

X20(c)SLXx1x

Information:

B&R makes every effort to keep data sheets as current as possible. From a safety point of view, however, the current version of the data sheet must always be used.

The certified, currently valid data sheet is available for download on the B&R website (www.br-automation.com).

Information:

This data sheet must be used with mapp Safety.

B&R safety technology can still be used in Safety Releases ≤ 1.10 , however. The documentation is available for download on the B&R website (www.br-automation.com).

For additional information about mapp Safety, additional technical descriptions (e.g. connection examples and error detection) as well as generally valid contents (intended use, etc.), see section Safety technology in Automation Help.

Organization of notices

Safety notices

Contain **only** information that warns of dangerous functions or situations.

Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in minor injury or damage to property.
Notice!	Failure to observe these safety guidelines and notices can result in damage to property.

Table 1: Organization of safety notices

General notices

Contain **useful** information for users and instructions for avoiding malfunctions.

Signal word	Description
Information:	Useful information, application tips and instructions for avoiding malfunctions.

Table 2: Organization of general notices

1 General information

The modules are equipped with SafeLOGIC functionality that allows them to safely execute applications designed in SafeDESIGNER. The modules can be used in safety applications up to PL e or SIL 3.

The SafeLOGIC controller coordinates the safety-related communication of all modules involved in the application. In this context, the SafeLOGIC controller also monitors the configuration of these modules and autonomously carries out parameter downloads to the modules if necessary. This guarantees a consistent and correct module configuration in the network from a safety point of view in all scenarios involving module replacement and service. For X20 SafeLOGIC products, these services are executed by the X20 SafeLOGIC controller. For X20 SafeLOGIC-X and X90 SafeLOGIC products, these services are executed on the standard CPU in interaction with Automation Runtime. The safety-related characteristics for applications up to PL e or SIL 3 are provided in both variants, however.

X20 SafeLOGIC-X and X90 SafeLOGIC products also have the I/O properties described in section "SafeIO" in Automation Help.

- openSAFETY manager for up to 10 / 20 / 100 / 280 SafeNODES
- Flexibly programmable using Automation Studio / SafeDESIGNER
- Innovative management of safe machine options (SafeOPTION)
- Parameter and configuration management

2 Coated modules

Coated modules are X20 modules with a protective coating for the electronics component. This coating protects X20c modules from condensation.

The modules' electronics are fully compatible with the corresponding X20 modules.

Information:

For simplification purposes, only images and module IDs of uncoated modules are used in this data sheet.

The coating has been certified according to the following standards:

- Condensation: BMW GS 95011-4, 2x 1 cycle
- Corrosive gas: EN 60068-2-60, Method 4, exposure 21 days

Contrary to the specifications for X20 system modules without safety certification and despite the tests performed, X20 safety modules are **NOT suited for applications with corrosive gases (EN 60068-2-60)!**



2.1 Starting temperature

The starting temperature describes the minimum permissible ambient temperature in a voltage-free state at the time the coated module is switched on. This is permitted to be as low as -40°C. During operation, the conditions as specified in the technical data continue to apply.

Information:

It is important to absolutely ensure that there is no forced cooling by air currents in the closed control cabinet, e.g. due to the use of a fan or ventilation slots.

Information:

The starting temperature is not supported by all modules mentioned in this data sheet. For the modules that are actually supported, see the technical data.

3 Order data


	
X20SLX210 / X20SLX410	X20SLX811
	X20SLX910
Order number	Short description
Intelligent programmable modules	
X20SLX210	X20 safe digital input module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 2 safe type A digital inputs, configurable input filter, 2 pulse outputs, 24 VDC
X20SLX410	X20 safe digital input module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 4 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC
X20cSLX410	X20 safe digital input module, coated, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 4 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC
X20SLX811	X20 safe digital input module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 8 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC, single-width
X20SLX910	X20 safe digital input module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 20 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC
X20cSLX910	X20 safe digital input module, coated, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 20 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC
Required accessories	
Bus modules	
X20BM13	X20 bus module, for X20 SafeIO modules, internal I/O power supply connected through, single-width
X20BM16	X20 bus module, for X20 SafeIO modules, with node number switch, internal I/O power supply connected through, single-width
X20BM33	X20 bus module, for X20 SafeIO modules, internal I/O power supply connected through
X20BM36	X20 bus module, for X20 SafeIO modules, with node number switch, internal I/O power supply connected through
X20cBM33	X20 bus module, coated, for X20 SafeIO modules, internal I/O power supply connected through
Terminal blocks	
X20TB52	X20 terminal block, 12-pin, safety-keyed

Table 3: X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Order data

4 Technical data

Order number	X20SLX210	X20SLX410	X20cSLX410	X20SLX811	X20SLX910	X20cSLX910
Short description						
I/O module	2 safe type A digital inputs, 2 pulse outputs, 24 VDC, SafeLOGIC-X technology	4 safe type A digital inputs, 4 pulse outputs, 24 VDC, SafeLOGIC-X technology		8 safe type A digital inputs, 4 pulse outputs, 24 VDC, SafeLOGIC-X technology	20 safe type A digital inputs, 4 pulse outputs, 24 VDC, SafeLOGIC-X technology	
General information						
B&R ID code	0xC5B0	0xC5B2	0xE288	0xE757	0xC5B1	0xE4D1
System requirements						
Automation Studio	4.0.16 or later			4.0 or later	4.0.16 or later	
Automation Runtime	From Safety Release 1.7 to 1.9: F4.06 or later Safety Release 1.10 or later: B4.25 or later			B4.25 or later	From Safety Release 1.7 to 1.9: F4.06 or later Safety Release 1.10 or later: B4.25 or later	
SafeDESIGNER	3.1.0 or later			4.2.0 or later	3.1.0 or later	
Safety Release	1.7 or later			1.10 or later	1.7 or later	
mapp Technology Package ¹⁾	mapp Safety 5.7.0 or later					
Status indicators	I/O function per channel, operating state, module status					
Diagnostics						
Module run/error	Yes, using LED status indicator and software					
Inputs	Yes, using LED status indicator and software					
Max. I/O cycle time	1600 µs			1 ms	1600 µs	
Power consumption						
Bus	0.25 W	0.32 W		0.4 W		
Internal I/O	1 W	1.25 W		2.5 W	1.6 W	
Additional power dissipation caused by actuators (resistive) [W] ²⁾	0.3	0.6		0.8	0.6	
Electrical isolation						
Channel - Bus	Yes					
Channel - Channel	No					
Certifications						
CE	Yes					
UKCA	Yes					
Functional safety	cULus FSPC E361559 Energy and industrial systems Certified for functional safety ANSI UL 1998:2013					
Functional safety	IEC 61508:2010, SIL 3 EN 62061:2005/A2:2015, SIL 3 EN ISO 13849-1:2015, Cat. 4 / PL e IEC 61511:2004, SIL 3					
Functional safety	EN 50156-1:2004					
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÜ 09 ATEX 0083X					
UL	cULus E115267 Industrial control equipment					
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5			-	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5	
DNV	Temperature: A (0 - 45°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck)			In preparation	Temperature: A (0 - 45°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck)	
LR	ENV1			-	ENV1	
KR	Yes			-	Yes	
ABS	Yes			-	Yes	
BV	EC21B Temperature: 5 - 45°C Vibration: 0.7 g EMC: Bridge and open deck			-	EC21B Temperature: 5 - 45°C Vibration: 0.7 g EMC: Bridge and open deck	
EAC	Yes					
KC	Yes		-		Yes	-
Safety characteristics						
EN ISO 13849-1:2015						
Category	Cat. 3 when using individual input channels, Cat. 4 when using input channel pairs (e.g. SI1 and SI2) or more than 2 input channels ³⁾					
PL	PL e					
DC	>94%					
Mission time	Max. 20 years					

Table 4: X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Technical data

Order number	X20SLX210	X20SLX410	X20cSLX410	X20SLX811	X20SLX910	X20cSLX910
IEC 61508:2010, IEC 61511:2004, EN 62061:2013						
SIL CL				SIL 3		
SFF				>90%		
PFH / PFH _d						
openSAFETY wired				Negligible		
openSAFETY wireless				<1*10 ⁻¹⁴ * Number of openSAFETY packets per hour		
Proof test interval (PT)				20 years		
Safe digital inputs						
EN ISO 13849-1:2015						
MTTFD per channel				100 years when using individual input channels, 2500 years when using input channel pairs (e.g. SI1 and SI2) or more than 2 input channels		
IEC 61508:2010, IEC 61511:2004, EN 62061:2013						
PFH / PFH _d per channel				<1*10 ⁻¹⁰		
PFD per channel				<2*10 ⁻⁵		
Functionality						
Communication with each other				Communication only possible with SafeLOGIC controller X20(c)SL81xx Max. 1 active SafeLOGIC-X controller per standard CPU (e.g. X20(c)CPxxxx) ⁴⁾		
Support for Safe Commissioning Options						
BOOL				64		
INT		-		16		-
UINT		-		16		-
DINT		-		16		-
UDINT		-		16		-
SafeMOTION support				Yes		
Max. number of SafeMOTION axes	4, depends on the data width of the modules used			6, depends on the data width of the modules used	4, depends on the data width of the modules used ⁵⁾	
Timing precision				Time * 0.05 + Cycle time of the safety application		
Shortest task class cycle time				2 ms		
Max. number of SafeNODEs				10, depends on the data width of the modules used		
Data exchange between CPU and SafeLOGIC controller						
Max. total data width for each direction ⁶⁾				16 bytes		
Max. number of data points for each direction						
BOOL				96		
INT				8		
UINT				8		
DINT				4		
UDINT				4		
Data exchange between SafeDOMAIN and SafeDOMAIN ⁷⁾						
Use as Managing SafeDOMAIN				Yes, starting with mapp Safety 5.10.0 and hardware upgrade 2.2.1.0		
Use as Connected SafeDOMAIN		No		Yes, starting with mapp Safety 5.13.0, hardware upgrade 2.4.0.0 and Automation Runtime A4.90	No	
Max. total data width for each direction ⁶⁾				8 bytes		
Max. total number of data points for each direction ⁸⁾		2		4	2	
Max. number of data points for each direction						
BOOL				16		
INT				2		
UINT				2		
DINT				2		
UDINT				2		
Max. number of linked Managing SafeDOMAINs		0		0, starting with mapp Safety 5.13.0, hardware upgrade 2.4.0.0 and Automation Runtime A4.90: 1	0	

Table 4: X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Technical data

Order number	X20SLX210	X20SLX410	X20cSLX410	X20SLX811	X20SLX910	X20cSLX910
Limit values for SafeDESIGNER application						
Max. resources available for SafeDESIGNER info window entries ⁹⁾						
FB instances			256			
Marker memory			5120 bytes (0x1400)			
Stack memory		2048 bytes		4096 bytes		2048 bytes
Memory for safe input data			128 bytes, 68 bytes of which are usable for modules			
Memory for safe output data			64 bytes			
Memory for standard input data			64 bytes			
Memory for standard output data			64 bytes			
Marker count			256			
Additional SafeDESIGNER limit values						
Max. number of function block types			64			
Max. number of force variables			8			
Max. number of variable with variable status			128			
I/O power supply						
Nominal voltage			24 VDC			
Voltage range			24 VDC -15% / +20%			
Integrated protection			Reverse polarity protection			
Safe digital inputs						
Quantity	2	4	8	20		
Variant			Type A			
Nominal voltage			24 VDC			
Input characteristics per EN 61131-2			Type 1			
Input filter						
Hardware			≤150 µs			
Software			Configurable between 0 and 500 ms			
Input circuit			Sink			
Input voltage			24 VDC -15% / +20%			
Input current at 24 VDC ¹⁰⁾			Min. 2 mA to max. 3.28 mA			
Input resistance			Min. 7.33 kΩ			
Error detection time		200 ms	100 ms	200 ms		
Insulation voltage between channel and bus			500 V _{eff}			
Switching threshold						
Low			<5 VDC			
High			>15 VDC			
Line length between signal source (pulse output or external signal) and input			Max. 60 m with unshielded line Max. 400 m with shielded line			
Pulse outputs						
Quantity	2	4				
Variant			Push-Pull			
Nominal output current			50 mA			
Output protection			Shutdown of individual channels in the event of overload or short circuit ¹¹⁾			
Peak short-circuit current		25 A for 15 µs	0.5 A for 120 µs	25 A for 15 µs		
Short-circuit current		100 mA _{eff}	15 mA _{eff}	100 mA _{eff}		
Leakage current when the output is switched off			0.1 mA			
R _{DS(on)}		60 Ω	80 Ω	60 Ω		
Switching voltage			I/O power supply minus voltage drop due to R _{DS(on)}			
Total nominal current	100 mA		200 mA			
Operating conditions						
Mounting orientation						
Horizontal			Yes			
Vertical			Yes			
Installation elevation above sea level			0 to 2000 m, no limitation			
Degree of protection per EN 60529			IP20			
Ambient conditions						
Temperature						
Operation						
Horizontal mounting orientation	0 to 60°C	-25 to 60°C	0 to 60°C	-25 to 60°C		
Vertical mounting orientation	0 to 50°C	-25 to 50°C	0 to 50°C	-25 to 50°C		
Derating			See section "Derating".			
Starting temperature	-	-	Yes, -40°C	-		
Storage			-40 to 85°C			
Transport			-40 to 85°C			

Table 4: X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Technical data

Order number	X20SLX210	X20SLX410	X20cSLX410	X20SLX811	X20SLX910	X20cSLX910
Relative humidity						
Operation	5 to 95%, non-condensing		Up to 100%, condensing	5 to 95%, non-condensing		Up to 100%, condensing
Storage	5 to 95%, non-condensing					
Transport	5 to 95%, non-condensing					
Mechanical properties						
Note	Order 1x safety-keyed terminal block separately. Order 1x safety-keyed bus module separately.			Order 1x safety-keyed terminal block separately. Order 1x safety-keyed bus module (single-width) separately.	Order 2x safety-keyed terminal block separately. Order 1x safety-keyed bus module separately.	
Pitch	25 ^{+0.2} mm			12.5 ^{+0.2} mm	25 ^{+0.2} mm	

Table 4: X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Technical data

- 1) The system requirements of the mapp Technology Package must be observed (see Automation Help).
- 2) Number of outputs x $R_{DS(on)}$ x Nominal output current². This value also applies to sensors that are supplied via these outputs. For a calculation example, see section "Mechanical and electrical configuration" in the X20 system user's manual.
- 3) In addition, the danger notices in the technical data sheet and section "Safety technology" in Automation Help must be observed.
- 4) If there are multiple SafeLOGIC-X controllers in the Automation Studio hardware tree, all but 1 must be disabled.
- 5) This module only supports SafeMOTION 1-axis modules.
- 6) Each 8 BOOL are combined to 1 byte. Possible stuffing bytes due to alignment must be taken into account. For additional information, see section "Real-time operating system → Target systems → Target systems - SG4 → Runtime behavior - SG4 → Alignment" in Automation Help.
- 7) For additional information about SafeDOMAIN-to-SafeDOMAIN communication, see section "SafeDOMAIN-to-SafeDOMAIN communication" in Automation Help.
- 8) It is important to note that 8 BOOL count as 1 data point.
- 9) For a parameter description, see section "Message window" in the SafeDESIGNER documentation.
- 10) The input current specifications refer to the switched-on state of the input.
- 11) The protective function is provided for max. 30 minutes for a continuous short circuit.

Derating

The derating curve refers to standard operation and can be shifted to the right by the specified derating bonus by the following measures in a horizontal mounting orientation.

The derating curve requires that the pulse outputs are used exclusively for supplying the safe digital inputs and not for supplying power to electronic actuators.

Module	X20SLX210	X20SLX410	X20SLX811	X20SLX910
Derating bonus				
I/O power supply / Input voltage: Max. 24 VDC	+2.5°C			+5°C
I/O power supply / Input voltage: Max. 20.4 VDC	+2.5°C		+5°C	+5°C
Dummy module on the left	+0°C		+2.5°C	+0°C
Dummy module on the right	+2.5°C			
Dummy module on the left and right	+5°C			
With double PFH / PFH _d	+0°C			

Table 5: Derating bonus

The number of inputs that should be used at the same time depends on the operating temperature and the mounting orientation. The resulting amount can be looked up in the following table.

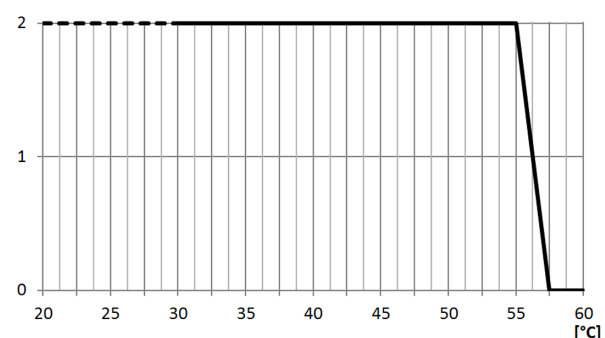
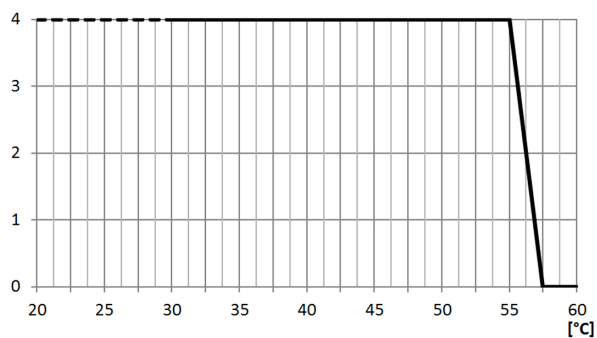
Horizontal (0 to 60°C, coated: -25 to 60°C)	Vertical (0 to 50°C, coated: -25 to 50°C)
X20SLX210	
	No derating

Table 6: Derating in relation to operating temperature and mounting orientation

Horizontal (0 to 60°C, coated: -25 to 60°C)

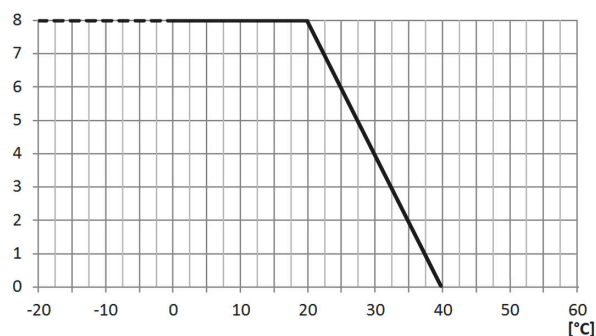
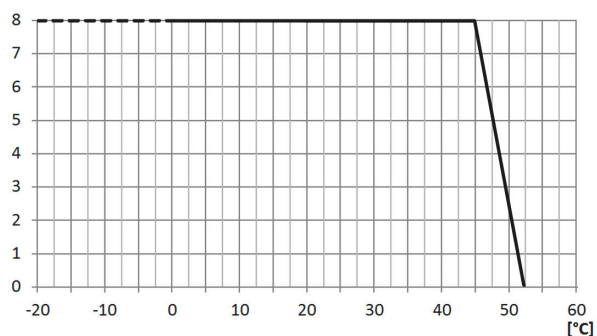
Vertical (0 to 50°C, coated: -25 to 50°C)

X20SLX410



No derating

X20SLX811



X20SLX910

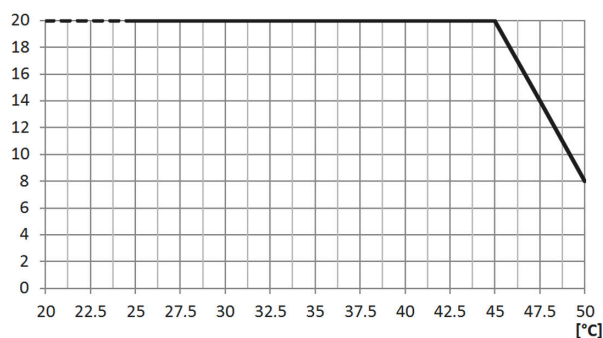
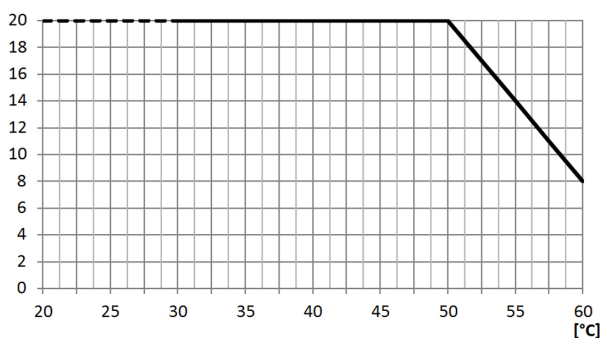


Table 6: Derating in relation to operating temperature and mounting orientation

Information:

Regardless of the values specified in the derating curve, the module cannot be operated above the values specified in the technical data.

Danger!

Operation outside the technical data is not permitted and can result in dangerous states.

Information:

For additional information about installation, see section "Installation notes for X20 modules" in Automation Help.

5 LED status indicators




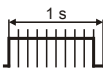
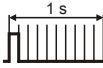
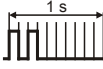

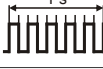

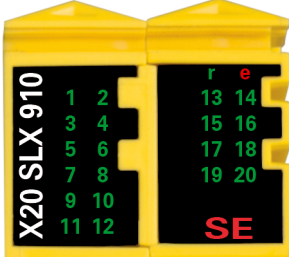
Figure	LED	Color	Status	Description
 X20SLX210	r	Green	Off	No power to module
			Single flash	Mode "Reset"
			Double flash	Updating firmware
			Blinking	Mode PREOPERATIONAL
			On	Mode RUN
	e	Red	Off	Module not supplied with power or everything OK
			Pulsating	Bootloader mode
			Triple flash	Updating safety-related firmware
			On	Error or I/O component not provided with voltage
	e + r	Solid red / Single green flash		Invalid firmware
1 to 20	Input state of the corresponding digital input The number of channel LEDs varies depending on the number of channels on the module type.			
	Red	On	Warning/Error on an input channel	
		Blinking (only for X20SLX910 and X20SLX811)	Error in dual-channel evaluation (synchronous blinking of 2 affected channels)	
		All on	Error on all channels or startup not yet completed	
	Green	On	Input set	
 X20SLX410	OO	These LEDs may not be available depending on the module type. Errors in dual-channel evaluation are indicated by channel LEDs 1 to 20 in this case.		
		Open - Open: Dual-channel evaluation on channels 1 and 2 using function block "Equivalent"		
	Red	On	Warning/Error on this evaluation channel	
		All on	Error on all channels or startup not yet completed	
	Green	On	Evaluation channel set	
OC	These LEDs may not be available depending on the module type. Errors in dual-channel evaluation are indicated by channel LEDs 1 to 20 in this case.			
	Open - Closed: Dual-channel evaluation on channels 1 and 2 using function block "Antivalent"			
	Red	On	Warning/Error on this evaluation channel	
		All on	Error on all channels or startup not yet completed	
	Green	On	Evaluation channel set	
 X20SLX811	SE	Red	Off	RUN mode or I/O component not supplied with voltage, safety firmware in OPERATIONAL state
				Boot phase, missing X2X Link or defective processor
				Safety PREOPERATIONAL state or "SafeOSstate!=RUN"
				Safe communication channel not OK, openSAFETY connection valid problem or "SafeOSstate!=RUN"
				Boot phase, faulty firmware, setup mode active For details about setup mode, see section "Setup mode" in Automation Help.
				Test/Pilot firmware or safety application created with test/pilot version of SafeDESIGNER
				SafeDESIGNER in "Debug" mode
			On	Safety state active for the entire module (= state "FailSafe")
			The "SE" LEDs separately indicate the status of safety processor 1 ("S" LED) and safety processor 2 ("E" LED).	
 X20SLX910				

Table 7: Status indicators

Danger!

Constantly lit "SE" LEDs indicate a defective module that must be replaced immediately. It is your responsibility to ensure that all necessary repair measures are initiated after an error occurs since subsequent errors can result in a hazard!

6 Pinouts

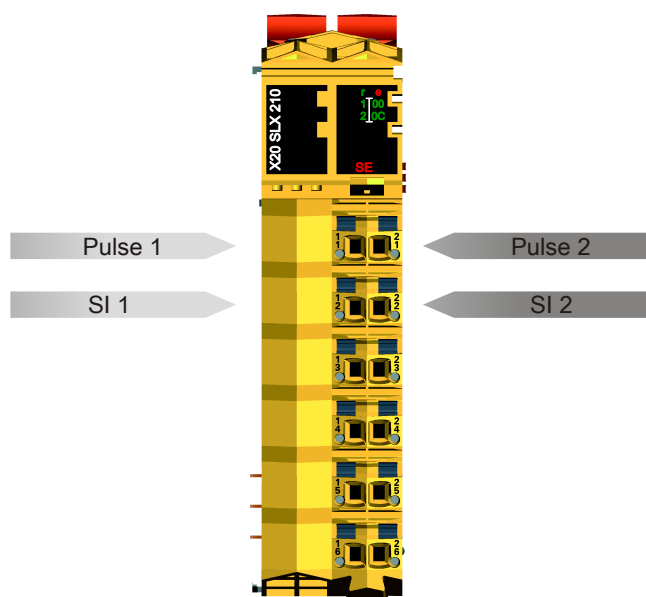


Figure 1: X20SLX210 - Pinout

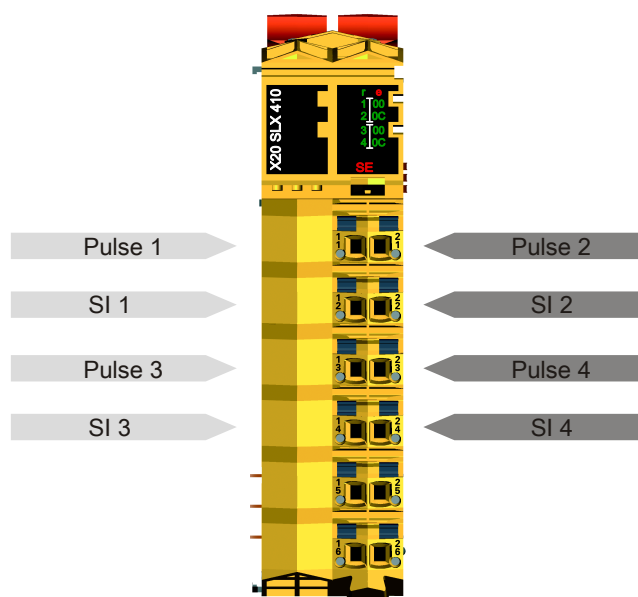


Figure 2: X20SLX410 - Pinout

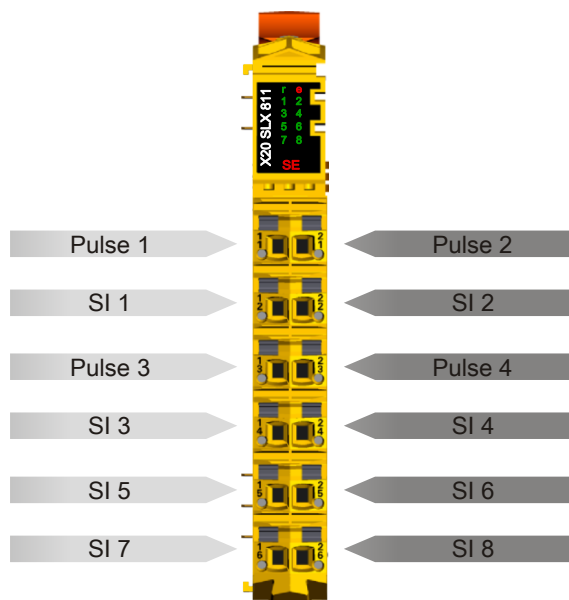


Figure 3: X20SLX811 - Pinout

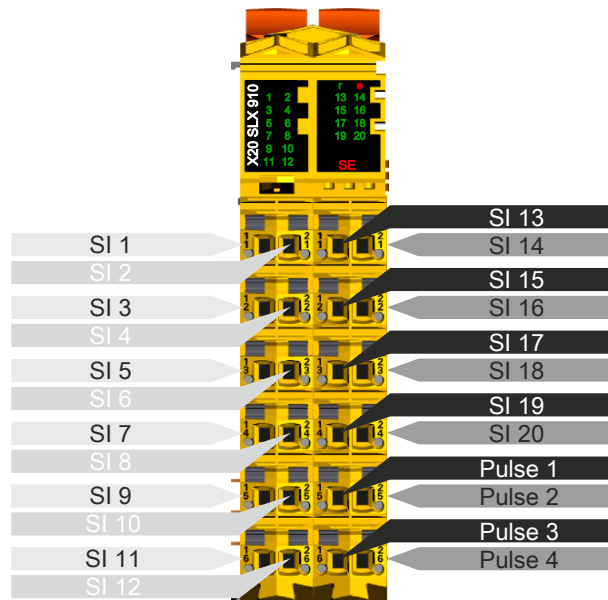


Figure 4: X20SLX910 - Pinout

7 Input circuit diagram

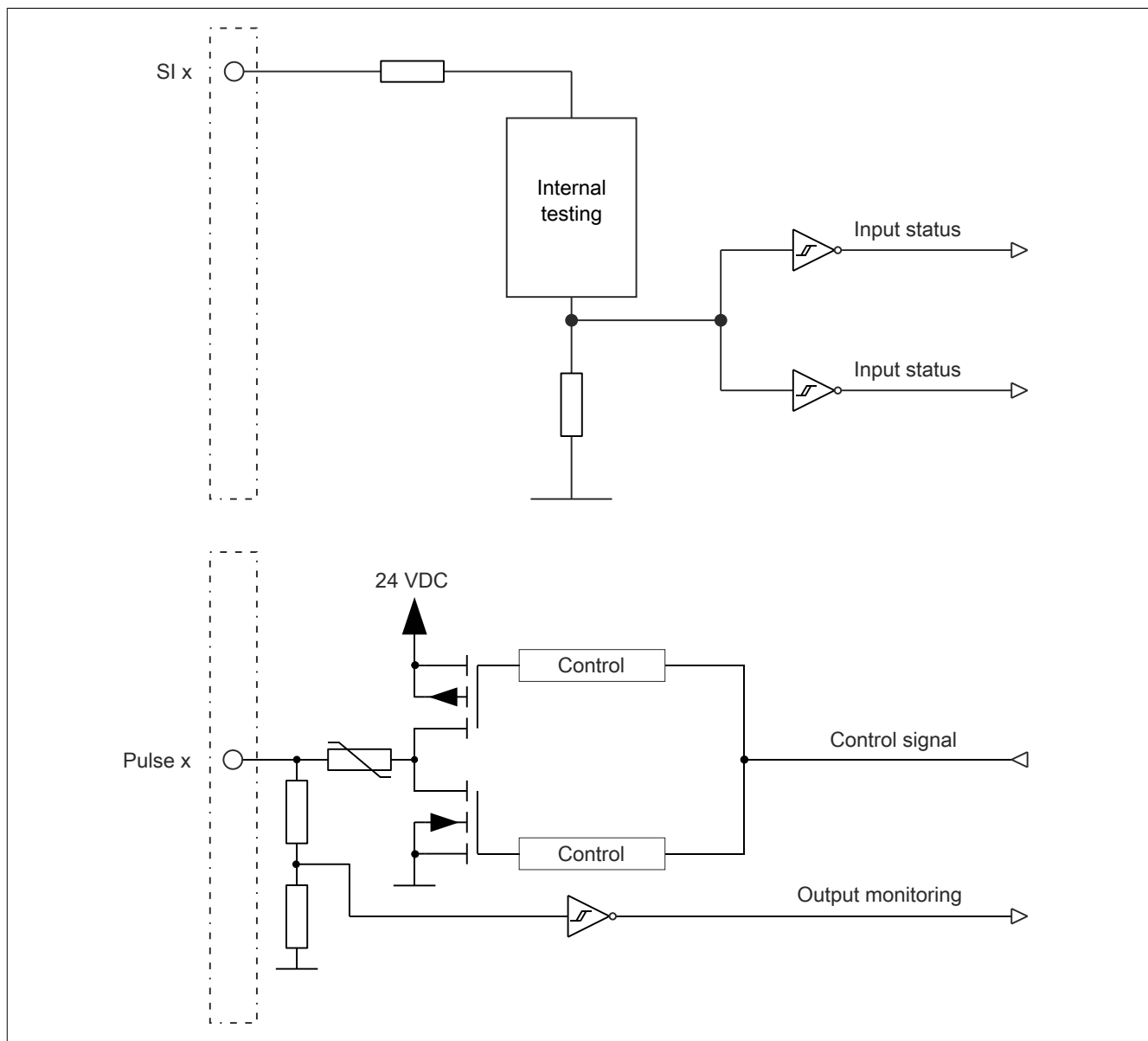


Figure 5: Input circuit diagram

8 Register description

8.1 Parameters in the I/O configuration

Group: Function model

Parameter	Description	Default value	Unit
Function model	This parameter is reserved for future functional expansions.	Default	-

Table 8: I/O configuration parameters: Function model

Group: General

Parameter	Description	Default value	Unit
Module supervised	System behavior when a module is missing	On	-
	Parameter value	Description	
	On	A missing module triggers service mode.	
	Off	A missing module is ignored.	
Channel state information	This parameter enables/disables channel-specific status information in the I/O mapping.	On	-
State number for dual-channel evaluation	This parameter enables/disables the status information of dual-channel evaluation. This parameter may not be available depending on the module type.	Off	-
SafeDOMAIN ID	In applications with multiple SafeLOGIC controllers, this parameter defines the module's association with a particular SafeLOGIC controller. <ul style="list-style-type: none">Permissible values: 1 to 1000	Assigned automatically	-
SafeNODE ID	Unique safety address of the module <ul style="list-style-type: none">Permissible values: 1	1	-
Manual cycle time configuration	Specification for the cycle time mode	No	-
	Parameter value	Description	
	Yes	Operation with a fixed cycle time (in accordance with parameter "Cycle time").	
	No	Operation with a dynamic cycle time. The actual cycle time is influenced by the SafeDESIGNER application and the value of data point "SLXioCycle" and can change at runtime. The actual cycle time of the safety application can be seen in the SafeLOGIC "Info" dialog box.	
Cycle time (Only visible if "Manual cycle time configuration = Yes")	This parameter determines the cycle time of the safety application. <ul style="list-style-type: none">Permissible values: 2400 to 28,000 µs (corresponds to 2.4 to 28 ms)	8000	µs

Table 9: I/O configuration parameters: General

Information:

Parameter "Cycle time" must be greater than the processing time for the safety application. The processing time can be determined in the online dialog window using function "Info". If the parameter "Cycle time" is less than or too close to the necessary processing time, a cycle time violation can occur.

For additional information, see section "Dialog box 'SafePLC info' in SafeDESIGNER" in Automation Help.

Group: SafeDESIGNER-to-SafeLOGIC communication

When SPROXY is enabled, the SafeLOGIC controller can be accessed via a TCP/IP port on the standard CPU. This uses SafeDESIGNER setting "SL - Communication through BR-CPU".

Parameter	Description	Default value	Unit
Server communication port	TCP/IP port number used to access the SafeLOGIC controller <ul style="list-style-type: none"> Recommended values: 50,000 to 50,100 <p>Note: If multiple SafeLOGIC controllers are being used in the project, then a different port number must be configured for each one!</p>	Assigned automatically	-

Table 10: I/O configuration parameters: SafeDESIGNER-to-SafeLOGIC communication

Group: CPU-to-SafeLOGIC communication

Parameter	Description	Default value	Unit
Number of BOOL channels	Number of BOOL channels from the CPU to the SafeLOGIC controller. <ul style="list-style-type: none"> Permissible values: 0, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96. 	8	-
Number of INT channels	Number of INT channels from the CPU to the SafeLOGIC controller. <ul style="list-style-type: none"> Permissible values: 0 to 8. 	0	-
Number of UINT channels	Number of UINT channels from the CPU to the SafeLOGIC controller. <ul style="list-style-type: none"> Permissible values: 0 to 8. 	0	-
Number of DINT channels	Number of DINT channels from the CPU to the SafeLOGIC controller. <ul style="list-style-type: none"> Permissible values: 0 to 4. 	0	-
Number of UDINT channels	Number of UDINT channels from the CPU to the SafeLOGIC controller. <ul style="list-style-type: none"> Permissible values: 0 to 4. 	0	-

Table 11: I/O configuration parameters: CPU-to-SafeLOGIC communication

Group: SafeLOGIC-to-CPU communication

Parameter	Description	Default value	Unit
Number of BOOL channels	Number of BOOL channels from the SafeLOGIC controller to the CPU. <ul style="list-style-type: none"> Permissible values: 0, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96. 	8	-
Number of INT channels	Number of INT channels from the SafeLOGIC controller to the CPU. <ul style="list-style-type: none"> Permissible values: 0 to 8. 	0	-
Number of UINT channels	Number of UINT channels from the SafeLOGIC controller to the CPU. <ul style="list-style-type: none"> Permissible values: 0 to 8. 	0	-
Number of DINT channels	Number of DINT channels from the SafeLOGIC controller to the CPU. <ul style="list-style-type: none"> Permissible values: 0 to 4. 	0	-
Number of UDINT channels	Number of UDINT channels from the SafeLOGIC controller to the CPU. <ul style="list-style-type: none"> Permissible values: 0 to 4. 	0	-

Table 12: I/O configuration parameters: SafeLOGIC-to-CPU communication

Group: SafeDOMAIN-to-SafeDOMAIN communication - Only X20SLX811

Starting with mapp Safety 5.13.0, hardware upgrade 2.4.0.0 and Automation Runtime A4.90

For additional information about SafeDOMAIN-to-SafeDOMAIN communication, see section "SafeDOMAIN-to-SafeDOMAIN communication" in Automation Help.

Parameter	Description	Default value	Unit
Group: Managing SafeDOMAIN connection xx Configuration of the SafeDOMAINs to which this SafeDOMAIN establishes a connection.			
SafeDOMAIN ID of connection xx	SafeDOMAIN ID of the Managing SafeDOMAIN to which a connection should be established	0	-
Group: Output channels This data is generated by the connected Managing SafeDOMAIN.			
Number of BOOL channels	Number of BOOL channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0, 8, 16.	8	-
Number of INT channels	Number of INT channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0 to 2.	0	-
Number of UINT channels	Number of UINT channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0 to 2.	0	-
Number of DINT channels	Number of DINT channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0 to 2.	0	-
Number of UDINT channels	Number of UDINT channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0 to 2.	0	-
Group: Input channels This data is received by the connected Managing SafeDOMAIN.			
Number of BOOL channels	Number of BOOL channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0, 8, 16.	8	-
Number of INT channels	Number of INT channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0 to 2.	0	-
Number of UINT channels	Number of UINT channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0 to 2.	0	-
Number of DINT channels	Number of DINT channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0 to 2.	0	-
Number of UDINT channels	Number of UDINT channels from the SafeDOMAIN to the SafeDOMAIN • Permissible values: 0 to 2.	0	-

Table 13: I/O configuration parameters: SafeDOMAIN-to-SafeDOMAIN communication

8.2 Parameters in SafeDESIGNER

8.2.1 SafeLOGIC-X basic settings

Group: Basic

Parameter	Description	Default value	Unit						
Min. required firmware revision	This parameter is reserved for future functional expansions.	Basic release	-						
Node guarding timeout	Timeout for changing the safety modules to the PRE_OPERATIONAL state after the SafeLOGIC controller drops out or if there is a communication problem between the safety module and the SafeLOGIC controller. This parameter also defines how long it takes for the SafeLOGIC controller to detect a missing module. <ul style="list-style-type: none">Permissible values: 30 to 300 s Notes <ul style="list-style-type: none">The shorter the time, the greater the amount of asynchronous data traffic.This setting is not critical to safety functionality. The time for safely cutting off actuators is determined independently of this.	60	s						
Auto-acknowledge SafeKEY exchange	This parameter enables automatic acknowledgment of a SafeKEY exchange (acknowledgment request "SafeKEY exchange").	No	-						
<table><tr><th>Parameter value</th><th>Description</th></tr><tr><td>Yes - Warning</td><td>Automatic acknowledgment of SafeKEY exchange is enabled.</td></tr><tr><td>No</td><td>Automatic acknowledgment of SafeKEY exchange is not enabled.</td></tr></table>				Parameter value	Description	Yes - Warning	Automatic acknowledgment of SafeKEY exchange is enabled.	No	Automatic acknowledgment of SafeKEY exchange is not enabled.
Parameter value	Description								
Yes - Warning	Automatic acknowledgment of SafeKEY exchange is enabled.								
No	Automatic acknowledgment of SafeKEY exchange is not enabled.								
Process data transfer rate	This parameter defines the base transfer rate for process data.	High	-						
<table><tr><th>Parameter value</th><th>Description</th></tr><tr><td>High</td><td>Normal transfer rate.</td></tr><tr><td>Low</td><td>Reduced transfer rate to support networks with low transfer rates (data transmission time >1 s). In rare cases, the connection to SafeNODEs present in the network may be aborted. Connection aborts to Connected SafeDOMAINs are not affected. Connection aborts to SafeNODEs can be avoided by setting up a new SafeDOMAIN in a separate network with a normal transfer rate and connecting this network to the original network with a reduced transfer rate via SafeDOMAIN-to-SafeDOMAIN communication.</td></tr></table>				Parameter value	Description	High	Normal transfer rate.	Low	Reduced transfer rate to support networks with low transfer rates (data transmission time >1 s). In rare cases, the connection to SafeNODEs present in the network may be aborted. Connection aborts to Connected SafeDOMAINs are not affected. Connection aborts to SafeNODEs can be avoided by setting up a new SafeDOMAIN in a separate network with a normal transfer rate and connecting this network to the original network with a reduced transfer rate via SafeDOMAIN-to-SafeDOMAIN communication.
Parameter value	Description								
High	Normal transfer rate.								
Low	Reduced transfer rate to support networks with low transfer rates (data transmission time >1 s). In rare cases, the connection to SafeNODEs present in the network may be aborted. Connection aborts to Connected SafeDOMAINs are not affected. Connection aborts to SafeNODEs can be avoided by setting up a new SafeDOMAIN in a separate network with a normal transfer rate and connecting this network to the original network with a reduced transfer rate via SafeDOMAIN-to-SafeDOMAIN communication.								
Availability source	This parameter sets the source for the availability settings of the individual SafeNODEs.	SafeDESIGNER	-						
<table><tr><th>Parameter value</th><th>Description</th></tr><tr><td>SafeDESIGNER</td><td>The availability of the SafeNODEs is defined in SafeDESIGNER.</td></tr><tr><td>SafeCOMMISSIONING</td><td>The availability of SafeNODEs is defined via "SafeNODE availability" parameters in SafeCOMMISSIONING.</td></tr></table>				Parameter value	Description	SafeDESIGNER	The availability of the SafeNODEs is defined in SafeDESIGNER.	SafeCOMMISSIONING	The availability of SafeNODEs is defined via "SafeNODE availability" parameters in SafeCOMMISSIONING.
Parameter value	Description								
SafeDESIGNER	The availability of the SafeNODEs is defined in SafeDESIGNER.								
SafeCOMMISSIONING	The availability of SafeNODEs is defined via "SafeNODE availability" parameters in SafeCOMMISSIONING.								

Table 14: SafeDESIGNER parameters: Basic

Information:

Startup time is also affected by the asynchronous bandwidth on the POWERLINK network. For ways to optimize, see section Communication → POWERLINK → General information → Multiple asynchronous send in Automation Help.

Information:

The information in section "Automatic acknowledgment" in Automation Help must be observed when using parameter "Auto-acknowledge SafeKEY exchange".

Group: Safety response time default values

The parameters for the safety response time are generally set in the same way for all stations involved in the application. This is why these parameters are configured for the SafeLOGIC controller in the "Safety response time default values" group in SafeDESIGNER.

If "Manual configuration = No" is set for the individual modules, then these default values are used.

Parameter	Description	Default value	Unit
Default safe data duration	This parameter specifies the maximum permissible data transmission time between the SafeLOGIC controller and SafeIO module. For additional information about the actual data transmission time, see section Diagnostics and service → Diagnostics tools → Network analyzer → Editor → Calculation of safety runtime in Automation Help. The following formula can be used as the lower limit: "Value of the Network Analyzer" * 2 + SafeLOGIC cycle time * 2 The stability of the system cannot be ensured for smaller values. <ul style="list-style-type: none"> Permissible values: 2000 to 10,000,000 µs (corresponds to 2 ms to 10 s) 	150000	µs
Default additional tolerated packet loss	This parameter specifies the number of additional tolerated lost packets during data transfer. <ul style="list-style-type: none"> Permissible values: 0 to 10 	1	Packets
Default node guarding packets	This parameter specifies the maximum number of packets used for node guarding. <ul style="list-style-type: none"> Permissible values: 1 to 255 Note <ul style="list-style-type: none"> The larger the configured value, the greater the amount of asynchronous data traffic. This setting is not critical to safety functionality. The time for safely cutting off actuators is determined independently of this. 	5	Packets

Table 15: SafeDESIGNER parameters: Safety response time default values

Group: Module configuration

Parameter	Description	Default value	Unit
Max. cycle time	Parameter for checking whether a maximum time between 2 SafeLOGIC cycles is exceeded. <ul style="list-style-type: none"> Permissible values: 2100 to 41,000 µs (corresponds to 2.1 to 41 ms) Important: This value should not be the same as the actual cycle time; jitter must also be taken into account.	40000	µs

Table 16: SafeDESIGNER parameters: Module configuration

Group: SafeDigitalInputxx

Parameter	Description	Default value	Unit
Pulse source	This parameter can be used to specify the pulse source for the input channel.	Pulse x	-
	Parameter value	Description	
	Pulse x	The input expects a test pulse from the pulse output (pulse x).	
	No pulse	The input does not expect a test pulse.	
	Other module	The input expects an external test pulse.	
Filter off	Switch-off filter for the channel to remove potentially disruptive signal low phases. <ul style="list-style-type: none">Permissible values: 0 to 500,000 µs (corresponds to 0 to 0.5 s)	0	µs
Filter on	Switch-on filter for the channel that can be used to "debounce" the signals. This function also makes it possible for the module to lengthen a switch-off signal that would otherwise be too short. <ul style="list-style-type: none">Permissible values: 0 to 500,000 µs (corresponds to 0 to 0.5 s) At least 5 ms must be configured for "Filter on" when using DYNlink.	200000	µs
Discrepancy time	Parameter only available for odd-numbered channels. This parameter specifies for function "dual-channel evaluation" the maximum time in which the selected "Dual-channel processing mode" is permitted to be violated by one of the input channels without an error being output. <ul style="list-style-type: none">Permissible values: 0 to 10,000,000 µs (corresponds to 0 to 10 s)	50000	µs
Dual-channel processing mode	Parameter only available for odd-numbered channels. This parameter specifies the type of dual-channel evaluation. Permissible values: <ul style="list-style-type: none">EquivalentAntivalent	Equivalent	-

Table 17: SafeDESIGNER parameters: SafeDigitalInputxx

Danger!

Configuring a switch-off filter lengthens the safety response time!
The configured filter value must be added to the total response time.

Danger!

Signals with a low phase shorter than the safety response time can potentially be lost. Such signals should be lengthened accordingly using the "switch-on filter" function on the input module.

Danger!

Configuring a switch-off filter causes signals with a low phase shorter than the switch-off filter to be filtered out. If this results in a problem concerning safety functionality, then the switch-off filter must be set to 0. Lengthening the low phase with a switch-on filter is not possible in these cases.

Group: PulseOutput

Parameter	Description	Default value	Unit
Pulse x mode	This parameter can be used to define the pulse pattern of the associated pulse output. Parameter "Pulse source" defines the input channel from which this pulse output is used.	Internal	-
	Parameter value	Description	
	Internal	The channel generates a unique pulse pattern that can only be processed by input channels where this pulse output is defined as the pulse source.	
	External	The channel generates a pulse pattern that can be processed by all input channels where an external test pulse is defined as the pulse source.	
	DYNlink (hardware upgrade 2.4.0.0 or later)	The channel generates a pulse pattern that is compatible with DYNlink sensors and can be processed by input channels where this pulse output is defined as the pulse source. If several DYNlink sensors are connected in series, this setting should be used for an even number of sensors. For additional information, see section "DYNlink" in Automation Help.	
DYNlink inverted (hardware upgrade 2.4.0.0 or later)	The channel generates a pulse pattern that is compatible with DYNlink sensors and can be processed by input channels where this pulse output is defined as the pulse source. If several DYNlink sensors are connected in series, this setting should be used for an odd number of sensors. For additional information, see section "DYNlink" in Automation Help.		

Table 18: SafeDESIGNER parameters: PulseOutput

8.2.2 Settings for the SafeDOMAIN-to-SafeDOMAIN connection

Starting with mapp Safety 5.10.0 and hardware upgrade 2.2.1.0

A connection between 2 SafeDOMAINs must be set up in order to exchange data.

Setting up the connection and defining the safe data to be transferred takes place in the Connected SafeDOMAIN.

For additional information about SafeDOMAIN-to-SafeDOMAIN communication, see section "SafeDOMAIN-to-SafeDOMAIN communication" in Automation Help.

Information:

Since SafeDOMAIN-to-SafeDOMAIN communication is represented as an additional safety module on the Managing SafeDOMAIN, the parameters for the connection are only available and set in the Managing SafeDOMAIN project.

8.2.2.1 Connected SafeDOMAIN parameters

Starting with mapp Safety 5.13.0, hardware upgrade 2.4.0.0 and Automation Runtime A4.90

Group: Basic

Parameter	Description	Default value	Unit										
Min. required firmware revision	This parameter is reserved for future functional expansions.	Basic release	-										
Availability	This parameter can be used to configure the module as "optional". Optional modules do not have to be present, i.e. the SafeLOGIC controller will not indicate that these modules are not present. However, this parameter does not influence the module's signal or status data.	Permanent	-										
<table><tr><th>Parameter value</th><th>Description</th></tr><tr><td>Permanent</td><td><p>This module is mandatory for the application.</p><p>The module must be in OPERATIONAL mode after startup, and safe communication with the SafeLOGIC controller must be established without errors (SafeModuleOK = SAFETRUE). Processing of the safety application on the SafeLOGIC controller is delayed after startup until this state is achieved for all modules with "Availability = Permanent".</p><p>After startup, module problems are indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is also made in the logbook.</p></td></tr><tr><td>Optional</td><td><p>The module is not required for the application.</p><p>The module is not taken into account during startup, which means the safety application is started regardless of whether the modules with "Availability = Optional" are in OPERATIONAL mode or if safe communication is properly established between these modules and the SafeLOGIC controller.</p><p>After startup, module problems are NOT indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is NOT made in the logbook.</p></td></tr><tr><td>Startup</td><td><p>This module is optional. The system determines how the module will proceed during startup.</p><p>If it is determined that the module is physically present during startup (regardless of whether it is in OPERATIONAL mode or not), then the module behaves as if "Availability = Permanent" is set.</p><p>If it is determined that the module is not physically present during startup, then the module behaves as if "Availability = Optional" is set.</p></td></tr><tr><td>Never</td><td><p>The module is not required for the application.</p><p>The module is not taken into account during startup, which means the safety application is started regardless of whether the modules with "Availability = Never" are physically present.</p><p>Unlike when "Availability = Optional" is configured, the module is not started with "Availability = Never", which optimizes system startup behavior.</p><p>After startup, module problems are NOT indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is NOT made in the logbook.</p></td></tr></table>				Parameter value	Description	Permanent	<p>This module is mandatory for the application.</p> <p>The module must be in OPERATIONAL mode after startup, and safe communication with the SafeLOGIC controller must be established without errors (SafeModuleOK = SAFETRUE). Processing of the safety application on the SafeLOGIC controller is delayed after startup until this state is achieved for all modules with "Availability = Permanent".</p> <p>After startup, module problems are indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is also made in the logbook.</p>	Optional	<p>The module is not required for the application.</p> <p>The module is not taken into account during startup, which means the safety application is started regardless of whether the modules with "Availability = Optional" are in OPERATIONAL mode or if safe communication is properly established between these modules and the SafeLOGIC controller.</p> <p>After startup, module problems are NOT indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is NOT made in the logbook.</p>	Startup	<p>This module is optional. The system determines how the module will proceed during startup.</p> <p>If it is determined that the module is physically present during startup (regardless of whether it is in OPERATIONAL mode or not), then the module behaves as if "Availability = Permanent" is set.</p> <p>If it is determined that the module is not physically present during startup, then the module behaves as if "Availability = Optional" is set.</p>	Never	<p>The module is not required for the application.</p> <p>The module is not taken into account during startup, which means the safety application is started regardless of whether the modules with "Availability = Never" are physically present.</p> <p>Unlike when "Availability = Optional" is configured, the module is not started with "Availability = Never", which optimizes system startup behavior.</p> <p>After startup, module problems are NOT indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is NOT made in the logbook.</p>
Parameter value	Description												
Permanent	<p>This module is mandatory for the application.</p> <p>The module must be in OPERATIONAL mode after startup, and safe communication with the SafeLOGIC controller must be established without errors (SafeModuleOK = SAFETRUE). Processing of the safety application on the SafeLOGIC controller is delayed after startup until this state is achieved for all modules with "Availability = Permanent".</p> <p>After startup, module problems are indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is also made in the logbook.</p>												
Optional	<p>The module is not required for the application.</p> <p>The module is not taken into account during startup, which means the safety application is started regardless of whether the modules with "Availability = Optional" are in OPERATIONAL mode or if safe communication is properly established between these modules and the SafeLOGIC controller.</p> <p>After startup, module problems are NOT indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is NOT made in the logbook.</p>												
Startup	<p>This module is optional. The system determines how the module will proceed during startup.</p> <p>If it is determined that the module is physically present during startup (regardless of whether it is in OPERATIONAL mode or not), then the module behaves as if "Availability = Permanent" is set.</p> <p>If it is determined that the module is not physically present during startup, then the module behaves as if "Availability = Optional" is set.</p>												
Never	<p>The module is not required for the application.</p> <p>The module is not taken into account during startup, which means the safety application is started regardless of whether the modules with "Availability = Never" are physically present.</p> <p>Unlike when "Availability = Optional" is configured, the module is not started with "Availability = Never", which optimizes system startup behavior.</p> <p>After startup, module problems are NOT indicated by a quickly blinking "MXCHG" LED on the SafeLOGIC controller. An entry is NOT made in the logbook.</p>												

Table 19: SafeDESIGNER parameters: Basic

Group: Safety response time

Parameter	Description	Default value	Unit						
Safe data duration	<p>This parameter specifies the maximum permissible data transmission time between the SafeLOGIC controller and SafeIO module.</p> <p>For additional information about the actual data transmission time, see section Diagnostics and service → Diagnostics tools → Network analyzer → Editor → Calculation of safety runtime in Automation Help.</p> <p>The following formula can be used as the lower limit: "Value of the Network Analyzer" * 2 + SafeLOGIC cycle time * 2</p> <p>The stability of the system cannot be ensured for smaller values.</p> <ul style="list-style-type: none">Permissible values: 2000 to 10,000,000 µs (corresponds to 2 ms to 10 s)	50000	µs						
Additional tolerated packet loss	<p>This parameter specifies the number of additional tolerated lost packets during data transfer.</p> <ul style="list-style-type: none">Permissible values: 0 to 10	1	Packets						
Slow connection	<p>This parameter specifies whether this connection is a slow connection.</p> <table><thead><tr><th>Parameter value</th><th>Description</th></tr></thead><tbody><tr><td>Yes</td><td><p>This is a connection with a large ratio between the SafeLOGIC cycle time and the telegram runtime (affects the parameter calculation internally).</p><p>Rule of thumb: "Yes" from ratio 50:1 (telegram runtime: SafeLOGIC cycle time)</p></td></tr><tr><td>No</td><td><p>Default connection, parameter calculation unchanged</p></td></tr></tbody></table>	Parameter value	Description	Yes	<p>This is a connection with a large ratio between the SafeLOGIC cycle time and the telegram runtime (affects the parameter calculation internally).</p> <p>Rule of thumb: "Yes" from ratio 50:1 (telegram runtime: SafeLOGIC cycle time)</p>	No	<p>Default connection, parameter calculation unchanged</p>	No	-
Parameter value	Description								
Yes	<p>This is a connection with a large ratio between the SafeLOGIC cycle time and the telegram runtime (affects the parameter calculation internally).</p> <p>Rule of thumb: "Yes" from ratio 50:1 (telegram runtime: SafeLOGIC cycle time)</p>								
No	<p>Default connection, parameter calculation unchanged</p>								
Node guarding packets	<p>This parameter specifies the maximum number of packets used for node guarding.</p> <ul style="list-style-type: none">Permissible values: 1 to 255 <p>Note</p> <ul style="list-style-type: none">The larger the configured value, the greater the amount of asynchronous data traffic.This setting is not critical to safety functionality. The time for safely cutting off actuators is determined independently of this.	5	Packets						

Table 20: SafeDESIGNER parameters: Safety response time

Information:

Parameter "Slow connection" can also be used to specify that the connection between the Connected SafeDOMAIN and Managing SafeDOMAIN is slow. If a value of a few seconds is needed for the connection timeout, then this parameter must be enabled ("Slow connection = Yes").

8.3 Channel list

Channel name	SLX210 SLX410	SLX811	SLX910	Access via Automation Studio	Access via Safe- DESIGNER	Data type	Description
ModuleOk	•	•	•	Read	-	BOOL	Indicates whether the module is physically present in the slot and configured
SerialNumber	•	•	•	Read	-	UDINT	Module serial number
ModuleID	•	•	•	Read	-	UINT	Module ID
HardwareVariant	•	•	•	Read	-	UINT	Hardware variant
FirmwareVersion	•	•	•	Read	-	UINT	Firmware version of the module
SLXioCycle	•	•	•	Read	-	UDINT	Cyclic data exchange between the SafeLOGIC-X controller and CPU (time in µs). This value is influenced by: <ul style="list-style-type: none"> Quantity and data width of SafeNODEs Cycle times set in Automation Studio (POWERLINK, X2X, crosslink task) Automation Studio configuration (see items above) The value must be <30 ms; otherwise, the max. SafeLOGIC-X cycle time (parameter "Max. cycle time") is exceeded. In addition, values <15 ms are recommended since large values slow down the SafeDESIGNER online connection.
UDID_low	•	•	•	(Read) ¹⁾	-	UDINT	UDID, lower 4 bytes
UDID_high	•	•	•	(Read) ¹⁾	-	UDINT	UDID, upper 2 bytes
SafetyFWversion1	•	•	•	(Read) ¹⁾	-	UINT	Firmware version - Safety processor 1
SafetyFWversion2	•	•	•	(Read) ¹⁾	-	UINT	Firmware version - Safety processor 2
SafetyFWversionSCM	•	•	•	(Read) ¹⁾	-	UINT	Firmware version - SCMar
SafetyFWcrc1	•	•	•	(Read) ¹⁾	-	UINT	CRC of the firmware header on safety processor 1
SafetyFWcrc2	•	•	•	(Read) ¹⁾	-	UINT	CRC of the firmware header on safety processor 2
ApplSDcrc	•	•	•	(Read) ¹⁾	-	UDINT	CRC of the SafeDESIGNER application on the module
ApplSDtime	•	•	•	(Read) ¹⁾	-	UDINT	Timestamp of the SafeDESIGNER application on the module in UNIX format
ApplSfComOptCRC	•	•	•	(Read) ¹⁾	-	UDINT	CRC of bit Safe Commissioning Options on the module ³⁾
ApplSfComOptTime	•	•	•	(Read) ¹⁾	-	UDINT	Timestamp of bit Safe Commissioning Options on the module in UNIX format
ApplSfComOpt2CRC	-	•	-	(Read) ¹⁾	-	UDINT	CRC of integer Safe Commissioning Options on the module ³⁾
ApplSfComOpt2Time	-	•	-	(Read) ¹⁾	-	UDINT	Timestamp of integer Safe Commissioning Options on the module in UNIX format

Table 21: Channel list

Channel name	SLX210 SLX410	SLX811	SLX910	Access via Automation Studio	Access via Safe- DESIGNER	Data type	Description																				
Bootstate	•	•	•	(Read) ¹⁾	-	UINT	<div>Startup state of the module.</div> <div>Notes:</div> <div><ul style="list-style-type: none">Some of the boot states do not occur during normal startup or are cycled through so quickly that they are not visible externally.The boot states usually cycle through in ascending order. There are cases, however, in which a previous value is captured.</div> <table><tr><th>Value</th><th>Description</th></tr><tr><td>0x0003</td><td>Startup of communication processor OK, no communication with the safety processors (check the 24 V supply voltage!)</td></tr><tr><td>0x0010</td><td>FAILSAFE. At least one of the safety processors is in the safe state.</td></tr><tr><td>0x0020</td><td>Internal communication with safety processors started</td></tr><tr><td>0x0024</td><td>Firmware update of the safety processors or download of the SafeDESIGNER application to the safety processors</td></tr><tr><td>0x0040</td><td>Firmware of safety processors started</td></tr><tr><td>0x0440</td><td>Firmware of safety processors running</td></tr><tr><td>0x0840</td><td>Waiting for openSAFETY "Operational" (loading the SafeDESIGNER application or no valid application available; waiting for acknowledgments such as module replacement)</td></tr><tr><td>0x3440</td><td>Stabilizing cyclic openSAFETY data exchange. Note: If the boot state remains here, SafeDESIGNER parameters "(Default) Safe data duration" and "(Default) Additional tolerated packet loss" must be checked.</td></tr><tr><td>0x4040</td><td>RUN. Final state, startup completed.</td></tr></table>	Value	Description	0x0003	Startup of communication processor OK, no communication with the safety processors (check the 24 V supply voltage!)	0x0010	FAILSAFE. At least one of the safety processors is in the safe state.	0x0020	Internal communication with safety processors started	0x0024	Firmware update of the safety processors or download of the SafeDESIGNER application to the safety processors	0x0040	Firmware of safety processors started	0x0440	Firmware of safety processors running	0x0840	Waiting for openSAFETY "Operational" (loading the SafeDESIGNER application or no valid application available; waiting for acknowledgments such as module replacement)	0x3440	Stabilizing cyclic openSAFETY data exchange. Note: If the boot state remains here, SafeDESIGNER parameters "(Default) Safe data duration" and "(Default) Additional tolerated packet loss" must be checked.	0x4040	RUN. Final state, startup completed.
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0x3440	Stabilizing cyclic openSAFETY data exchange. Note: If the boot state remains here, SafeDESIGNER parameters "(Default) Safe data duration" and "(Default) Additional tolerated packet loss" must be checked.																										
0x4040	RUN. Final state, startup completed.																										
SLXbootState	•	•	•	(Read) ¹⁾	-	USINT	<div>Startup state of the SafeLOGIC-X system</div> <table><tr><th>Status</th><th>Description</th></tr><tr><td>0</td><td>Invalid - Firmware not yet running</td></tr><tr><td>1</td><td>Start - Waiting for synchronization of internal cyclic systems</td></tr><tr><td>4</td><td>Start OK - Application data valid</td></tr><tr><td>25</td><td>Safety PREOPERATIONAL state or "SafeOSstate!=RUN"</td></tr><tr><td>34</td><td>Waiting on X2X parameters from Automation Runtime</td></tr><tr><td>50²⁾</td><td>Ready for RUN - Waiting on "SafeModuleOK" of the modules</td></tr><tr><td>52²⁾</td><td>Waiting period for stable valid "SafeModuleOK" in progress</td></tr><tr><td>54²⁾</td><td>Startup complete - SafeRUN</td></tr></table> <div>²⁾ Connection to SafeLOGIC-X controller possible via SafePLC window in SafeDESIGNER (see section "SafePLC dialog box" in Automation Help).</div>	Status	Description	0	Invalid - Firmware not yet running	1	Start - Waiting for synchronization of internal cyclic systems	4	Start OK - Application data valid	25	Safety PREOPERATIONAL state or "SafeOSstate!=RUN"	34	Waiting on X2X parameters from Automation Runtime	50 ²⁾	Ready for RUN - Waiting on "SafeModuleOK" of the modules	52 ²⁾	Waiting period for stable valid "SafeModuleOK" in progress	54 ²⁾	Startup complete - SafeRUN		
Status	Description																										
0	Invalid - Firmware not yet running																										
1	Start - Waiting for synchronization of internal cyclic systems																										
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25	Safety PREOPERATIONAL state or "SafeOSstate!=RUN"																										
34	Waiting on X2X parameters from Automation Runtime																										
50 ²⁾	Ready for RUN - Waiting on "SafeModuleOK" of the modules																										
52 ²⁾	Waiting period for stable valid "SafeModuleOK" in progress																										
54 ²⁾	Startup complete - SafeRUN																										

Table 21: Channel list

Channel name	SLX210 SLX410	SLX811	SLX910	Access via Automation Studio	Access via Safe- DESIGNER	Data type	Description																				
SafeOsState	●	●	●	(Read) ¹⁾	-	USINT	<div>Status of the safety application. For details, see section "Dialog box 'SafePLC info' in SafeDESIGNER" in Automation Help.</div> <table><tr><th>Status</th><th>Description</th></tr><tr><td>0x00</td><td>Invalid (e.g. SafeKEY blank) or start-up still active (BOOT_STATE!=0x12)</td></tr><tr><td>0x0F</td><td>ON (startup / internal initialization) or error (check logbook)</td></tr><tr><td>0x33</td><td>Loading (startup / internal initialization)</td></tr><tr><td>0x55</td><td>Stop [Safe]</td></tr><tr><td>0x66</td><td>Run [Safe]</td></tr><tr><td>0x99</td><td>Halt [Debug]</td></tr><tr><td>0xAA</td><td>Stop [Debug]</td></tr><tr><td>0xCC</td><td>Run [Debug]</td></tr><tr><td>0xF0</td><td>No execution</td></tr></table>	Status	Description	0x00	Invalid (e.g. SafeKEY blank) or start-up still active (BOOT_STATE!=0x12)	0x0F	ON (startup / internal initialization) or error (check logbook)	0x33	Loading (startup / internal initialization)	0x55	Stop [Safe]	0x66	Run [Safe]	0x99	Halt [Debug]	0xAA	Stop [Debug]	0xCC	Run [Debug]	0xF0	No execution
Status	Description																										
0x00	Invalid (e.g. SafeKEY blank) or start-up still active (BOOT_STATE!=0x12)																										
0x0F	ON (startup / internal initialization) or error (check logbook)																										
0x33	Loading (startup / internal initialization)																										
0x55	Stop [Safe]																										
0x66	Run [Safe]																										
0x99	Halt [Debug]																										
0xAA	Stop [Debug]																										
0xCC	Run [Debug]																										
0xF0	No execution																										
Diag1_Temp	●	●	●	(Read) ¹⁾	-	INT	Module temperature in °C																				
FBInputStatexxyy	●	●	-	Read	-	USINT	State number of dual-channel evaluation (PLCopen function block "Equivalent" or "Antivalent")																				
FBInputStatexxyy	-	-	●	(Read) ¹⁾	-	USINT	State number of dual-channel evaluation (PLCopen function block "Equivalent" or "Antivalent")																				
InputErrorStates	●	●	●	(Read) ¹⁾	-	UDINT	<div>Channel status, additional information for channel error</div> <table><tr><th>Type of error</th></tr><tr><th>Inputs</th></tr><tr><th>Input stuck at high</th></tr><tr><td>Bit no. 0 to x = Channel 1 to x (depends on the number of channels of the module)</td></tr></table> <div>If a bit is set, the corresponding error has been detected on the respective channel.</div>	Type of error	Inputs	Input stuck at high	Bit no. 0 to x = Channel 1 to x (depends on the number of channels of the module)																
Type of error																											
Inputs																											
Input stuck at high																											
Bit no. 0 to x = Channel 1 to x (depends on the number of channels of the module)																											
PulseOutputErrors	●	●	●	(Read) ¹⁾	-	UDINT	<div>Channel status, additional information for channel error</div> <table><tr><th>Type of error</th></tr><tr><th>Pulse outputs</th></tr><tr><th>Feedback stuck at high (shorted to 24 VDC)</th><th>Feedback stuck at low (ground fault)</th></tr><tr><td>Bit no. 8 to 11 = Pulse 1 to 4</td><td>Bit no. 0 to 3 = Pulse 1 to 4</td></tr></table> <div>If a bit is set, the corresponding error has been detected on the respective channel.</div>	Type of error	Pulse outputs	Feedback stuck at high (shorted to 24 VDC)	Feedback stuck at low (ground fault)	Bit no. 8 to 11 = Pulse 1 to 4	Bit no. 0 to 3 = Pulse 1 to 4														
Type of error																											
Pulse outputs																											
Feedback stuck at high (shorted to 24 VDC)	Feedback stuck at low (ground fault)																										
Bit no. 8 to 11 = Pulse 1 to 4	Bit no. 0 to 3 = Pulse 1 to 4																										
SafeDigitalInputxx	●	●	●	Read	Read	SAFEBOOL	Physical channel SI xx																				
SafeTwoChannelInputxxyy	●	●	●	Read	Read	SAFEBOOL	Dual-channel evaluation of channel SI xx/yy																				
SafeInputOKxx	●	●	●	Read	Read	SAFEBOOL	Status of physical channel SI xx																				
SafeTwoChannelOKxxyy	●	●	●	Read	Read	SAFEBOOL	Status of dual-channel evaluation of channel SI xx/yy																				
BOOL1xxxx	●	●	●	Write	Read	BOOL	CPU to SafeLOGIC communication channel																				
INT1xxx	●	●	●	Write	Read	INT	CPU to SafeLOGIC communication channel																				
UINT1xxx	●	●	●	Write	Read	UINT	CPU to SafeLOGIC communication channel																				
DINT1xxx	●	●	●	Write	Read	DINT	CPU to SafeLOGIC communication channel																				
UDINT1xxx	●	●	●	Write	Read	UDINT	CPU to SafeLOGIC communication channel																				
BOOL0xxxx	●	●	●	Read	Write	BOOL	SafeLOGIC to CPU communication channel																				
INT0xxx	●	●	●	Read	Write	INT	SafeLOGIC to CPU communication channel																				
UINT0xxx	●	●	●	Read	Write	UINT	SafeLOGIC to CPU communication channel																				
DINT0xxx	●	●	●	Read	Write	DINT	SafeLOGIC to CPU communication channel																				
UDINT0xxx	●	●	●	Read	Write	UDINT	SafeLOGIC to CPU communication channel																				
SafeModuleOK ²⁾	-	●	-	-	Read	SAFEBOOL	Indicates whether the safe communication channel between SafeDOMAIN and SafeDOMAIN is OK																				
SafeBOOLxxx ²⁾	-	●	-	Read	Read/Write	SAFEBOOL	SafeDOMAIN-to-SafeDOMAIN communication channel																				
SafeINTxx ²⁾	-	●	-	Read	Read/Write	SAFEINT	SafeDOMAIN-to-SafeDOMAIN communication channel																				
SafeUINTxx ²⁾	-	●	-	Read	Read/Write	SAFEWORD	SafeDOMAIN-to-SafeDOMAIN communication channel																				

Table 21: Channel list

Channel name	SLX210 SLX410	SLX811	SLX910	Access via Automation Studio	Access via Safe- DESIGNER	Data type	Description
SafeDINTxx ²⁾	-	•	-	Read	Read/Write	SAFEDINT	SafeDOMAIN-to-SafeDOMAIN communication channel
SafeUDINTxx ²⁾	-	•	-	Read	Read/Write	SAFED-WORD	SafeDOMAIN-to-SafeDOMAIN communication channel
SafeCommissioningOptionBITxxx	•	•	•	-	Read	SAFEBOOL	Internal channels for Safe Commissioning Options
SafeCommissioningOptionINTxx	-	•	-	-	Read	SAFEINT	Internal channels for Safe Commissioning Options
SafeCommissioningOptionUINTxx	-	•	-	-	Read	SAFE-WORD	Internal channels for Safe Commissioning Options
SafeCommissioningOptionDINTxx	-	•	-	-	Read	SAFEDINT	Internal channels for Safe Commissioning Options
SafeCommissioningOptionUDINTxx	-	•	-	-	Read	SAFED-WORD	Internal channels for Safe Commissioning Options

Table 21: Channel list

- 1) This data is accessed in Automation Studio using library ASIOACC.
- 2) Starting with mapp Safety 5.13.0, hardware upgrade 2.4.0.0 and Automation Runtime A4.90. For additional information about SafeDOMAIN-to-SafeDOMAIN communication, see section "SafeDOMAIN-to-SafeDOMAIN communication" in Automation Help.
- 3) This data point does not correspond to the checksum of SfDomainInfo or the display in SafeDESIGNER.

9 Minimum cycle time

The minimum cycle time specifies the time up to which the bus cycle can be reduced without communication errors occurring.

Minimum cycle time
200 µs

10 I/O update time

The time needed by the module to generate a sample is specified by the I/O update time.

Minimum I/O update time			
X20SLX210	X20SLX410	X20SLX811	X20SLX910
800 µs	800 µs	500 µs	800 µs

Maximum I/O update time			
X20SLX210	X20SLX410	X20SLX811	X20SLX910
3350 µs + Filter time (see section "Filter" in Automation Help)	3350 µs + Filter time (see section "Filter" in Automation Help)	1150 µs + Filter time (see section "Filter" in Automation Help)	3350 µs + Filter time (see section "Filter" in Automation Help)

11 Version history

Version	Date	Comment
2.20	February 2024	<ul style="list-style-type: none"> Chapter 4 "Technical data": Updated section Derating. Chapter 8.2.1 "SafeLOGIC-X basic settings": Group "SafeDigitalInputxx": Updated description of "Filter on".
2.19	August 2023	Chapter 4 "Technical data": Updated safety characteristics.
2.18	May 2023	Chapter 4 "Technical data": Safety characteristics: Added safe digital inputs.
2.17	February 2023	<ul style="list-style-type: none"> Chapter 4 "Technical data": <ul style="list-style-type: none"> Updated certifications. Safety characteristics: Updated MTTFD (per channel), PFH/PFH_d (per channel) and PFD (per channel). Removed line "4 safe inputs (SI)" in section "Derating". Chapter 8.3 "Channel list": Added "ApplSfComOpt2CRC" and "ApplSfComOpt2Time".
2.15	August 2022	Chapter 8.2.1 "SafeLOGIC-X basic settings": Group "Basic": Parameter "Process data transfer rate": Updated description of value "Low".
2.14	May 2022	<ul style="list-style-type: none"> Chapter 4 "Technical data": <ul style="list-style-type: none"> Safety characteristics: Editorial change for PFH / PFH_d Updated DNV certification. Updated chapter 12 "Declaration of conformity".
2.11	August 2021	Chapter 4 "Technical data": Safe digital inputs: Input current at 24 VDC: Added footnote and min. value.
2.10	May 2021	<ul style="list-style-type: none"> Chapter 4 "Technical data": <ul style="list-style-type: none"> Updated display of system requirements. X20SLX811: Updated max. number of SafeMOTION axes X20SLX910: Max. number of SafeMOTION axes: Added footnote X20SLX811: Updated stack memory. Safety characteristics: Updated footnote. Editorial changes.
2.09	February 2021	<ul style="list-style-type: none"> Chapter 4 "Technical data": <ul style="list-style-type: none"> Data exchange between CPU and SafeLOGIC controller: Added footnote for max. total data width for each direction. Data exchange between SafeDOMAIN and SafeDOMAIN: Added footnote for max. total data width for each direction.
2.08	November 2020	<ul style="list-style-type: none"> Chapter 3 "Order data": Updated number of openSAFETY nodes. Chapter 4 "Technical data": <ul style="list-style-type: none"> Added use as Connected SafeDOMAIN. X20SLX811: Updated max. total number of data points for each direction. X20SLX811: Updated max. number of linked Managing SafeDOMAINs. Safe digital inputs: Added number of channels and renamed "Cable length between pulse output and input" to "Cable length between signal source (pulse output or external signal) and input". Pulse outputs: Added number of channels. Chapter 8.1 "Parameters in the I/O configuration": Added group "SafeDOMAIN-to-SafeDOMAIN communication". Chapter 8.2.1 "SafeLOGIC-X basic settings": Group "PulseOutput": Added new values for DYNlink. Added chapter 8.2.2.1 "Connected SafeDOMAIN parameters". Chapter 8.3 "Channel list": Added new channels. Editorial changes.
2.07	August 2020	<ul style="list-style-type: none"> Chapter 4 "Technical data": <ul style="list-style-type: none"> General information: Added additional power dissipation caused by actuators (resistive) [W]. Updated certifications. Pulse outputs: Added R_{DS(on)}, removed residual voltage, updated switching voltage. Chapter 8.2.1 "SafeLOGIC-X basic settings": Group "PulseOutput": Updated description. Editorial changes.
2.06	May 2020	<ul style="list-style-type: none"> Chapter 2 "Coated modules": Added description of starting temperature. Chapter 4 "Technical data": <ul style="list-style-type: none"> Added footnote for system requirements. Updated certifications. Functionality: Data exchange between SafeDOMAIN and SafeDOMAIN: Added max. number of linked Managing SafeDOMAINs. Coated modules: Updated operating temperature. Coated modules: Added starting temperature. X20SLX811: Updated derating. Editorial changes.

Table 22: Version history

Version	Date	Comment
2.05	February 2020	<ul style="list-style-type: none"> Chapter 4 "Technical data": Added data exchange between SafeDOMAIN and SafeDOMAIN. Added chapter 8.2.2 "Settings for the SafeDOMAIN-to-SafeDOMAIN connection". Editorial changes.
2.04	November 2019	<ul style="list-style-type: none"> Chapter 4 "Technical data": <ul style="list-style-type: none"> Updated certifications. Support for Safe Commissioning Options: X20SLX811: Updated channels. Chapter 8.3 "Channel list": X20SLX811: Added new channels. Editorial changes.
2.03	August 2019	Chapter 4 "Technical data": Updated derating.
2.02	May 2019	First edition for mapp Safety

Table 22: Version history

12 Declaration of conformity

This document was originally written in the German language. The German edition therefore represents the original documentation in accordance with Machinery Directive 2006/42/EC. Documents in other languages should be interpreted as translations of the original documentation.

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Commercial register number: FN 111651 v

Commercial registry: Regional court Ried im Innkreis

UID number: ATU62367156

Legal structure: Limited liability company

Corporate headquarters: Municipality of Eggelsberg (Upper Austria)

Declarations of conformity for B&R products are available for download on the B&R website (www.br-automation.com).