X67BC7321-1

1 General information

1.1 Other applicable documents

For additional and supplementary information, see the following documents.

Other applicable documents

Document name	Title
MAX67	X67 System user's manual
MAEMV	Installation / EMC guide

1.2 Order data

Order number	Short description	Figure
	Bus controller modules	
X67BC7321-1	X67 bus controller, 1 CAN I/O interface, extended CAN I/O functionality, 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: X67BC7321-1 - Order data

Required accessories
See "Required cables and connectors" on page 9. For a general overview, see section "Accessories - General overview" in the X67 System user's manual.

1.3 Module description

The bus controller makes it possible to connect X2X Link I/O nodes to CAN I/O. CAN I/O is a transfer protocol based on standard CAN bus that is fully integrated in the B&R system.

Up to 44 logical I/O modules can be connected to the bus controller. Up to 16 of these can be analog modules including power supply module.

Information:

The bus controller is unable to detect modules after a gap in the X2X Link node numbers. Possible causes:

- **Unconnected X67 modules**
- **Modules with integrated node number switches**

Functions:

- CAN I/O
- Digital inputs
- Event counter / Gate measurement
- Digital outputs
- Monitoring the operating limits

CAN I/O

CAN I/O is a B&R-specific I/O system that functions via a special protocol on the CAN bus using fixed identifier assignment.

Digital inputs

The digital inputs are equipped with an input filter with a configurable input delay.

Event counter / Gate measurement

The module has 2 counter channels that can be used either as event counters or for gate measurement.

Monitoring status of the digital outputs

The output signal of the digital outputs is monitored for short circuit or overload.

Monitoring operating limits

The voltage of the I/O power supply is monitored for voltage overshoot or undershoot.

2 Technical description

2.1 Technical data

Order number	X67BC7321-1
Short description	
Bus controller	CAN I/O
General information	
Inputs/Outputs	8 digital channels, configurable as inputs or outputs using software, inputs with additional functions
Insulation voltage between channel and bus	500 V_{eff}
Nominal voltage	24 VDC
B&R ID code	
Bus controller	0x18CB
Internal I/O module	0x1311
Sensor/Actuator power supply	0.5 A summation current
Status indicators	I/O function per channel, supply voltage, bus function
Diagnostics	
Outputs	Yes, using LED status indicator and software
I/O power supply	Yes, using LED status indicator and software
Connection type	
Fieldbus	M12, A-coded
X2X Link	M12, B-coded
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	2.1 W
Internal I/O	2 W
X2X Link power supply	6.2 W at maximum power output for connected I/O modules
Certifications	
CE	Yes
UKCA	Yes
ATEX	Zone 2, II 3G Ex nA IIA T5 Gc IP67, Ta = 0 - Max. 60°C TÜV 05 ATEX 7201X
UL	cULus E115267 Industrial control equipment
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5
EAC	Yes
KC	Yes
Interfaces	
Fieldbus	CAN I/O
Variant	M12 interface (male connector on the module)
Max. distance	1000 m
Transfer rate	Max. 1 Mbit/s
Default transfer rate	Automatic transfer rate detection
X2X Link cycle time	Permanently set to 1 ms [1)]
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 characteristics per EN 61131-2	Type 1
Input voltage	18 to 30 VDC
Input current at 24 VDC	Typ. 4 mA
Input circuit	Sink
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 resistance	Typ. 6 kΩ
Additional functions	50 kHz event counting, gate measurement

Table 2: X67BC7321-1 - Technical data

Order number	X67BC7321-1
Switching threshold	
Low	<5 VDC
High	>15 VDC
Event counters	
Quantity	2
Signal form	Square wave pulse
Evaluation	Each negative 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	Positive edge - Negative 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	Current-sourcing FET
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 shutdown in the event of overcurrent or short circuit, integrated protection for switching inductive loads, reverse polarity protection of the output power supply
Diagnostic status	Output monitoring with 10 ms delay
Leakage current when the output is 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 nominal 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 CAN I/O and bus CAN I/O 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 limitation
>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	195 g
Torque for connections	
M8	Max. 0.4 Nm
M12	Max. 0.6 Nm

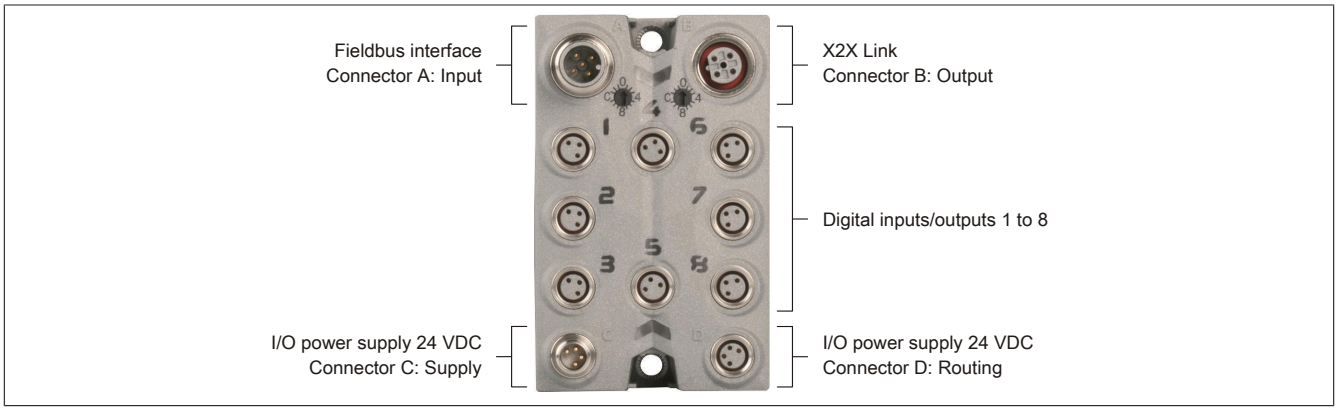
Table 2: X67BC7321-1 - Technical data

1) CAN I/O data points are processed in Automation Runtime in a separate cycle set to 10 ms (CAN I/O cycle).
2) The power consumption of the sensors and actuators connected to the module is not permitted to exceed 12 W.

2.2 LED status indicators

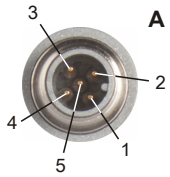
Figure	LED	Color	Status	Description
	**Status indicator 1**			
	Left	Status indicator for CAN I/O bus controller.		
		Green	Off	No power supply via CAN fieldbus
			Flickering	Transfer rate detection in progress
			Blinking	Mode PREOPERATIONAL
			On	Mode RUN
	Right	Status indicator for CAN fieldbus.		
		Red	Off	No power supply via CAN fieldbus or everything OK
			Flickering	Transfer rate detection in progress
			Single flash	CAN connection reporting "Warning limit reached"
			On	CAN connection reporting "Bus off state"
	I/O LEDs			
	1 - 8	Orange	-	Input/Output state of the corresponding channel
	Status indicator 2: Status indicator for module functionality			
	Left	Green	Off	No power to module
			Single flash	Mode RESET
			Blinking	Mode PREOPERATIONAL
			On	Mode RUN
	Right	Red	Off	Module not supplied with power or everything OK
			On	Error or reset state
			Single flash	Warning/Error on an I/O channel. Level monitoring for digital outputs has been triggered.
			Double flash	Supply voltage not within the valid range

2.3 Operating and connection elements



2.3.1 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**	**Name**
	1	Shield[1)]
	2	Not used
	3	CAN⊥
	4	CAN_High
	5	CAN_Low
	1) Shield also provided by threaded insert in module. A → A-coded (male), input	

2.3.2 Node number and transfer rate

The node number and transfer rate are configured using the two number switches on the bus controller. The switch positions 0x00 to 0x40 and 0x60 enable automatic transfer rate detection (see section "Automatic transfer rate detection" on page 6). The rest of the switch positions have a fixed transfer rate (see table).

High Low

Switch position	Node number	Transfer rate
0x00[1)]	From EEPROM	From EEPROM
0x01 - 0x3F	1 - 63	Automatic
0x40[1)]	From EEPROM	From EEPROM
0x41 - 0x5F	1 - 31	1000 kbit/s
0x60[1)]	From EEPROM	From EEPROM
0x61 - 0x7F	1 - 31	800 kbit/s
0x80	Reserved	-
0x81 - 0x9F	1 - 31	500 kbit/s
0xA0	Reserved	-
0xA1 - 0xBF	1 - 31	250 kbit/s
0xC0	Reserved	-
0xC1 - 0xDF	1 - 31	125 kbit/s
0xE0	Reserved	-
0xE1 - 0xFE	1 - 31	20 kbit/s
0xFF	Reserved	-

1) When one of these numbers is configured, the bus controller uses the operating parameters from the internal EEPROM. The EEPROM is programmed using library CANIO.

2.3.2.1 Automatic transfer rate detection

After startup, 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.

Starting transfer rate

The bus controller begins the search with this transfer rate. The starting transfer rate can be defined in two different ways:

- Read from EEPROM
- The last detected transfer rate is used after a software reset (command code 20).

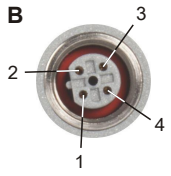
Lookup table

The bus controller tests the transfer rate according to this table. Beginning with the starting transfer rate, 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
1000 kbit/s
500 kbit/s
250 kbit/s
125 kbit/s
50 kbit/s
20 kbit/s
10 kbit/s

2.3.3 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 via threaded insert in the module B → B-coded (female), output	

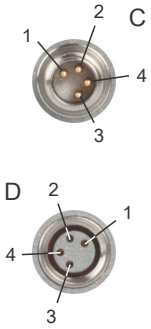
2.3.4 I/O power supply 24 VDC

The I/O power supply is connected via M8 connectors C and D. The power supply is fed via connector 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, supply for I/O power supply D → Connector (female) in module, routing of I/O power supply		

Information:

If the summation current of the outputs is >4 A, current must also be supplied via connector D, pin 2.

2.4 Logical I/O modules

Up to 43 I/O modules can be connected to the bus controller (up to 16 can be analog modules). This value refers not to the physical but the logical I/O module slots.

Information:

Physical I/O modules can take up more than one digital or analog slot.

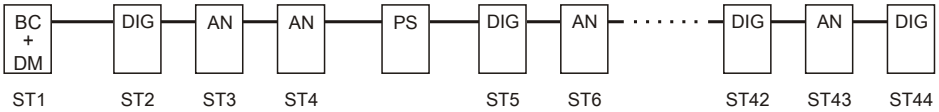
The following table lists all CAN I/O-capable X67 modules and how many logical digital or analog slots they occupy.

Module	Digital module slots	Analog module slots
X67AI1223	0	1
X67AI1233	0	1
X67AI1323	0	1
X67AI1333	0	1
X67AI2744	0	**2**
X67AI4850	0	1
X67AM1223	0	1
X67AM1323	0	1
X67AO1223	0	1
X67AO1323	0	1
X67AT1311	0	1
X67AT1322	0	1
X67AT1402	0	1
X67BC7321-1	1	0
X67DC1198	0	**2**
X67DC2322	0	**2**
X67DI1371	1	0
X67DI1371.L08	**2**	0
X67DI1371.L12	**2**	0
X67DI1372	1	0
X67DM1321	1	0
X67DM1321.L08	**2**	0
X67DM1321.L12-1	**2**	0
X67DM1321.L12	**2**	0
X67DM9321	1	0
X67DM9321.L12	**2**	0
X67DM9331.L12	1	0
X67DO1332	1	0
X67DO9332.L12	1	0
X67DS438A	0	**3**
X67DV1311.L08	**2**	0
X67IF1121-1	0	**3**
X67MM2436	0	**2**
X67SM2436	0	**2**
X67SM2446-1	0	**2**
X67SM4320	0	**4**

2.5 System configuration

The X67DM1321 digital mixed module is already integrated in the bus controller. This makes the bus controller the first I/O module on the CAN bus (ST1 → Station 1).

Up to 28 logical digital modules (including bus controller) and 16 logical analog modules can be operated on the bus controller. There is no fixed order of modules. Digital and analog modules can be arranged as needed.



Legend:
BC → Bus controller
DM → Digital mixed module
DIG → Digital module
AN → Analog module
ST → Station
PS → Supply module X67PS1300 (not counted as a station on the CAN bus)

Information:

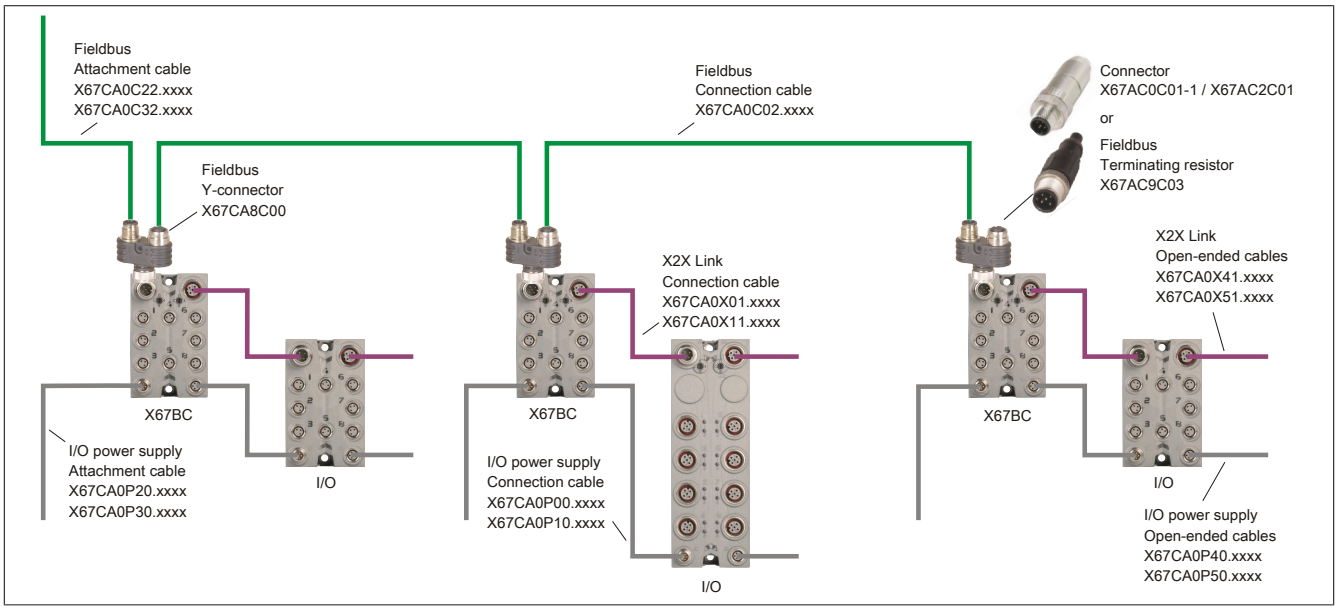
3 W are made available from the bus controller for additional X67 modules or other modules based on X2X Link.

System supply module X67PS1300 is needed for additional power. This supply module provides 15 W for additional modules. It should be installed in the middle of the modules to be supplied with power.

2.6 Required cables and connectors

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

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



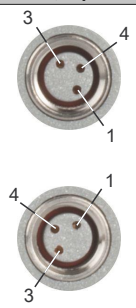
3 Integrated digital mixed module

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

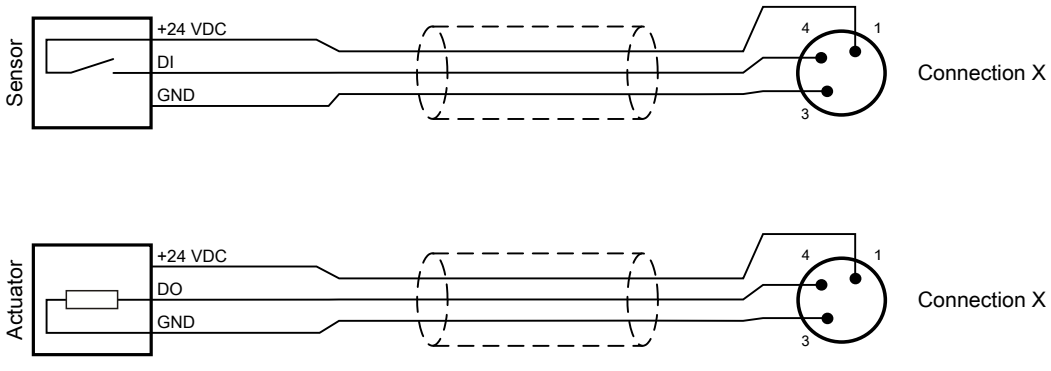
3.1 Pinout

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

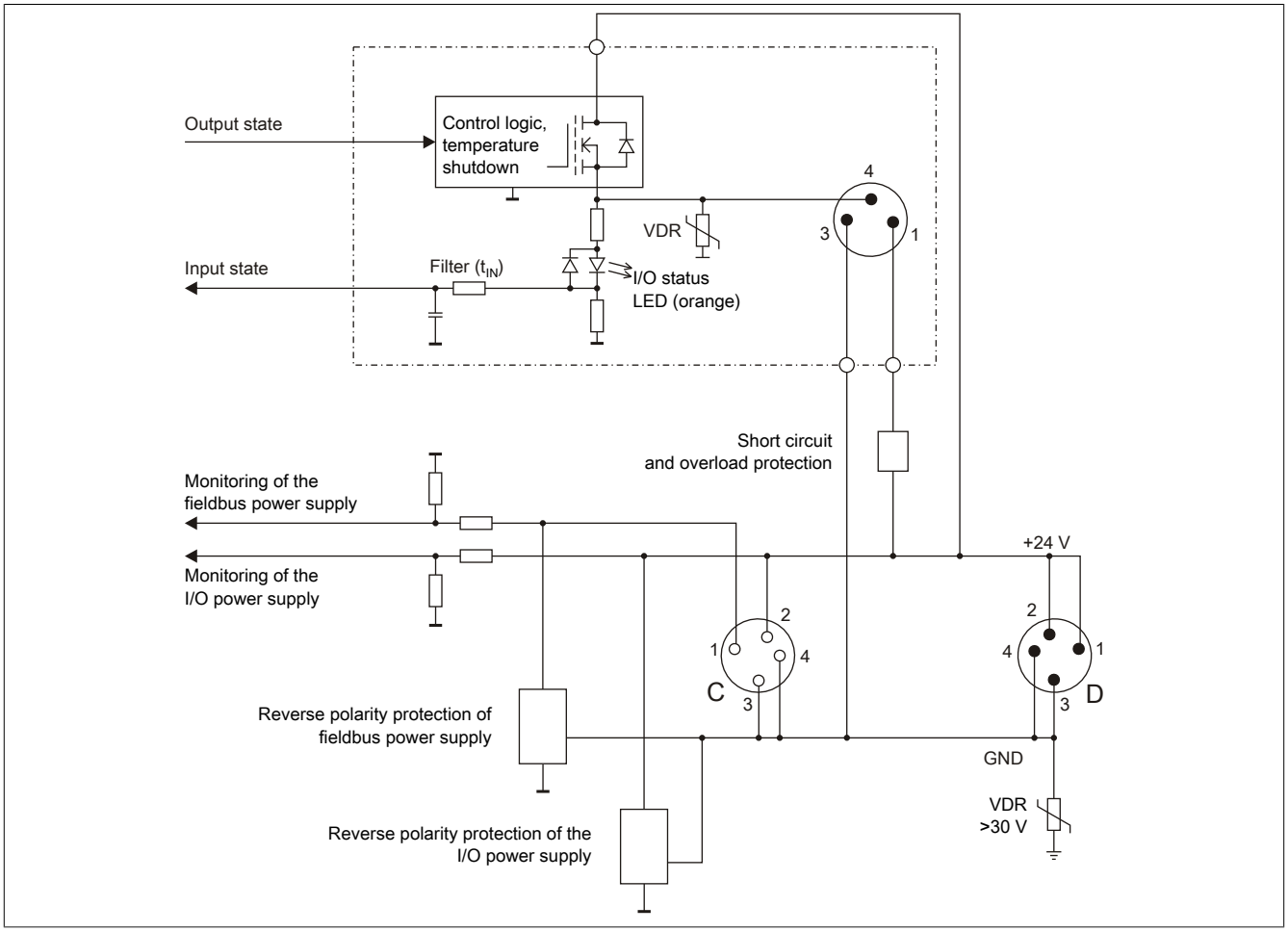
3.2 Connections X1 to X8

M8, 3-pin	Pinout	
	**Pin**	**Name**
	1	24 VDC sensor/actuator power supply[1)]
	3	GND
	4	Input/Output
	1) The sensor/actuator power supply is not permitted to be external.	
	Connections (female), input/output	

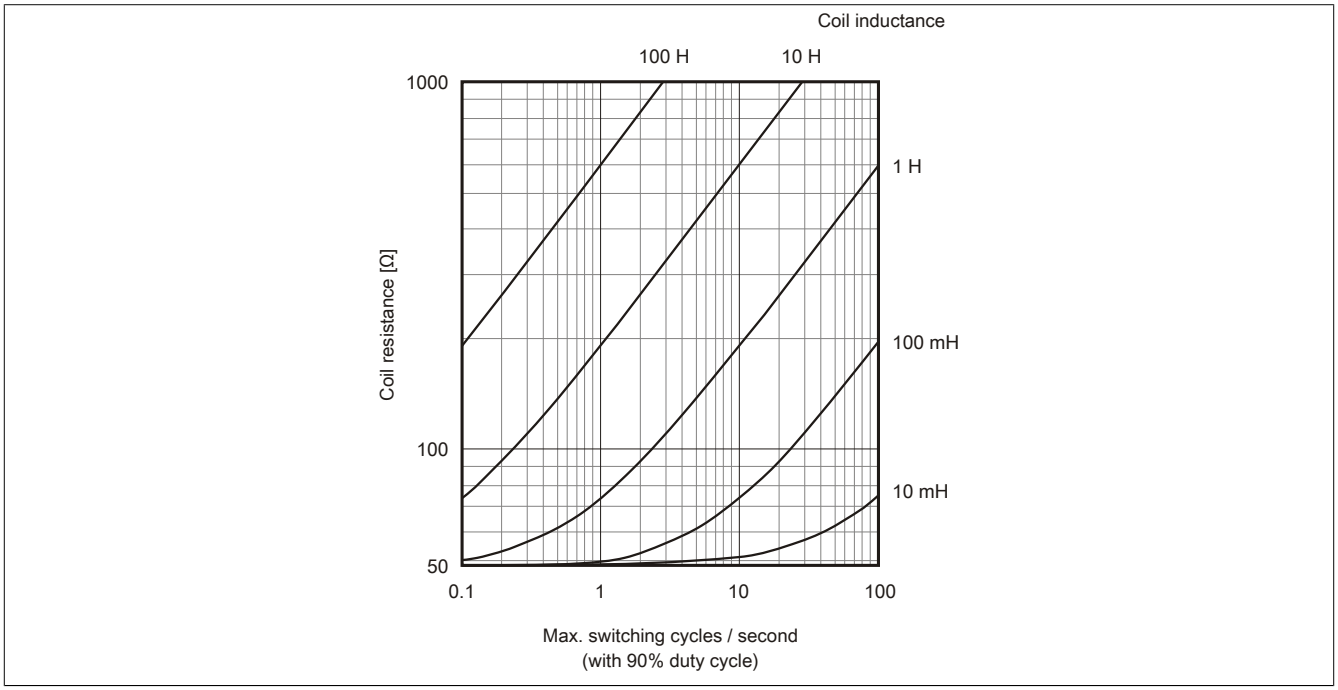
3.3 Connection examples



3.4 Input/Output circuit diagram



3.5 Switching inductive loads



4 Function description

4.1 CAN I/O

CAN I/O is a B&R-specific I/O system that functions via a special protocol on the CAN bus using fixed identifier assignment.

CAN I/O makes it possible to connect B&R CAN slave nodes (CAN I/O slaves for short) to all central processing units that are equipped with a CAN interface or that can be expanded with an interface card. The connection is implemented using CAN I/O master software (CAN I/O master for short).

The CAN I/O slaves connected to and configured on the CAN bus are detected by the CAN I/O master and initialized accordingly to enable reading and writing of the I/O points. The CAN I/O master takes over node monitoring and error signaling. The response to changes is event-related with CAN I/O.

4.2 Digital inputs

The module is equipped with 8 digital channels that can be configured as digital inputs.

Information:

The register is described in "I/O masks 1 to 8" on page 18.

4.2.1 Recording the input state

Unfiltered

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

Filtered

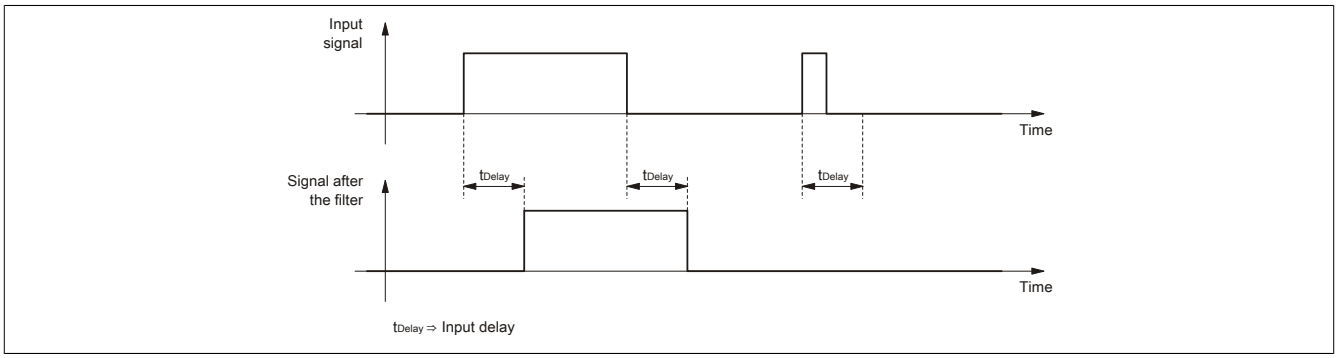
The filtered state is collected with a fixed offset to the network cycle and transferred in the same cycle. Filtering takes place asynchronously to the network in multiples of 200 µs with a network-related jitter of up to 50 µs.

Information:

The register is described in "Input state of digital inputs 1 to 8" on page 19.

4.2.2 Input filter

An input filter is available for each input. Disturbance pulses that are shorter than the input delay are suppressed by the input filter.



The input delay can be set in steps of 100 µs. It makes sense, however, to enter values in steps of 2 since the input signals are sampled in an interval of 200 µs.

Values	Filter
0	No software filter
2	0.2 ms
...	...
250	25 ms - Higher values are limited to this value.

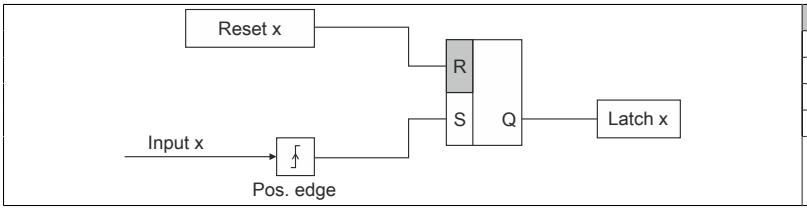
Information:

The register is described in "Digital input filter" on page 18.

4.2.3 Input latch

The positive edges of the input signals can be latched with a resolution of 200 µs.

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

Information:

The register is described in "Input latch" on page 20.

4.3 Event counter / Gate measurement

The module has 2 counter channels that can be used either as event counters or for gate measurement.

Event counter operation

The falling edges are registered on the counter input.

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

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 greater than 100 µs.

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

Information:

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

Information:

Registers are described in "Configuring counter channels 1 and 2" on page 18 and "Event counter / Gate measurement" on page 20.

4.4 Digital outputs

The module is equipped with 8 digital channels that can be configured as digital outputs.

Information:

The register is described in "I/O masks 1 to 8" on page 18.

4.4.1 Monitoring status of the 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 out. A change in the monitoring status is actively transmitted as an error message.

Supervision status	Description
0	Digital output channel: No error
1	Digital output channel: Short circuit or overload

Information:

The register is described in "Monitoring status of the digital outputs" on page 19.

4.5 Monitoring the operating limits

The status of the I/O power supply can be read out.

Bit	Description
0	I/O power supply within the warning limits (18 to 30 V)
1	I/O power supply outside the warning limits (<18 V or >30 V)

Information:

The register is described in "Operating limit status registers" on page 20.

5 Commissioning

5.1 SG4

The module comes with preinstalled firmware. The firmware is also part of the Automation Runtime operating system for the PLC. With different versions, the Automation Runtime firmware is loaded onto the module.

Current firmware is made available automatically by updating Automation Runtime.

6 Register description

6.1 General data points

In addition to the registers described in the register description, the module has additional general data points. These are not module-specific but contain general information such as serial number and hardware variant.

General data points are described in section "Additional information - General data points" in the X67 System user's manual.

6.2 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 - Positive edges 1 to 8	USINT	•			
	InputLatch01	Bit 0				
	...	...				
	InputLatch08	Bit 7				
28	Acknowledgment - Input latches 1 to 8	USINT			•	
	QuitInputLatch01	Bit 0				
	...	...				
	QuitInputLatch08	Bit 7				
8192	asy_ModulID	UINT		•		
8196	asy_SupplyStatus	USINT		•		
8208	asy_SupplyInput	USINT		•		

6.3 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 - Positive edges 1 to 8	USINT	•			
	InputLatch01	Bit 0				
	...	...				
	InputLatch08	Bit 7				
28	Acknowledgment - Input latches 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		•		

6.4 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 - Positive edges 1 to 8	USINT	•			
		InputLatch01	Bit 0				
		...	...				
		InputLatch08	Bit 7				
28	-	Acknowledgment - Input latches 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.

6.4.1 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 other registers and functions depending on the fieldbus used.

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

6.4.2 CAN I/O bus controller

The module occupies 1 digital logical slot on CAN I/O.

6.5 Configuration

6.5.1 I/O masks 1 to 8

Name:
ConfigIOMask01

Channels can be 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 the 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

6.5.2 Digital input filter

Name:
ConfigOutput03

The filter value for all digital inputs can be configured in this register.

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

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

6.5.3 Configuring 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 the 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 effect on counter (bus controller default setting)
		1	Clears the counter
6 - 7	Configuration of the operating mode	0	Event counter operation (bus controller default setting)
		1	Gate measurement

6.6 Communication

6.6.1 Digital inputs

6.6.1.1 Input state of digital inputs 1 to 8

Name:
DigitalInput01 to DigitalInput08

This register contains 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

6.6.2 Digital outputs

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

6.6.2.1 Switching state of digital outputs 1 to 8

Name:
DigitalOutput01 to DigitalOutput08

This register stores 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

6.6.3 Monitoring status of the digital outputs

On the module, the output states of the outputs are compared to the target states.

6.6.3.1 Status of digital outputs 1 to 8

Name:
StatusDigitalOutput01 to StatusDigitalOutput08

This register contains the state 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

6.6.4 Input latch

6.6.4.1 Input latch - Positive edges 1 to 8

Name:
InputLatch01 to InputLatch08

The positive 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 20.

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

6.6.4.2 Acknowledgment - Input latches 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

6.6.5 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

6.6.6 Reading out the module ID

Name:
asy_ModulID

This register offers the possibility to read the module ID.

Data type	Values
UINT	Module ID

6.6.7 Operating limit status registers

Name:
asy_SupplyStatus

The status of the operating limits can be read out in this register.

Data type	Values
USINT	See the 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 the warning limits (<18 V or >30 V)
1 - 7	Reserved	0	

6.6.8 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

6.6.9 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