X67DO9332.L12

1 General information

The module is a digital output module with 8 channels. The outputs can handle up to 2 A. The summation current is 8 A.

The node number switches for setting the X2X Link address are a unique feature. When modular machine configurations change, it is necessary, for example, to define specific module groups at a fixed address that is independent of the preceding modules in the line. All subsequent standard modules refer to this offset and use it automatically for addressing purposes.

- 8 digital outputs
- Outputs can handle up to 2 A
- Node number switches for setting the X2X Link address
- 1:1 replacement for passive distributors
- All outputs with single-channel diagnostics
- Extensive additional status information

2 Order data

Model number	Short description	Figure
	Digital output modules	
X67DO9332.L12	X67 digital output module, 8 outputs, 24 VDC, 2 A, single-channel actuator power supply monitoring, M12 connectors, X2X Link address switch, high-density module	

Table 1: X67DO9332.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	X67DO9332.L12
Short description	
I/O module	8 digital outputs 24 VDC
General information	
B&R ID code	0x2658
Status indicators	I/O function for each channel, actuator power supply for each channel, supply voltage, bus function
Diagnostics	
Outputs	Yes, using status LED and software
Actuator power supply	Yes, using status LED and software
I/O power supply	Yes, using status LED and software
Connection type	
X2X Link	M12, B-keyed
Outputs	8x M12, A-keyed
I/O power supply	M8, 4-pin
Power consumption	
Internal I/O	1.7 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	
Actuator power supply	Max. 12 W [1)]
Digital outputs	
Quantity	8
Variant	FET positive switching
Nominal voltage	24 VDC
Switching voltage	I/O power supply minus residual voltage
Nominal output current	2 A
Total nominal current	8 A
Output circuit	Source
Output protection	Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances, reverse polarity protection for output power supply
Actuator power supply	
Actuator current	0.1 A
Total nominal current	0.5 A
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	<0.5 V at 2 A nominal current
Peak short-circuit current	<21 A
Switching delay	
0 → 1	<250 µs
1 → 0	<270 µs
Switching frequency	
Resistive load	Max. 100 Hz
Braking voltage when switching off inductive loads	50 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

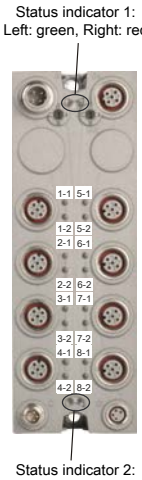
Table 2: X67DO9332.L12 - Technical data

Model number	X67DO9332.L12
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	See section "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

Table 2: X67DO9332.L12 - Technical data

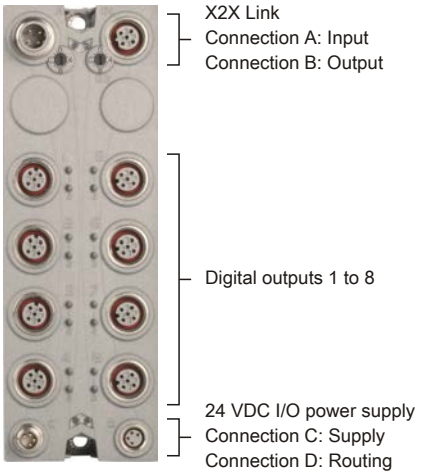
1) The power consumption of the sensors and actuators connected to the module is not permitted to exceed 12 W.

4 LED status indicators

Figure	LED	Color/Status		Description
	**Status indicator 1**: Status indicator for X2X Link			
	LED	**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			
	LED	**Color**	**Status**	**Description**
	x-1	Red	Off	Actuator supply within valid range
			On	Short circuit or overload
	x-2	Orange	-	Output status of the corresponding channel
	Status indicator 2: Status indicator for module function			
	LED	**Color**	**Status**	**Description**
	Left	Green	Off	No power to module
			Single flash	RESET mode
			Double flash	BOOT mode (during firmware update)[1)]
			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 of digital outputs triggered or short circuit / overload of actuator supply
			Double flash	Supply voltage not in the valid range

1) Depending on the configuration, a firmware update can take up to several minutes.

5 Connection elements



5.1 Node number switches

The decentralized X2X Link backplane, which connects individual X67 modules with one another, is set up to be self-addressing. Because of this, it is not necessary to set the node numbers. The module address is assigned according to its position in the X2X Link line.

In certain cases, e.g. when configurations of modular machines change, it is necessary to define specific module groups at a fixed address, regardless of the preceding modules in the line.

For this reason, the digital mixed module is equipped with node number switches that can be used to set the X2X Link address. All subsequent modules refer to this offset and use it automatically for addressing purposes.

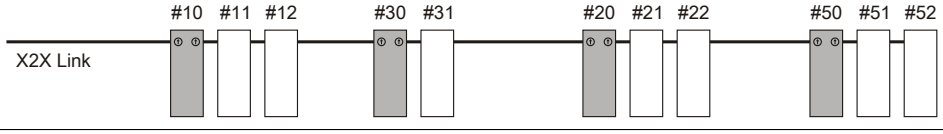
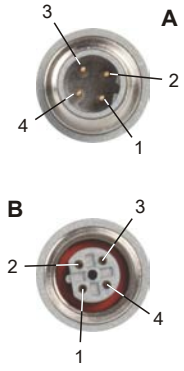


Figure 1: Sample configuration

If the node number on the module is set to 0x00, then the module address is assigned according to its position in the X2X Link line.

6 X2X Link

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

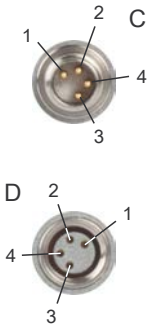
Connection	Pinout	
	**Pin**	**Description**
	1	X2X+
	2	X2X
	3	X2X⊥
	4	X2X\
	Shield connection made via threaded insert in the module. A → B-keyed (male), input B → B-keyed (female), output	

7 24 VDC 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:

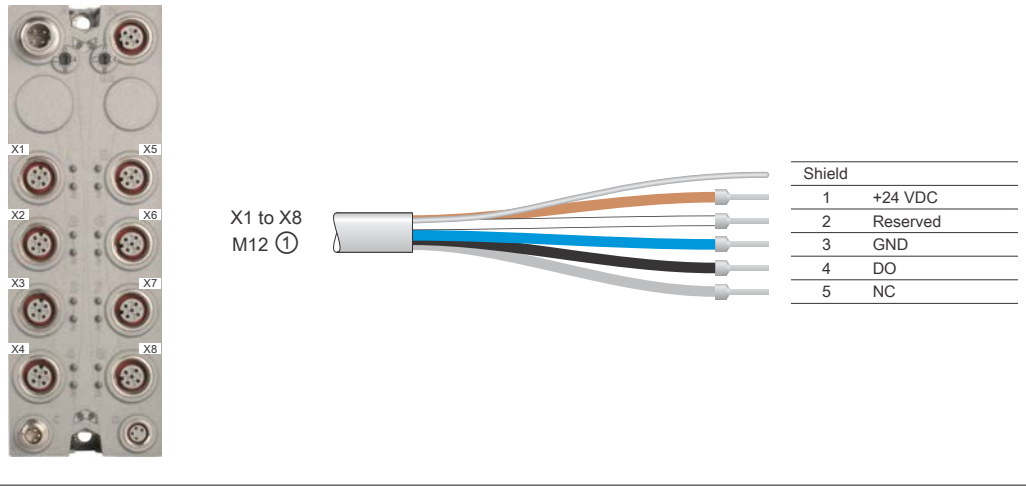
The maximum permissible current for the I/O power supply is 8 A (4 A per connection pin)!

Connection	Pinout	
	**Pin**	**Name**
	1	24 VDC I/O power supply[1)]
	2	24 VDC output supply[1)]
	3	GND
	4	GND
	C → Connector (male) in module, feed for I/O power supply D → Connector (female) in module, routing of I/O power supply 1) Both supply pins must be supplied. Due to the division of the supply voltage, the output supply can be cut off while the module continues to be supplied.	

Information:

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

8 Pinout

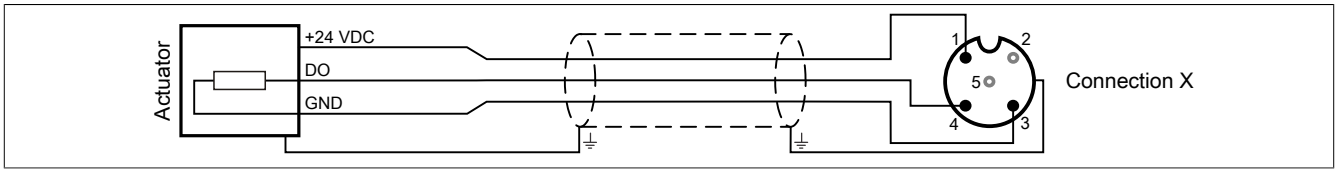


① X67CA0A41.xxxx: M12 sensor cable, straight
X67CA0A51.xxxx: M12 sensor cable, angled

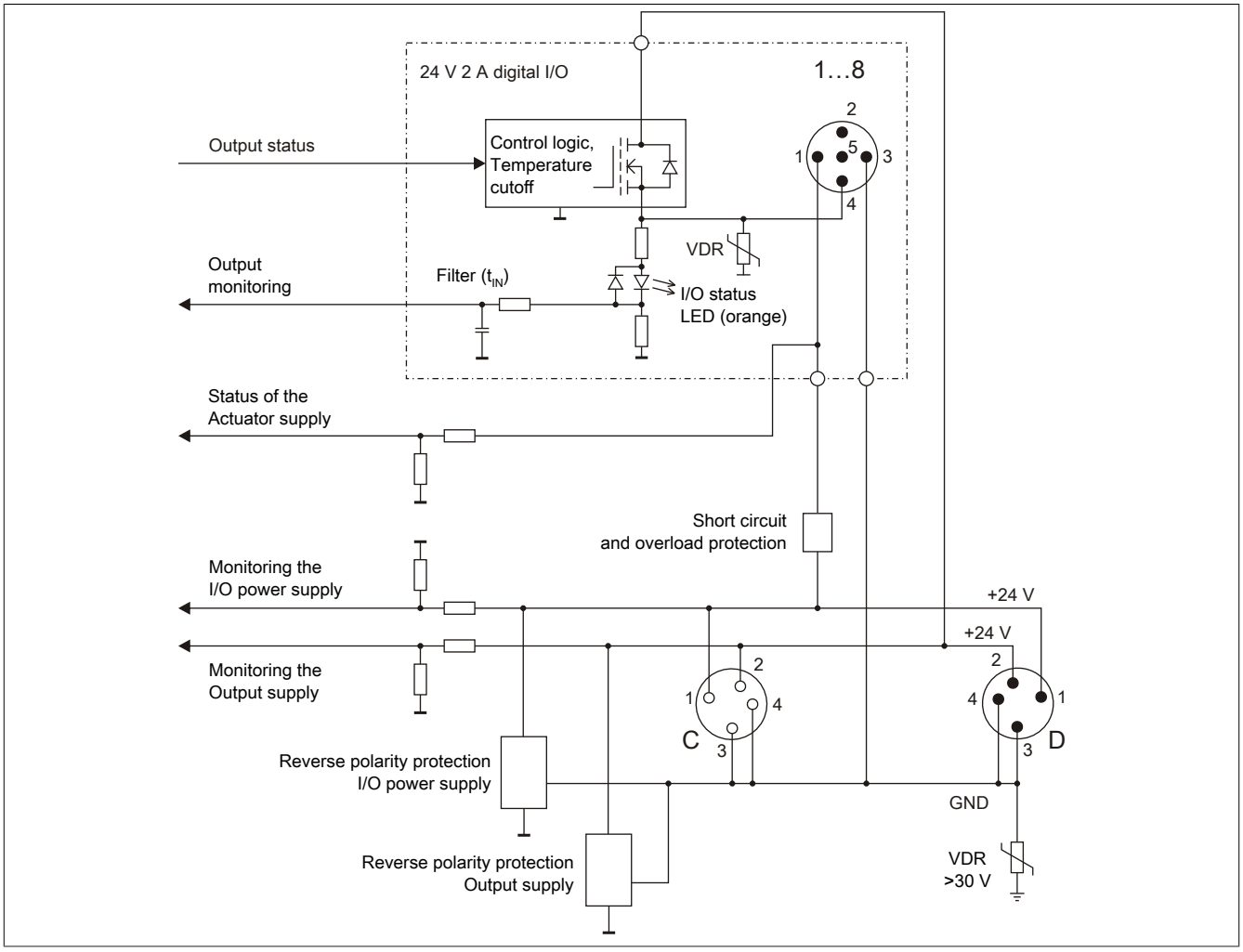
8.1 Connections X1 to X8

M12, 5-pin	Pinout	
	**Pin**	**Name**
	1	24 VDC actuator supply[1)]
	2	Reserved
	3	GND
	4	Output
	5	Not connected
	Shield connection made via threaded insert in the module 1) Actuators are not permitted to be supplied externally. Connections → A-keyed (female), input	

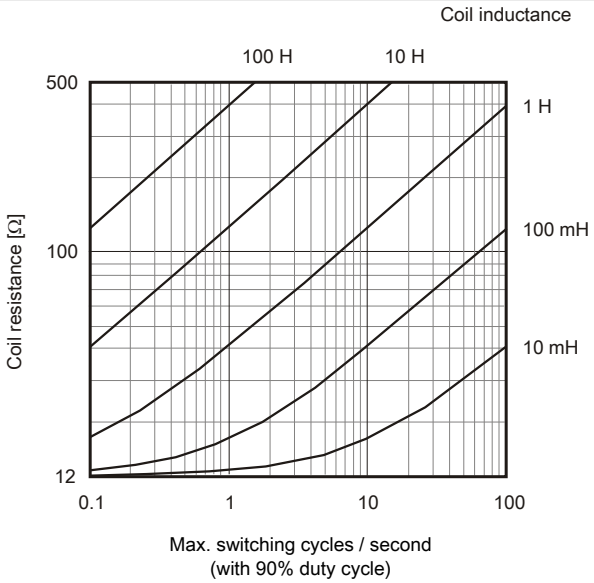
9 Connection example



10 Output circuit diagram



11 Switching inductive loads



12 Derating / Operation with 2 A

The outputs of the module can handle up to 2 A. With a summation current of 8 A, no more than 4 channels are operable at full load. To ensure optimal use of the module, it is important to assign the channels properly, and to keep in mind a potential derating.

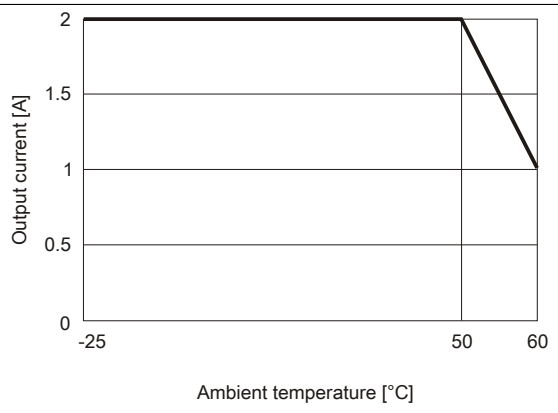
Correct channel assignment is important, since the 8 outputs are divided between 2 output drivers. The channels operated with 2 A must therefore be evenly divided between both output drivers.

Output driver 1: Channels 1 to 4
Output driver 2: Channels 5 to 8

The following table provides an overview of the number of fully used channels, the resulting best distribution, and a potential derating.

Number of channels using 2 A	Division	Derating
1	Any	No
2	1st channel with 2 A ... channel no. 1 to 4 2nd channel with 2 A ... channel no. 5 to 8	No
3	Assign all even or all odd channel numbers. Examples: 1, 3, 5 2, 4, 6 3, 5, 7 4, 6, 8	 Channels 1 and 3 Channels 2 and 4 Channels 5 and 7 Channels 6 and 8
4	Assign all even or all odd channel numbers. Possible divisions: 1, 3, 5, 7 2, 4, 6, 8	 On each channel On each channel

Derating when 3 or 4 channels are operated with 2 A:



13 Register description

13.1 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.

13.2 Function model 0 - Standard

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
Digital signal - Communication						
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				
28	Status of the actuator supply for digital outputs 1 to 8	USINT	•			
	StatusSupplyOutput01	Bit 0				
	...	...				
	StatusSupplyOutput08	Bit 7				
8192	asy_ModulID	UINT		•		
8196	asy_SupplyStatus	USINT		•		
8208	asy_SupplyInput	USINT		•		
8210	asy_SupplyOutput	USINT		•		

13.3 Function model 254 - Bus controller

Register	Offset[1)]	Name	Data type	Read		Write	
				Cyclic	Acyclic	Cyclic	Acyclic
Digital signal - Communication							
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				
28	-	Status of the actuator supply for digital outputs 1 to 8	USINT		•		
		StatusSupplyOutput01	Bit 0				
		...	...				
		StatusSupplyOutput08	Bit 7				
8192	-	asy_ModulID	UINT		•		
8196	-	asy_SupplyStatus	USINT		•		
8208	-	asy_SupplyInput	USINT		•		
8210	-	asy_SupplyOutput	USINT		•		

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

13.3.1 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).

13.3.2 CAN I/O bus controller

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

13.4 Digital signal - Communication

13.4.1 Digital outputs

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

13.4.1.1 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

13.4.2 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.

13.4.2.1 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

13.4.3 Monitoring status of actuator supply

The actuator supply is monitored for each channel. The status of each individual channel can be read.

13.4.3.1 Status of the actuator supply for digital outputs 1 to 8

Name:
StatusSupplyOutput01 to StatusSupplyOutput08

The status of the actuator supply for digital outputs 1 to 8 is mapped in this register.

Data type	Value
USINT	See bit structure.

Bit structure:

Bit	Name	Value	Information
0	StatusSupplyOutput01	0	Channel 01: Supply within valid range
		1	Channel 01: Short circuit or overload
...		...	
8	StatusSupplyOutput08	0	Channel 08: Supply within valid range
		1	Channel 08: Short circuit or overload

13.4.4 Reading the module ID

Name:
asy_ModulID

This register offers the possibility to read the module ID.

Data type	Values
UINT	Module ID

13.4.5 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	

13.4.6 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

13.4.7 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

13.5 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
150 µs

13.6 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
150 µs