
	StatusDigitalOutput08	Bit 7				
26	Input latch - Rising edges 1 to 8	USINT	•			
	InputLatch01	Bit 0				
	...	...				
	InputLatch08	Bit 7				
28	Acknowledgment - Input latch 1 to 8	USINT			•	
	QuitInputLatch01	Bit 0				
	...	...				
	QuitInputLatch08	Bit 7				
8192	asy_ModulID	UINT		•		
8196	asy_SupplyStatus	USINT		•		
8208	asy_SupplyInput	USINT		•		

11.3 Function model 1 - Counter

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
Configuration						
16	ConfigIOMask01	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 8	USINT	•			
	DigitalInput01	Bit 0				
	...	...				
	DigitalInput08	Bit 7				
2	Switching state of digital outputs 1 to 8	USINT			•	
	DigitalOutput01	Bit 0				
	...	...				
	DigitalOutput08	Bit 7				
30	Status of digital outputs 1 to 8	USINT	•			
	StatusDigitalOutput01	Bit 0				
	...	...				
	StatusDigitalOutput08	Bit 7				
26	Input latch - Rising edges 1 to 8	USINT	•			
	InputLatch01	Bit 0				
	...	...				
	InputLatch08	Bit 7				
28	Acknowledgment - Input latch 1 to 8	USINT			•	
	QuitInputLatch01	Bit 0				
	...	...				
	QuitInputLatch08	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		•		

11.4 Function model 254 - Bus controller

Register	Offset[1)]	Name	Data type	Read		Write	
				Cyclic	Acyclic	Cyclic	Acyclic
Configuration							
16	-	ConfigIOMask01	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 8	USINT	•			
		DigitalInput01	Bit 0				
		...	...				
		DigitalInput08	Bit 7				
2	0	Switching state of digital outputs 1 to 8	USINT			•	
		DigitalOutput01	Bit 0				
		...	...				
		DigitalOutput08	Bit 7				
30	-	Status of digital outputs 1 to 8	USINT	•			
		StatusDigitalOutput01	Bit 0				
		...	...				
		StatusDigitalOutput08	Bit 7				
26	-	Input latch - Rising edges 1 to 8	USINT	•			
		InputLatch01	Bit 0				
		...	...				
		InputLatch08	Bit 7				
28	-	Acknowledgment - Input latch 1 to 8	USINT			•	
		QuitInputLatch01	Bit 0				
		...	...				
		QuitInputLatch08	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		•		

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 1 digital logical slot 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.

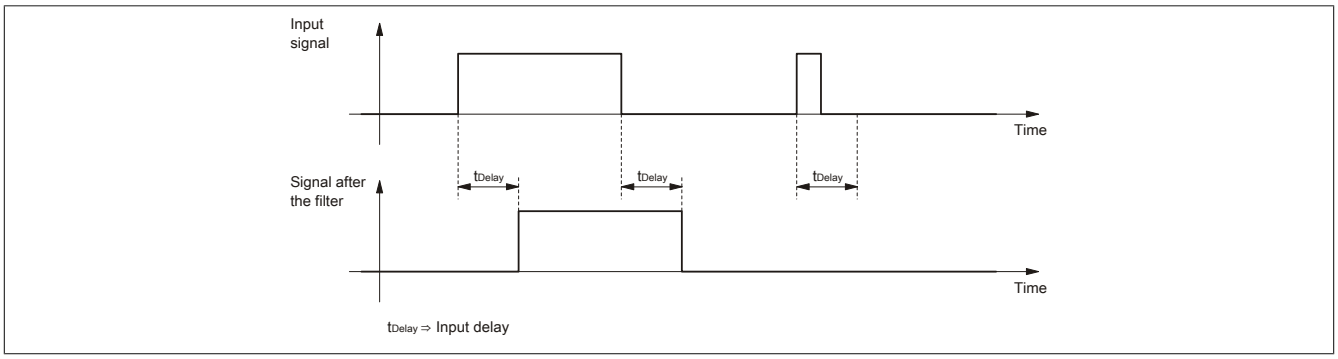
Data type	Values	Bus controller default setting
USINT	See bit structure.	0

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 Input filter

An input filter is available for each input. The input delay can be set using register "ConfigOutput03" on page 14. Disturbance pulses which are shorter than the input delay are suppressed by the input filter.



11.5.2.1 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

11.5.3 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 8

Name:
DigitalInput01 to DigitalInput08

This register indicates the input state of digital inputs 1 to 8.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	DigitalInput01	0 or 1	Input state - Digital input 1
...		...	
7	DigitalInput08	0 or 1	Input state - Digital input 8

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 8

Name:
DigitalOutput01 to DigitalOutput08

This register is used to store the switching state of digital outputs 1 to 8.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	DigitalOutput01	0	Digital output 01 reset
		1	Digital output 01 set
...		...	
7	DigitalOutput08	0	Digital output 08 reset
		1	Digital output 08 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 8

Name:
StatusDigitalOutput01 to StatusDigitalOutput08

This register is used to indicate the status of digital outputs 1 to 8.

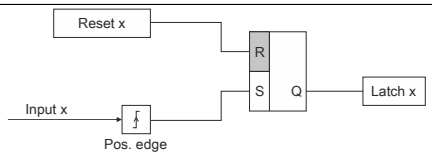
Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	StatusDigitalOutput01	0	Channel 01: No error
		1	Channel 01: Short circuit or overload
...		...	
7	StatusDigitalOutput08	0	Channel 08: No error
		1	Channel 08: 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 17.

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 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

11.6.5 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	Values
USINT	See bit structure.

Bit structure:

Bit	Description	Value	Information
0	I/O power supply within/outside warning limits	0	Within the warning limits (18 to 30 V)
		1	Outside of the warning limits (<18 V or >30 V)
1 - 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