3.9 X20(c)SLXxxx

Module overview

Order number	Short description
X20SLX402	X20 safe digital mixed module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 4 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC, 2 safe type B2 digital outputs, 24 VDC, 0.2 A, OSSD <10 µs
X20cSLX402	X20 safe digital mixed 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, 2 safe type B2 digital outputs, 24 VDC, 0.2 A, OSSD <10 µs
X20SLX806	X20 safe digital mixed module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 8 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC, 6 safe type B2 digital outputs, 24 VDC, 0.2 A, OSSD <10 µs
X20SLX842	X20 safe digital mixed module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 8 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC, 4 safe type A digital outputs, 24 VDC, 3 A, OSSD <500 µs, 2 safe type B2 digital outputs, 24 VDC, 50 mA, OSSD <500 µs
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

Module-specific information

X20(c)SLXxxx modules have the following module-specific information:

Module-specific information	Link
Order data	"X20(c)SLXxxx - Order data" on page 37
Technical data	"X20(c)SLXxxx - Technical data" on page 63
Functionality	"Functionality " on page 284
Safety characteristics	"Safety characteristics" on page 89
Derating	"X20(c)SLXxxx - Derating" on page 112
Inrush current behavior for output channels	X20(c)SLXx0x and X20SLX842: "X20(c)SLXxxx - Inrush current behavior for output channels" on page 125
LED status indicators	• "Operating and error states of the r/e LEDs" on page 138 • "X20(c)SLXxxx - State of I/O channels" on page 141 • "Operating and error states: Safety SE-LED - SafeLogic-X and X20SL8201" on page 145
Pinout	"X20(c)SLXxxx - Pinout" on page 150
Input circuit diagram	"X20(c)SLXx0x, X20SLX842 - Input circuit diagram" on page 154 "X20(c)SLXx1x - Input circuit diagram" on page 153
Output circuit diagram	"Type A - Output circuit diagram" on page 158 "Type B of X20 modules - Output circuit diagram" on page 159
Parameter description	**Parameters in the I/O configuration** • "Group: Function model" on page 182 • "Group: General (mapp Safety)" on page 182 • "Group: Output signal path " on page 179 • "Group: SafeDesigner-to-SafeLogic communication" on page 183 • "Group: CPU-to-SafeLogic communication" on page 183 • "Group: SafeLogic-to-CPU communication" on page 183 • "Group: SafeDomain-to-SafeDomain communication" on page 184 **Parameters in SafeDesigner - SafeLogic controller basic settings** • "Group: Basic" on page 200 • "Group: Safety response time default values" on page 201 • "Group: Module configuration - For SafeLogic(-X) modules" on page 201 • "Group: Module configuration - For modules with safe digital outputs" on page 192 • "Group: SafeDigitalInputxx" on page 194 • "Group: PulseOutput" on page 195 **Parameters in SafeDesigner - Parameters of the Connected SafeDomain** • "Group: Basic" on page 202 • "Group: Safety response time" on page 203

4.9 X20(c)SLXxxx - Order data



Order number	Short description
	Intelligent programmable modules
X20SLX402	X20 safe digital mixed module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 4 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC, 2 safe type B2 digital outputs, 24 VDC, 0.2 A, OSSD <10 µs
X20cSLX402	X20 safe digital mixed 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, 2 safe type B2 digital outputs, 24 VDC, 0.2 A, OSSD <10 µs
X20SLX806	X20 safe digital mixed module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 8 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC, 6 safe type B2 digital outputs, 24 VDC, 0.2 A, OSSD <10 µs
X20SLX842	X20 safe digital mixed module, safety controller, openSAFETY, 10 openSAFETY nodes, 4 SafeMOTION axes, 8 safe type A digital inputs, configurable input filter, 4 pulse outputs, 24 VDC, 4 safe type A digital outputs, 24 VDC, 3 A, OSSD <500 µs, 2 safe type B2 digital outputs, 24 VDC, 50 mA, OSSD <500 µs
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 9: X20SLX402, X20cSLX402, X20SLX806, X20SLX842, X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Order data

For additional module-specific information, see "X20(c)SLXxxx" on page 22.

Order number	X20SLX402	X20cSLX402	X20SLX806	X20SLX842
Pulse outputs				
Quantity	4			
Variant	Push-Pull			
Nominal output current	50 mA			
Output protection	Shutdown of individual channels in the event of overload or short circuit [7]			
Peak short-circuit current	0.5 A for 120 µs			
Short-circuit current	15 mA_{eff}			
Leakage current when the output is switched off	0.1 mA			
$R_{DS(on)}$	80 Ω			
Switching voltage	I/O power supply minus voltage drop due to $R_{DS(on)}$			
Total nominal current	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	
Vertical mounting orientation	0 to 50°C	-25 to 50°C	0 to 50°C	
Derating	See section "Derating".			
Starting temperature	-	Yes, -40°C	-	
Storage	-40 to 85°C			
Transport	-40 to 85°C			
Relative humidity				
Operation	5 to 95%, non-condensing	Up to 100%, condensing	5 to 95%, non-condensing	
Storage	5 to 95%, non-condensing			
Transport	5 to 95%, non-condensing			
Mechanical properties				
Note	Order 2x safety-keyed terminal block separately. Order 1x safety-keyed bus module separately.			
Pitch	$25^{+0.2}$ mm			

Table 26: X20SLX402, X20cSLX402, X20SLX806, X20SLX842 - Technical data

1) Number of outputs x $R_{DS(on)}$ x Nominal output current^2. 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.
2) For a parameter description, see section "Message window" in the SafeDESIGNER documentation.
3) The input current specifications refer to the switched-on state of the input.
4) The module's total nominal current is limited to 10 A. The output currents of group "Safe digital HS-HS outputs" must be included.
5) Due to the internal protective circuit, this braking voltage only takes effect starting at a load of typ. 250 mA.
6) The value for this module is limited to 50 mA by the nominal output current of the HS-HS outputs.
7) The protective function is provided for max. 30 minutes for a continuous short circuit.

X20(c)SLXx1x

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
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					
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] [1]	0.3	0.6		0.8	0.6	
Electrical isolation						
Channel - Bus	Yes					
Channel - Channel	No					

Table 27: X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Technical data

Technical data

Order number	X20SLX210	X20SLX410	X20cSLX410	X20SLX811	X20SLX910	X20cSLX910
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) FTZÚ 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 to 45°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)			-	Temperature: **A** (0 to 45°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)	
CCS	Yes		-		Yes	-
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	
KC	Yes		-		Yes	-
Safety characteristics						
Note	See section "Safety characteristics".					
Limit values for SafeDESIGNER application						
Max. resources available for SafeDESIGNER info window entries [2]						
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 protective function	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 [3]	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}					

Table 27: X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Technical data

Order number	X20SLX210	X20SLX410	X20cSLX410	X20SLX811	X20SLX910	X20cSLX910
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 [4]					
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	-		Yes, -40°C
Storage	-40 to 85°C					
Transport	-40 to 85°C					
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 27: X20SLX210, X20SLX410, X20cSLX410, X20SLX811, X20SLX910, X20cSLX910 - Technical data

1) Number of outputs x $R_{DS(on)}$ x Nominal output current^2. 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.
2) For a parameter description, see section "Message window" in the SafeDESIGNER documentation.
3) The input current specifications refer to the switched-on state of the input.
4) The protective function is provided for max. 30 minutes for a continuous short circuit.



Information:

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

For additional module-specific information, see "X20(c)SLXxxx" on page 22.

Additional information:

- "Safety characteristics" on page 89
- "X20(c)SLXxxx - Derating" on page 112
- "Inrush current behavior for output channels - X20(c)SLXxxx" on page 125

6.3.9 X20(c)SLXxxx - Derating

The derating curve refers to standard operation and must be observed. With a horizontal mounting orientation, the curve can be shifted to the right by the specified derating bonus by taking the following measures.

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	X20SLX402	X20SLX806	X20SLX842	X20SLX210	X20SLX410	X20SLX811	X20SLX910
Derating bonus							
I/O power supply / Input voltage: Max. 24 VDC	+2.5°C		+5°C	+2.5°C			+5°C
I/O power supply / Input voltage: Max. 20.4 VDC	+7.5°C		+10°C	+2.5°C		+5°C	+5°C
Dummy module on the left	+2.5°C			+0°C		+2.5°C	+0°C
Dummy module on the right	+0°C			+2.5°C			
Dummy module on the left and right	+2.5°C		+5°C				
4 safe inputs (SI)	+0°C	+2.5°C [1]	+0°C	-	-	-	-
For double PFH / PFH_d or triple PFD	+0°C						

Table 57: Derating bonus

1) Only 4 safe inputs (SI) in use. Bonus valid only for derating curve of outputs.

Inputs

The number of inputs to be used simultaneously depends on the ambient temperature during operation and the mounting orientation. The resulting amount is listed in the following table.

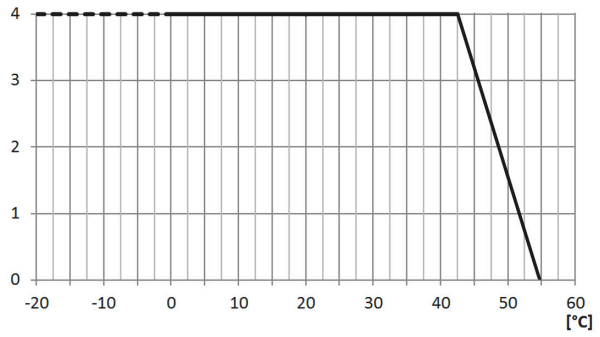
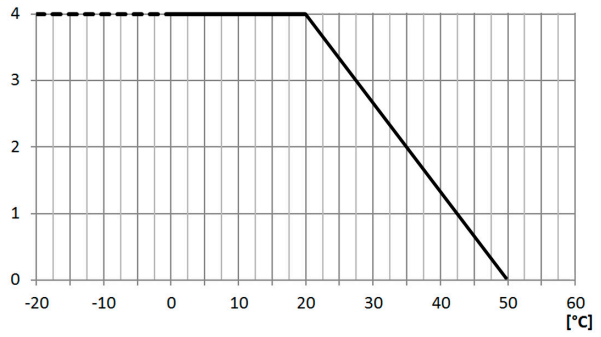
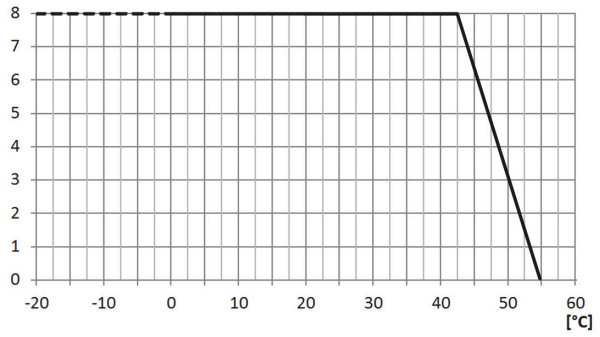
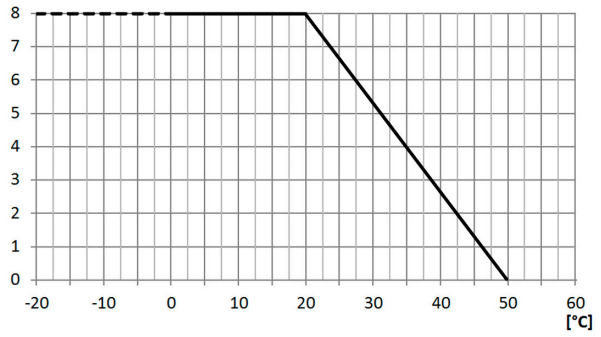
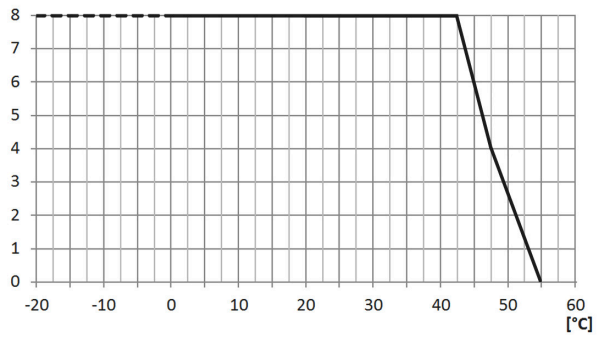
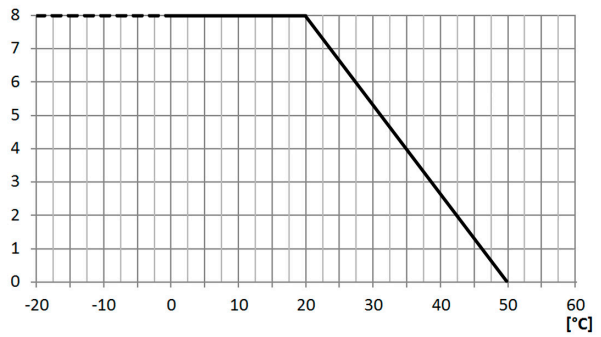
Horizontal (0 to 60°C, coated: -25 to 60°C)	Vertical (0 to 50°C, coated: -25 to 50°C)
X20SLX402	
	
X20SLX806	
	
X20SLX842	
	

Table 58: Derating in relation to operating temperature and mounting orientation

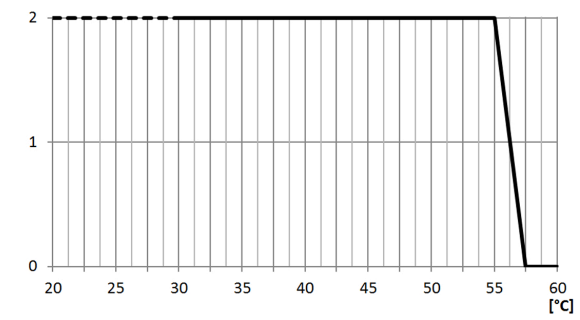
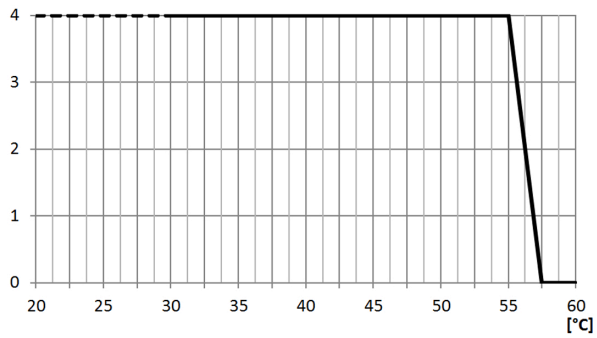
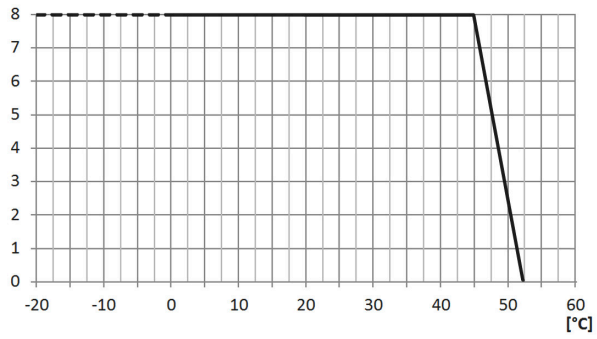
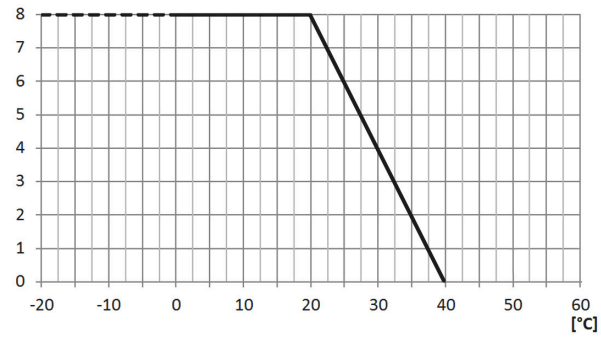
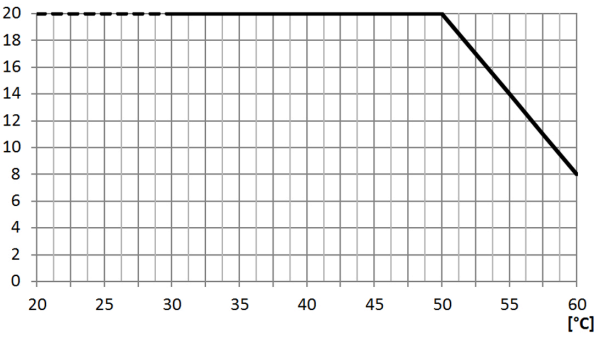
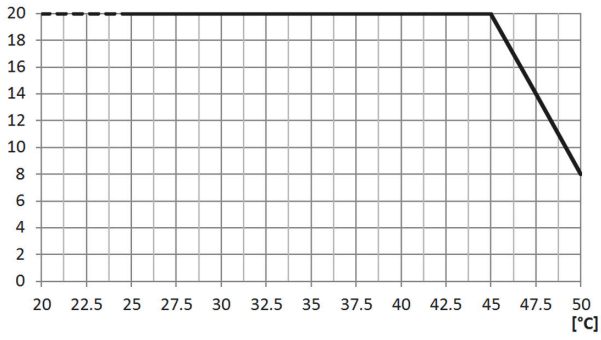
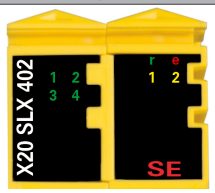
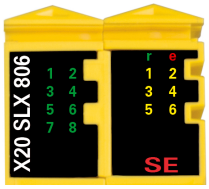
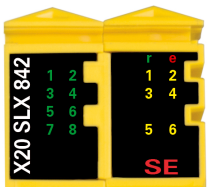
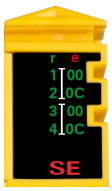
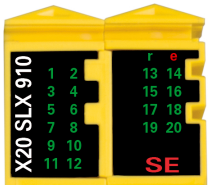
Horizontal (0 to 60°C, coated: -25 to 60°C)	Vertical (0 to 50°C, coated: -25 to 50°C)
X20SLX210	
	No derating
X20SLX410	
	No derating
X20SLX811	
	
X20SLX910	
	

Table 58: Derating in relation to operating temperature and mounting orientation

X20(c)SLXxxx - State of I/O channels

Figure	LED	Color	Status	Description
	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[1]	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
	1 to 6	Output state of the corresponding digital output. The number of channel LEDs varies depending on the number of channels on the module type.		
		Red	On	Warning/Error on an output channel
			All on	Error on all channels or startup not yet completed
		Orange	On	Output set
	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
 X20SLX210  X20SLX410	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				
 X20SLX910				

1 Only for modules X20(c)SLX402, X20SLX806, X20SLX842, X20SLX811 and X20(c)SLX910

For additional module-specific information, see "X20(c)SLXxxx" on page 22.

X20SP1130 - State of I/O channels

Figure	LED	Color	Status	Description
	1	Output state of the digital output		
		Red	On	Warning/Error of the output channel, connection to the SafeLogic controller not OK or startup not yet completed
		Orange	On	Output set

For additional module-specific information, see "X20SP1130" on page 26.