

X67DV1311.L12

1 General information

This module lets you control valve terminals using multi-pin technology. The digital inputs use M12 connectors.

- Controlling valve manifolds with multi-pin technology
- Up to 16 valves per valve manifold
- 16 digital inputs for feedback
- Separate feed for inputs and valve coils
- Configurable digital input filter
- All outputs with single channel diagnostics
- Extensive additional status information

2 Order data

Model number	Short description	Figure
	Valve control	
X67DV1311.L12	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, M12 connectors, high-density module	

Table 1: X67DV1311.L12 - Order data

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

3 Technical data

Model number	X67DV1311.L12
Short description	
I/O module	16 digital outputs for controlling valve terminals with multi-pin technology 16 digital inputs for feedback
General information	
Isolation voltage between channel and bus	500 V _{Eff}
Nominal voltage	24 VDC
B&R ID code	0x1AEE
Status indicators	I/O function for each digital input, supply voltage, bus function
Diagnostics	
Outputs	Yes, using status LED and software
I/O power supply	Yes, using status LED and software
Connection type	
X2X Link	M12, B-keyed
Outputs	M16, 19-pin
Inputs	8x M12, A-keyed
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
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
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 voltage	18 to 30 VDC
Input current at 24 VDC	Typ. 4.4 mA
Input characteristics per EN 61131-2	Type 1
Input filter	
Hardware	≤100 µs
Software	Default 0 ms, configurable between 0 and 25 ms in 0.2 ms intervals
Input circuit	Sink
Input resistance	Typ. 5 kΩ
Sensor power supply	0.5 A summation current
Switching threshold	
Low	<5 VDC
High	>15 VDC
Digital outputs	
Variant	FET positive switching
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 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	<0.1 V at 0.1 A nominal current
Peak short-circuit current	<2 A
Switching delay	
0 → 1	<100 µs
1 → 0	<150 µs
Switching frequency	
Resistive load	Max. 100 Hz
Inductive load	See "Switching inductive loads"
Braking voltage when switching off inductive loads	52 VDC

Table 2: X67DV1311.L12 - Technical data

Model number	X67DV1311.L12
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 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	330 g
Torque for connections	
M8	Max. 0.4 Nm
M12	Max. 0.6 Nm
M16	Max. 1.0 Nm

Table 2: X67DV1311.L12 - Technical data

- 1) 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: 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 X2X Link communication not functioning	
		On	On	PREOPERATIONAL: X2X Link supplied, module not initialized	
	I/O LEDs: Status indicator for the corresponding analog output				
	1-1 to 8-2	Color	Status	Description	
		Green	On/Off	Input state of the corresponding digital input.	
	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		

5 Connection elements



X2X Link

Connection A: Input

Connection B: Output

Valve manifold connection

Digital inputs 1 to 16

24 VDC I/O power supply

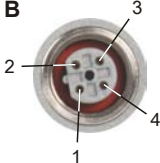
Connection C: Supply

Connection D: Routing

Left side / Channels 1 to 8 in the first byte		Right side / Channels 9 to 16 in the second byte	
Channel	Connection	Connection	Channel
1	1-1	5-1	9
2	1-2	5-2	10
...	...	...	...
7	4-1	8-1	15
8	4-2	8-2	16

6 X2X Link

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

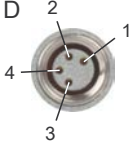
Connection	Pinout	
	Pin	Description
	1	X2X+
	2	X2X
	3	X2X _L
	4	X2X _I
	Shield connection made via threaded insert in the module.	
	A → B-keyed (male), input B → B-keyed (female), output	

7 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)!

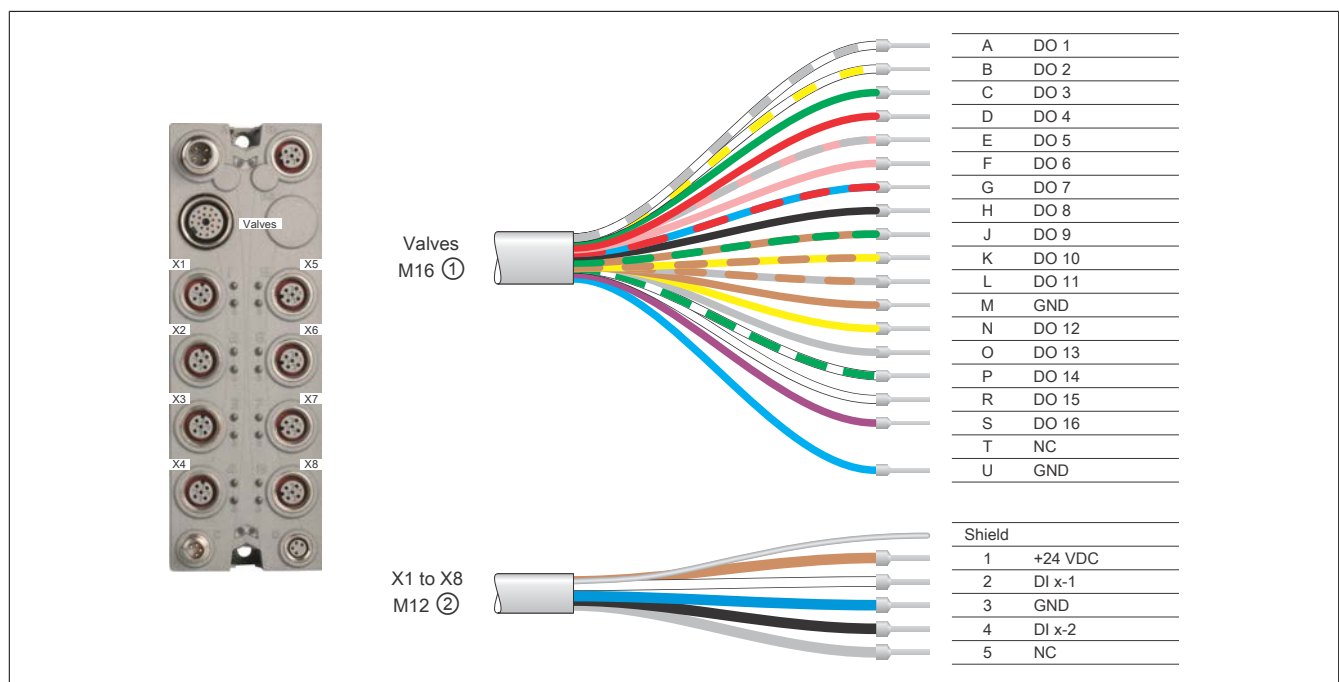
Connection	Pinout	
	Pin	Name
	1	24 VDC input supply ¹⁾
	2	24 VDC output supply ¹⁾
	3	GND
	4	GND
	1	
	2	
	3	
	4	
C → Connector (male) in module, feed for I/O power supply C → Connector (female) in module, routing of I/O power supply		

1) Dividing up the supply voltage can cause the power supply to the outputs to be cut off. The power supply of the inputs is maintained, however.

Information:

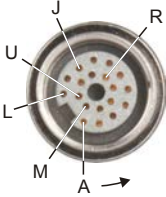
In order to achieve category 4 shutdown in accordance with EN 954-1, the entire I/O power supply (supply via 2 pins) must be safely cut off.

8 Pinout



- ① X67CA0V40.xxxx: Valve terminal cable, straight
 X67CA0V50.xxxx: Valve terminal cable, angled
 ② X67CA0A41.xxxx: M12 sensor cable, straight
 X67CA0A51.xxxx: M12 sensor cable, angled

8.1 Valve connection

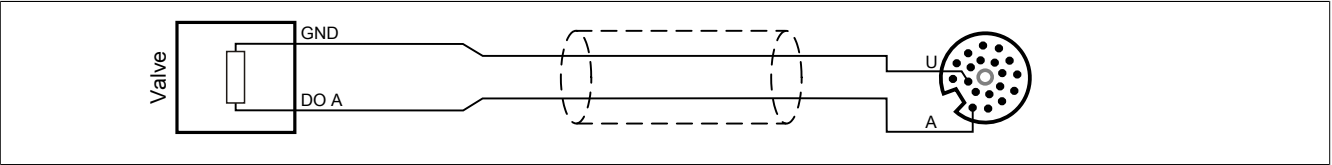
M16, 19-pin	Pinout					
	Pin	Name	Wire colors	Pin	Name	Wire colors
	A	Output 1	White/Gray	L	Output 11	Gray/Brown
	B	Output 2	White/Yellow	M	GND	Brown
	C	Output 3	Green	N	Output 12	Yellow
	D	Output 4	Red	O	Output 13	Gray
	E	Output 5	Gray/Pink	P	Output 14	White/Green
	F	Output 6	Pink	R	Output 15	White
	G	Output 7	Red/Blue	S	Output 16	Purple
	H	Output 8	Black	T	NC	-
	J	Output 9	Brown/Green	U	GND	Blue
	K	Output 10	Yellow/Brown			

8.2 Connections X1 to X8

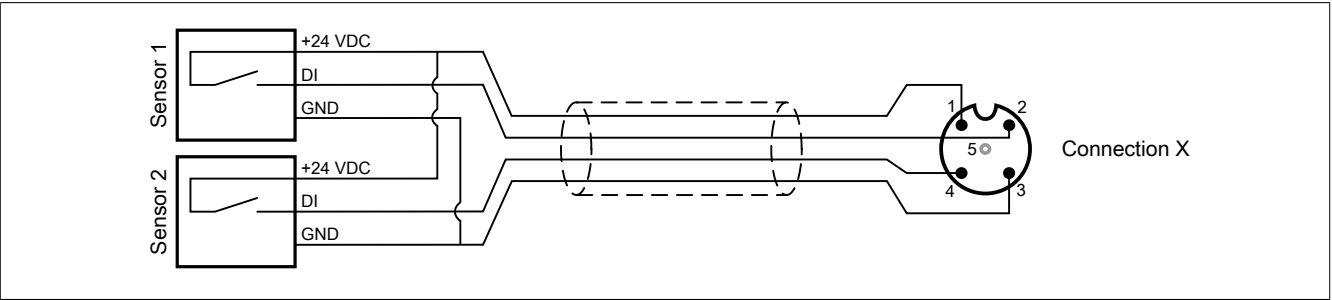
M12, 5-pin	Pinout	
	Pin	Name
	1	24 VDC sensor supply ¹⁾
	2	Input 1
	3	GND
	4	Input 2
5	NC	
Shield connection made via threaded insert in the module		
1) Sensors are not permitted to be supplied externally.		
Connections → A-keyed (female), input		

9 Connection examples

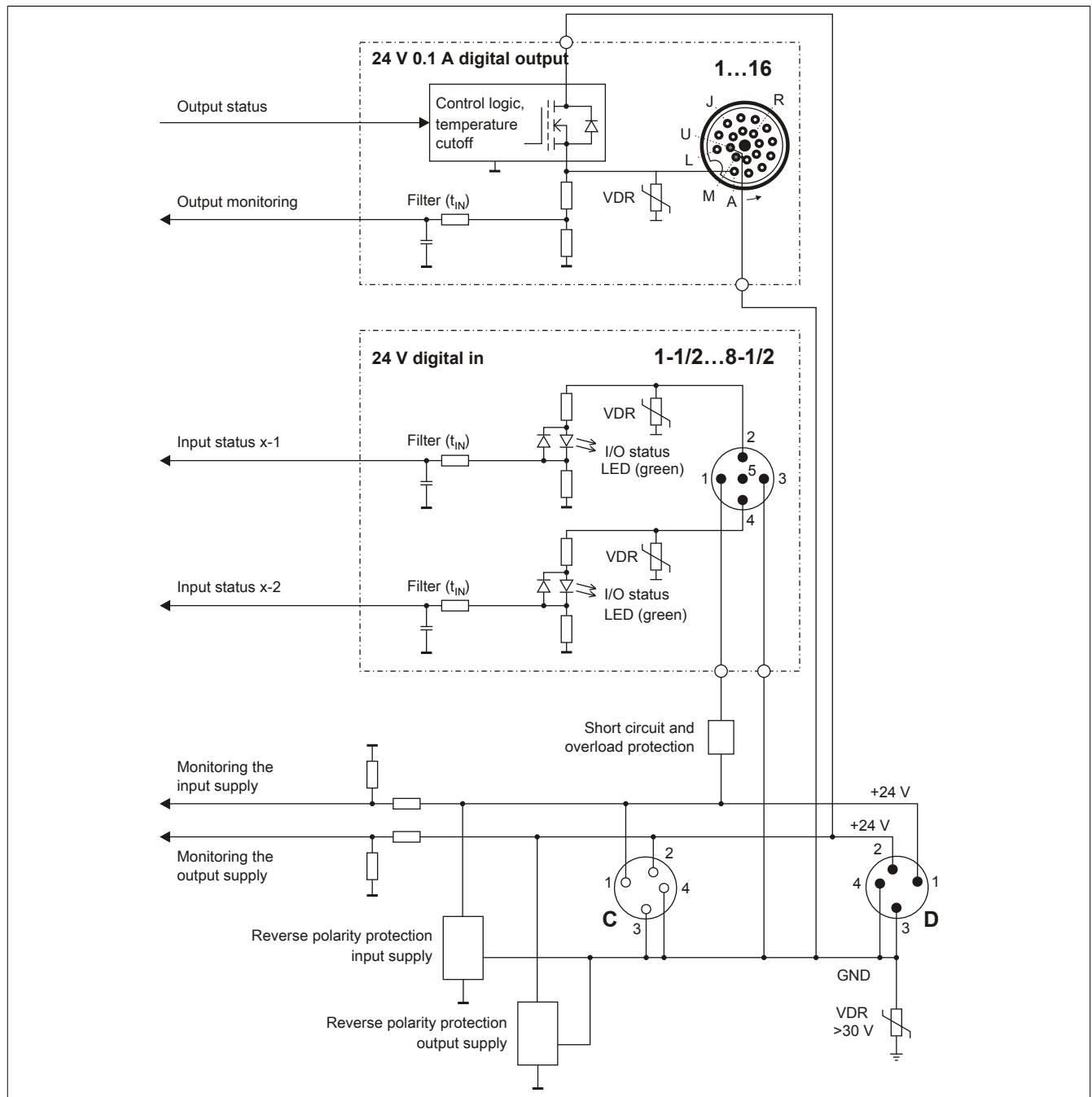
Valves (Only 1 valve shown)



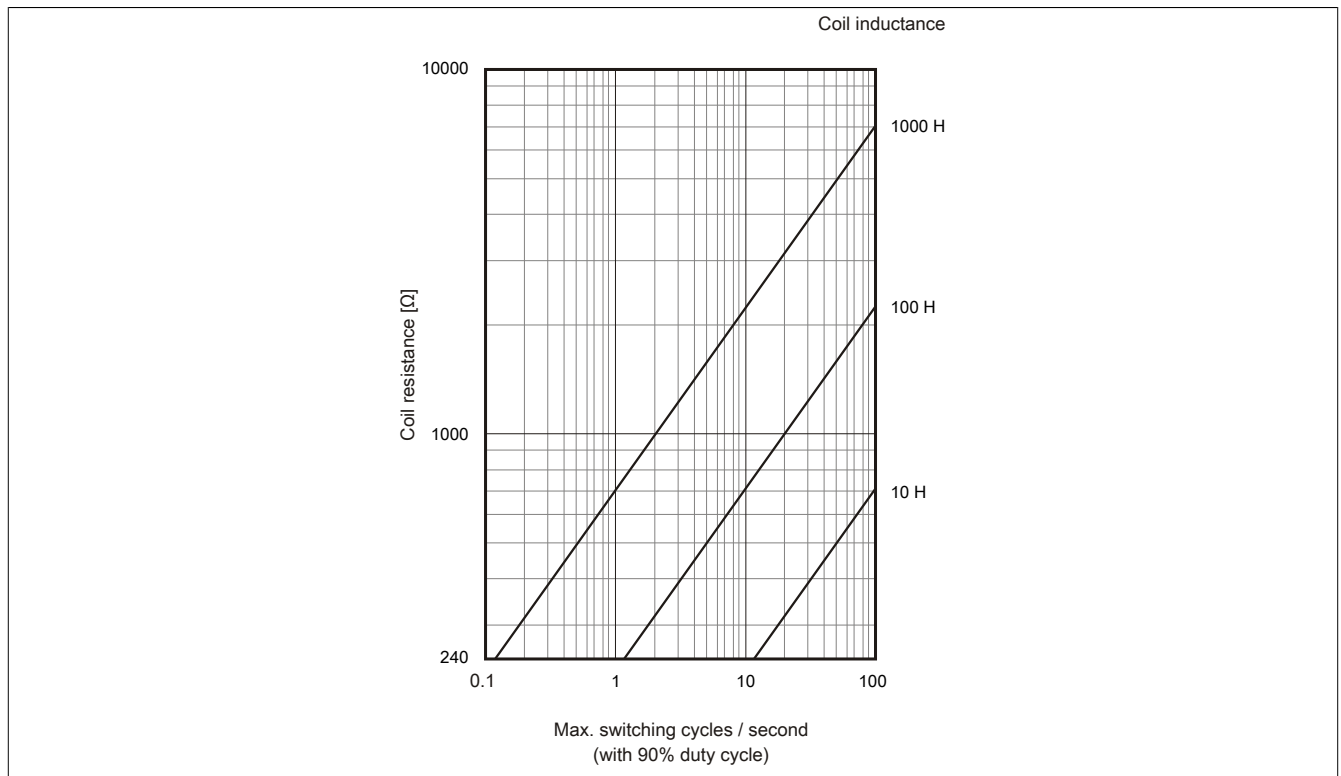
Digital inputs



10 Input/Output circuit diagram



11 Switching inductive loads



12 Register description

12.1 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.

12.2 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		•		

12.3 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	Bit7				
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.

12.3.1 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 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).

12.3.2 CAN I/O bus controller

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

12.4 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.

12.4.1 Digital input filter

Name:

ConfigOutput01

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

12.4.2 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

12.4.3 Input state of digital inputs 9 to 16

Name:

DigitalInput09 to DigitalInput16

This register indicates 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

12.5 Digital outputs

The output status is transferred to the output channels with a fixed offset (<60 µs) in relation to the network cycle (SyncOut).

12.5.1 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

12.5.2 Switching state of digital outputs 9 to 16

Name:

DigitalOutput09 to DigitalOutput16

This register is used to store 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

12.6 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. A change in the monitoring status generates an error message.

12.6.1 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

12.6.2 Status of digital outputs 9 to 16

Name:

StatusDigitalOutput09 to StatusDigitalOutput16

This register is used to indicate the status 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

12.7 Reading the module ID

Name:

asy_ModulID

This register offers the possibility to read the module ID.

Data type	Values
UINT	Module ID

12.8 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

12.9 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

12.10 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	

12.11 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

12.12 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