

X67DV1311.L08

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
	Valve control	
X67DV1311.L08	X67 digital valve control module, 16 digital outputs, 24 VDC, 0.1 A, 1 M16 connection, 16 digital inputs, 24 VDC, sink, configurable input filter, M8 connectors, high-density module	

Table 1: X67DV1311.L08 - Order data

Required accessories
For a general overview, see section "Accessories - General overview" in the X67 system user's manual.

1.3 Module description

This module makes it possible to control valve terminals with multi-pin technology. The digital inputs are designed as M8 connectors.

Functions:

- [Digital valves](#)
- [Digital inputs](#)
- [Monitoring the operating limits](#)

Digital valves

The digital outputs of the module make it possible to control valve terminals with multi-pin technology. The output signal is monitored for short circuit or overload.

Digital inputs

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

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	X67DV1311.L08
Short description	
I/O module	16 digital outputs for controlling valve terminals with multi-pin technology 16 digital inputs for feedback
General information	
Insulation voltage between channel and bus	500 V _{eff}
Nominal voltage	24 VDC
B&R ID code	0x1AED
Status indicators	I/O function per digital input, 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	
X2X Link	M12, B-coded
Outputs	M16, 19-pin
Inputs	16x M8, 3-pin
I/O power supply	M8, 4-pin
Power consumption	
Internal I/O	1.3 W
X2X Link power supply	0.75 W
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
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 ¹⁾
Digital inputs	
Input characteristics per EN 61131-2	Type 1
Input voltage	18 to 30 VDC
Input current at 24 VDC	Typ. 4.4 mA
Input circuit	Sink
Input filter	
Hardware	≤100 µs
Software	Default 0 ms, configurable between 0 and 25 ms in 0.2 ms intervals
Input resistance	Typ. 5 kΩ
Sensor power supply	0.5 A summation current
Switching threshold	
Low	<5 VDC
High	>15 VDC
Digital outputs	
Variant	Current-sourcing FET
Switching voltage	I/O power supply minus residual voltage
Nominal output current	0.1 A
Total nominal current	1.6 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	<0.1 V at 0.1 A nominal current
Peak short-circuit current	<2 A
Switching delay	
0 → 1	<100 µs
1 → 0	<150 µs

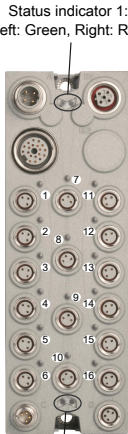
Table 2: X67DV1311.L08 - Technical data

Order number	X67DV1311.L08
Switching frequency	
Resistive load	Max. 100 Hz
Inductive load	See "Switching inductive loads"
Braking voltage when switching off inductive loads	52 VDC
Actuator power supply	
Voltage	I/O power supply minus voltage drop for short-circuit protection
Voltage drop for short-circuit protection at 500 mA	Max. 2 VDC
Summation current	Max. 0.5 A
Short-circuit proof	Yes
Electrical properties	
Electrical isolation	Channel isolated from bus 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	155 mm
Depth	42 mm
Weight	350 g
Torque for connections	
M8	Max. 0.4 Nm
M12	Max. 0.6 Nm
M16	Max. 1.0 Nm

Table 2: X67DV1311.L08 - Technical data

- 1) 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: Green, Right: Red Status indicator 2: Left: Green, Right: Red	Status indicator 1: Status indicator for X2X Link			
	Left/Right	Green(left)	Red (right)	Description
		Off	Off	No power supply via X2X Link
		On	Off	X2X Link supplied, communication OK
		Off	On	X2X Link supplied but no X2X Link communication
		On	On	PREOPERATIONAL: X2X Link supplied, module not initialized
	I/O LEDs: Status indicator for the corresponding analog output			
	1 - 16	Color	Status	Description
		Green	On/Off	Input state of the corresponding digital input.
	Status indicator 2: Status indicator for module functionality			
	Left	Color	Status	Description
		Green	Off	No power to module
			Single flash	Mode RESET
			Blinking	Mode PREOPERATIONAL
			On	Mode RUN
	Right	Color	Status	Description
		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 Connection elements

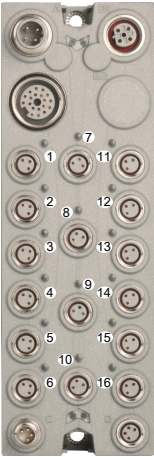
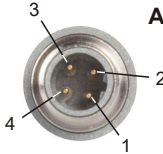
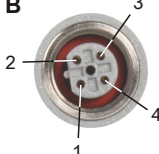


Diagram of the module front panel showing various connectors and digital inputs. The connectors are labeled as follows:

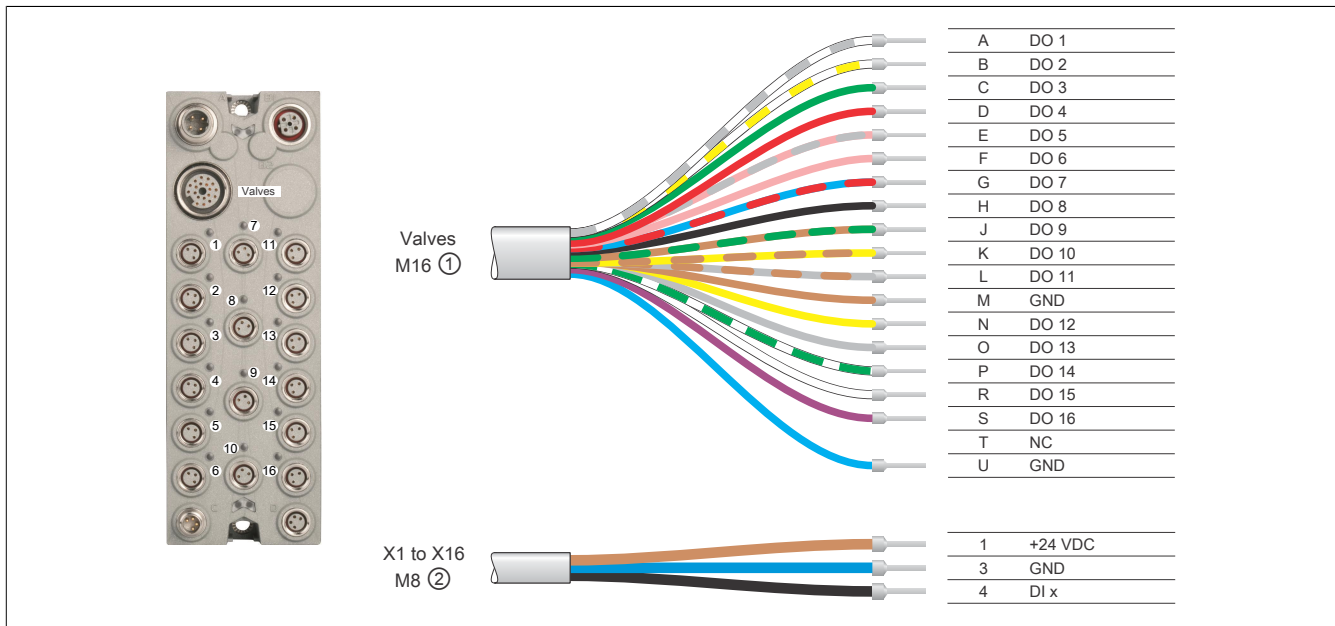
- X2X Link
- Connector A: Input
- Connector B: Output
- Valve terminal connection
- Digital inputs 1 to 16
- I/O power supply 24 VDC
- Connector C: Supply
- Connector D: Routing

2.3.1 X2X Link

The module is connected to the X2X Link network using pre-assembled cables. The connection is made using M12 circular connectors.

Connection		Pinout	
 A	Pin	Name	
	1	X2X+	
	2	X2X	
	3	X2X⊥	
	4	X2X\	
Shield connection made via threaded insert in the module.			
 B	A → B-coded (male), input		
	B → B-coded (female), output		

2.3.2 Pinout



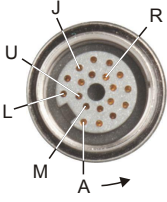
① Valve terminal cables:

The valve terminal cable must be purchased from a third-party supplier. For example, cable BSM19-E01-3/S90 or BSM19-E01-x/TEL from TURCK. The color coding shown in the diagram varies depending on the cable manufacturer.

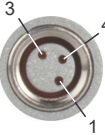
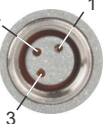
② X67CA0D40.xxxx:
X67CA0D50.xxxx:

M8 sensor cable, straight
M8 sensor cable, angled

2.3.2.1 Valve connection

M16, 19-pin	Pinout			
	Pin	Name	Pin	Name
	A	Output 1	L	Output 11
	B	Output 2	M	GND
	C	Output 3	N	Output 12
	D	Output 4	O	Output 13
	E	Output 5	P	Output 14
	F	Output 6	R	Output 15
	G	Output 7	S	Output 16
	H	Output 8	T	Not used
	J	Output 9	U	GND
	K	Output 10		

2.3.2.2 Connections X1 to X16

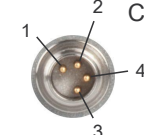
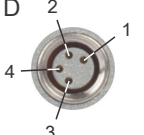
M8, 3-pin	Pinout	
	Pin	Name
	1	Sensor power supply 24 VDC ¹⁾
	3	GND
	4	Input
	1) The sensor power supply is not permitted to be external.	
	Connectors (female), input	

2.3.3 I/O power supply

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

Information:

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

Connection	Pinout	
	Pin	Name
	1	24 VDC input power supply ¹⁾
	2	24 VDC output power supply ¹⁾
	3	GND
	4	GND
		
C → Connector (male) in module, supply for I/O power supply D → Connector (female) in module, routing for I/O power supply		

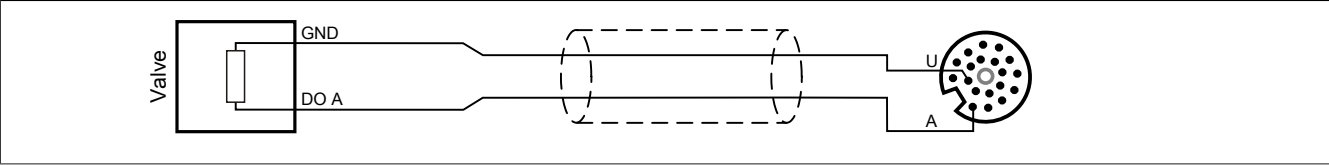
1) By splitting the supply voltage, the output power supply can be cut off. However, the power supply to the inputs remains intact.

Information:

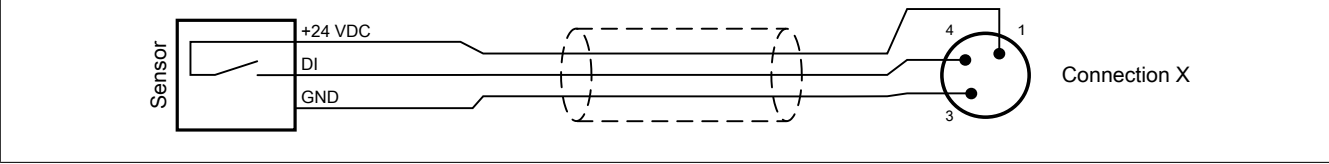
In order to achieve category 4 shutdown per EN 954-1, the entire I/O power supply (supply via 2 pins) must be safely cut off.

2.4 Connection examples

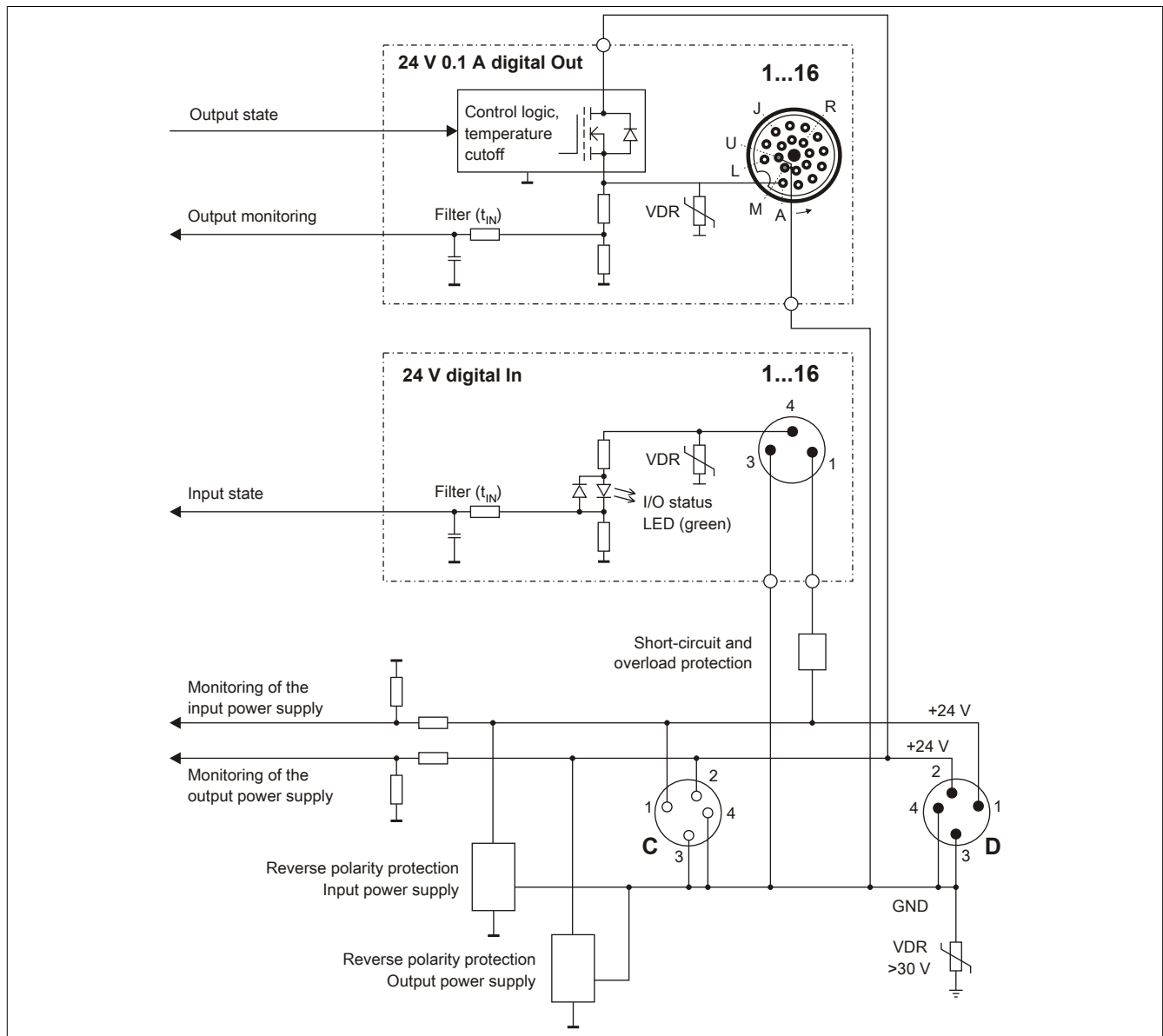
Valves (only 1 example drawn)



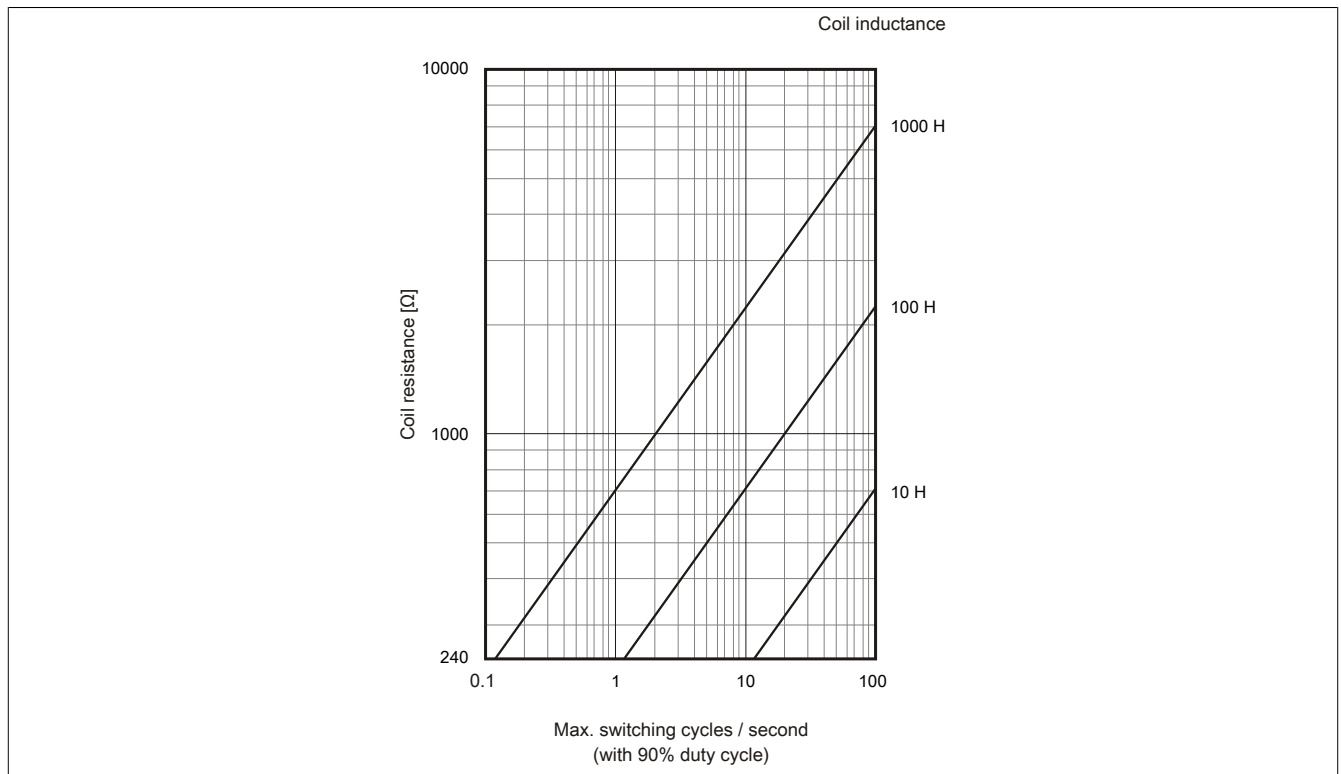
Digital inputs



2.5 Input/Output circuit diagram



2.6 Switching inductive loads



3 Function description

3.1 Digital valves

The digital outputs make it possible to control valve terminals with multi-pin technology. Multi-pin is a simple way of connecting valve terminals. Digital outputs are connected here via the 25-pin DSUB connector, which then switch the valves. The valve control modules use an M16 connector to link to the multipin connector.

This allows up to 16 valves of a valve terminal to be controlled with a simple cable connection. The maximum current is 100 mA. The output state is transferred to the output channels with a fixed offset in relation to the network cycle.

3.1.1 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 registers are described in "[Status of digital outputs 1 to 8](#)" on page 14 and [Status of digital outputs 9 to 16](#).

3.2 Digital inputs

The module is equipped with 16 digital inputs.

3.2.1 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

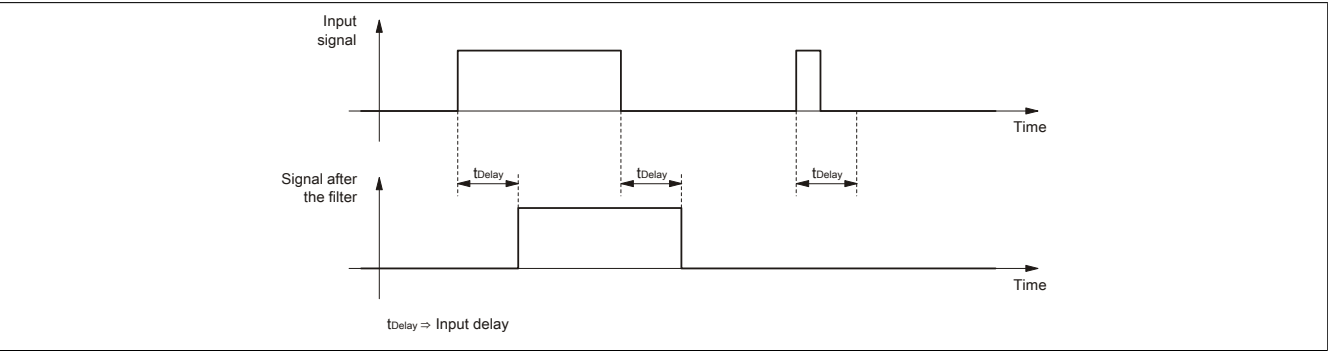
The filtered state is collected with a fixed offset to the network cycle and transferred in the same cycle. Filtering takes place asynchronously to the network in multiples of 200 µs with a network-related jitter of up to 50 µs.

Information:

The registers are described in "[Input state of digital inputs 1 to 8](#)" on page 13 and "[Input state of digital inputs 9 to 16](#)" on page 13.

3.2.2 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 μ s. It makes sense, however, to enter values in steps of 2 since the input signals are sampled in an interval of 200 μ s.

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 13](#).

3.3 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 15](#).

4 Register description

4.1 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.

4.2 Function model 0 - Standard

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
Configuration						
18	ConfigOutput01 (input filter)	USINT				•
Communication						
0	Input state of digital inputs 1 to 8	USINT	•			
	DigitalInput01	Bit 0				
	...	...				
	DigitalInput08	Bit 7				
1	Input state of digital inputs 9 to 16	USINT	•			
	DigitalInput09	Bit 0				
	...	...				
	DigitalInput16	Bit 7				
2	Switching state of digital outputs 1 to 8	USINT			•	
	DigitalOutput01	Bit 0				
	...	...				
	DigitalOutput08	Bit 7				
3	Switching state of digital outputs 9 to 16	USINT			•	
	DigitalOutput09	Bit 0				
	...	...				
	DigitalOutput16	Bit 7				
30	Status of digital outputs 1 to 8	USINT	•			
	StatusDigitalOutput01	Bit 0				
	...	...				
	StatusDigitalOutput08	Bit 7				
31	Status of digital outputs 9 to 16	USINT	•			
	StatusDigitalOutput09	Bit 0				
	...	...				
	StatusDigitalOutput16	Bit 7				
8192	asy_ModulID	UINT		•		
8208	asy_SupplyInput	USINT		•		
8210	asy_SupplyOutput	USINT		•		
8196	asy_SupplyStatus	USINT		•		

4.3 Function model 256 - Bus controller

Register	Offset ¹⁾	Name	Data type	Read		Write	
				Cyclic	Acyclic	Cyclic	Acyclic
Configuration							
18	-	ConfigOutput01 (input filter)	USINT				•
Communication							
0	0	Input state of digital inputs 1 to 8	USINT	•			
		DigitalInput01	Bit 0				
		...	...				
		DigitalInput08	Bit 7				
1	1	Input state of digital inputs 9 to 16	USINT	•			
		DigitalInput09	Bit 0				
		...	...				
		DigitalInput16	Bit 7				
2	0	Switching state of digital outputs 1 to 8	USINT			•	
		DigitalOutput01	Bit 0				
		...	...				
		DigitalOutput08	Bit 7				
3	1	Switching state of digital outputs 9 to 16	USINT			•	
		DigitalOutput09	Bit 0				
		...	...				
		DigitalOutput16	Bit 7				
30	-	Status of digital outputs 1 to 8	USINT		•		
		StatusDigitalOutput01	Bit 0				
		...	...				
		StatusDigitalOutput08	Bit 7				
31	-	Status of digital outputs 9 to 16	USINT		•		
		StatusDigitalOutput09	Bit 0				
		...	...				
		StatusDigitalOutput16	Bit 7				
8192	-	asy_ModulID	UINT		•		
8208	-	asy_SupplyInput	USINT		•		
8210	-	asy_SupplyOutput	USINT		•		
8196	-	asy_SupplyStatus	USINT		•		

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

4.3.1 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).

4.3.2 CAN I/O bus controller

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

4.4 Digital inputs

4.4.1 Digital input filter

Name:

ConfigOutput01

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

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.

4.4.2 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

4.4.3 Input state of digital inputs 9 to 16

Name:

DigitalInput09 to DigitalInput16

This register contains the input state of digital inputs 9 to 16.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	DigitalInput09	0 or 1	Input state - Digital input 9
...		...	
7	DigitalInput16	0 or 1	Input state - Digital input 16

4.5 Digital outputs

The output state is transferred to the output channels with a fixed offset (<60 µs) based on the network cycle (SyncOut).

4.5.1 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

4.5.2 Switching state of digital outputs 9 to 16

Name:

DigitalOutput09 to DigitalOutput16

This register stores the switching state of digital outputs 9 to 16.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	DigitalOutput09	0	Digital output 09 reset
		1	Digital output 09 set
...	...	...	...
7	DigitalOutput16	0	Digital output 16 reset
		1	Digital output 16 set

4.6 Status of the outputs

4.6.1 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

4.6.2 Status of digital outputs 9 to 16

Name:

StatusDigitalOutput09 to StatusDigitalOutput16

This register contains the state of digital outputs 9 to 16.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	StatusDigitalOutput09	0	Channel 09: No error
		1	Channel 09: Short circuit or overload
...		...	
7	StatusDigitalOutput16	0	Channel 16: No error
		1	Channel 16: Short circuit or overload

4.7 Reading out the module ID

Name:

asy_ModulID

This register offers the possibility to read the module ID.

Data type	Values
UINT	Module ID

4.8 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

4.9 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

4.10 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	Input power supply within/outside the warning limits	0	Within the warning limits (18 to 30 V)
		1	Outside the warning limits (<18 V or >30 V)
1	Reserved	0	
2	Output power supply within/outside the warning limits	0	Within the warning limits (18 to 30 V)
		1	Outside the warning limits (<18 V or >30 V)
3 - 7	Reserved	0	

4.11 Minimum cycle time

The minimum cycle time specifies how far 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

4.12 Minimum I/O update time

The minimum I/O update time specifies how far the bus cycle can be reduced so that an I/O update is performed in each cycle.

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