EN
ES
IT

CARLO GAVAZZI

SMXL20
SMX20
Lift Levelling Modules

Instruction manual

Manual de instrucciones

Manuale d'istruzioni

Carlo Gavazzi Industri A/S Over Hadstenvej 40, 8370 Hadsten, Denmark

EN

Table of contents

SMXL20 / SMX20 - Original instruction manual

Ownership

Safety messages

The following symbols are used in this document to indicate warning concerning the user and/or the safety device:

Danger! a potentially risky situation which could lead to death or serious physical injury.

Warning: indicates actions that if not observed may lead to damage to the device.

Attention: only CARLO GAVAZZI technical service personnel are authorized to open the safety device.

General information

Information: This manual should be consulted for all situations related to installation and use. It must be kept in good condition and in a clean location accessible to all operators.

Service and warranty

In the event of malfunction or requests for information please contact the CARLO GAVAZZI branch or distributor in your country.

Maintenance and repairs

The device contains no parts that require maintenance.
In case of failure, do not open the device; the device must be sent to CARLO GAVAZZI branch or distributor.

1. Introduction

Description

The SMXL20 module and SMX20 module are compliant with international standards, designed to provide the most comprehensive protection for equipment and personnel.

Validity of documentation

This documentation is valid only for SMXL20 and SMX20 lift levelling modules and until new documentation is published.
This instruction manual describes the function, operation and installation of the product.
It is the user responsibility to decide if the module is correctly suited to the application

How to use the documentation

This user manual must be read and completely understood by personnel dealing with all the uses of the modules prior to carrying out any operation involving the module.
Please keep this document for future reference.
All the operations described in this manual must be carried out exclusively by specialized personnel, carefully following all the instructions given.

Use of the product

The modules provide a safety-related interruption of a safety circuit.
The lift modules are compliant with the requirements of EN 81-20 and EN 81-50 and may be used in applications with:

- Safety magnetic sensors
- Safety magnetic switches
- Safety limit switches

2. Safety

2.1 Lift Safety Standards

In 2014 The European Committee for Standardization released two new safety standards for the construction of lifts and for the testing of lift components. Both new standards applied to both passenger and goods lifts.
EN 81-20 defines the technical requirements for the construction of lifts.
EN 81-50 defines design rules, calculations and tests for lift components.
The modules are compliant with these Standards (EN 81-20 and EN 81-50).

2.2 Functional safety

Installation of the module is the sole responsibility of the installer or the user.
The device must be installed in accordance with the specific risk analysis of the application and all the applicable standards.
Carlo Gavazzi is not responsible for these operations or for any risks in connection with them. Reference should be made to the manual and to the relative product and/or application standards to ensure correct use of any devices connected to the module within the specific application.
The ambient temperature where the system is installed must be compatible with the operating temperature parameters stated on the product label and in the specifications.

3. Installation and environmental conditions

	**Warning:** Avoid installation during thunderstorms.
	**Danger!** If the safety module is tampered, it can no longer ensure the safety of the operator and the warranty is void.
	**Information:** Use the notch on the rear of the unit to attach it to a DIN rail. Ensure the unit is mounted securely on a DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).
	**Information:** Do not dispose of the packaging in the environment.
	**Information:** The module must only be used within an ambient temperature range of -25 ÷ +60°C (-13 ÷ +140°F); UL: +40°C (+104°F), away from any condensation or conducting fluids. To avoid possible interference, keep the connecting conductors separate from the power conductors.

At installation and wiring of the device, ensure to use appropriate cables, conduits and wiring layouts in order to prevent short circuits on the safety input signals

4. Wiring

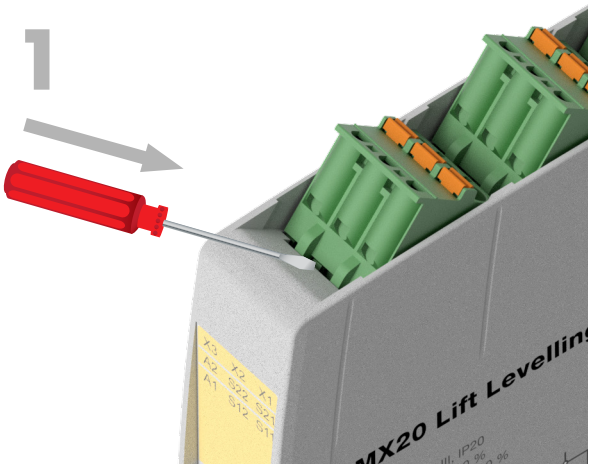
4.1 Power supply

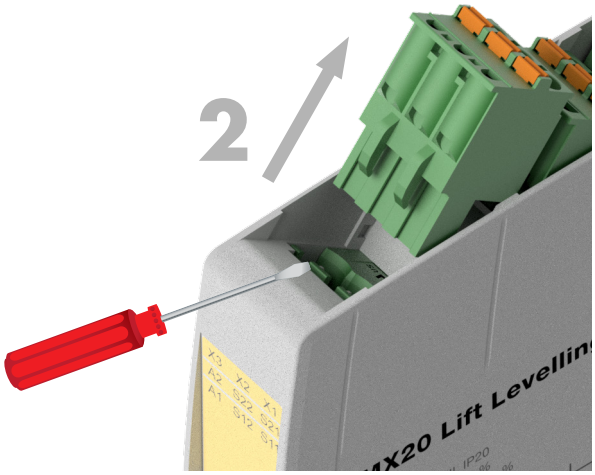
24Vdc ± 10%; 24Vac -15%/+10%, 50÷60 Hz, Class 2, overvoltage category III.

4.2 Wiring

	1	**Warning:** Switch power supply OFF before wiring the device
	2	**Warning:** At installation and wiring of the device, ensure to use appropriate cables, conduits and wiring layouts in order to prevent short circuits on the safety input signals
	3	To prevent contact welding, a fuse should be connected on the output contacts. Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads. Ensure the wiring and EMC requirements of IEC 60204-1 are met.
	4	**Information:** It is good practice to separate the power supply of the control unit from that of other electrical devices (e.g. frequency drives, electric motors, inverters) or other sources of disturbance.
	5	**Information:** Use conductors with section: 0,2 - 2,5 mm² (24 - 14 AWG)
	6	Do not exceed the electrical ratings.

The safety modules are equipped with pluggable terminal blocks for easy wiring and devices exchange.





Procedure:

- Switch power supply OFF before wiring the device
- Insert the screwdriver in the recess of the terminal block and lift it to remove it. Do not remove the terminals blocks by pulling the cables!
- Once the wiring of the terminal block is completed, insert the terminal block into the respective position

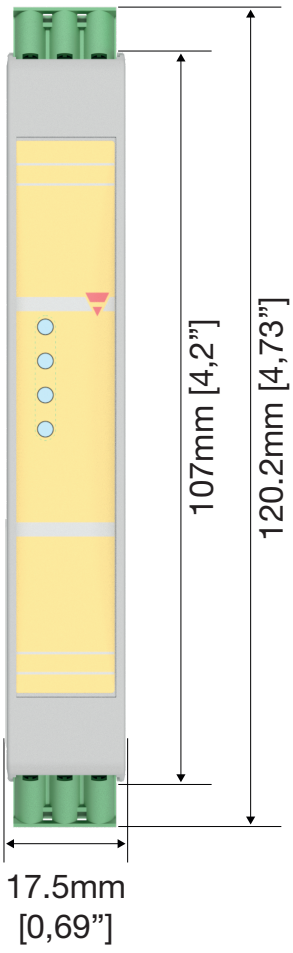
The plug-in terminal blocks are coded, so to prevent inserting the terminal blocks in the wrong position.

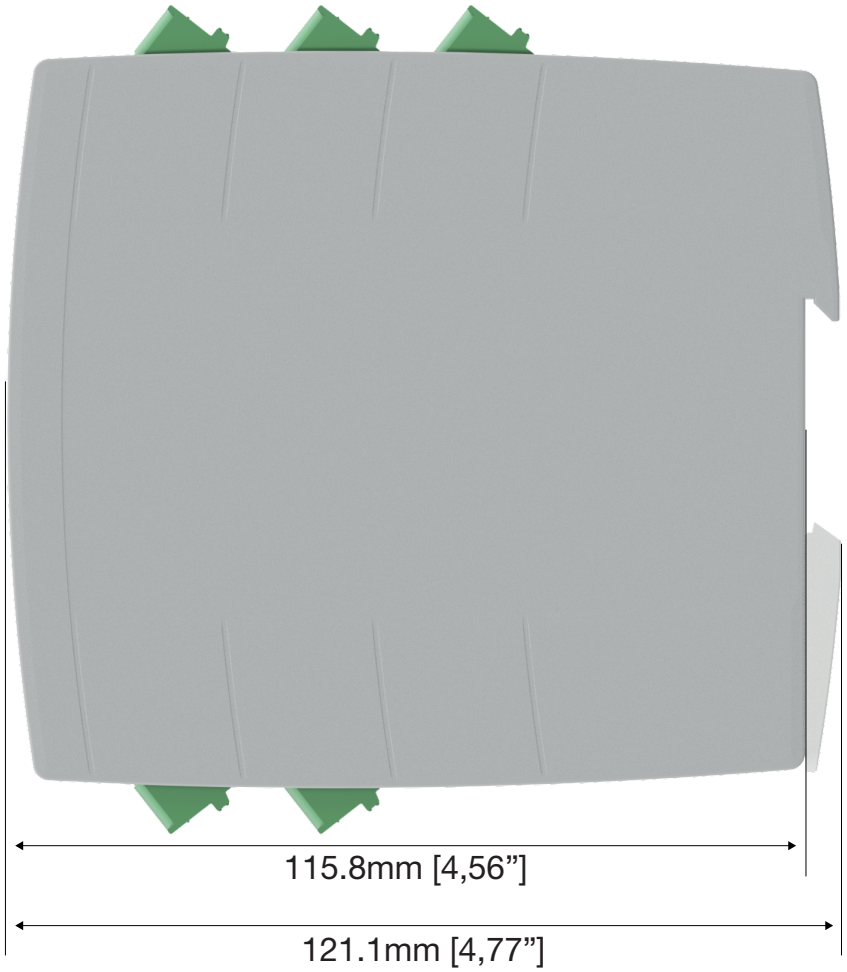
5. Devices

The modules are used for floor levelling and relevelling of lift cabin, according to the 2014/33/EU Lift Directive, in lift applications.

	SMXL20	SMX20
		
NO safety outputs	2	2
Input type	2 NO, 3-wires with 1 common terminal	2 NO, 4-wires

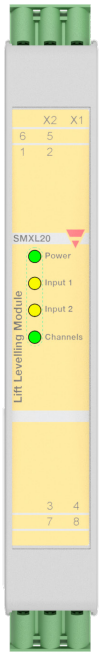
5.1 Dimensions





6. SMXL20

6.1 Terminal layout

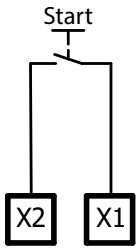


X1-X2: manual start / automatic start
2-6: channel 1 NO input
5-6: channel 2 NO input
1: power supply 24 Vdc (+)/Vac(~)
6: power supply 24 Vdc (-)/Vac(~)

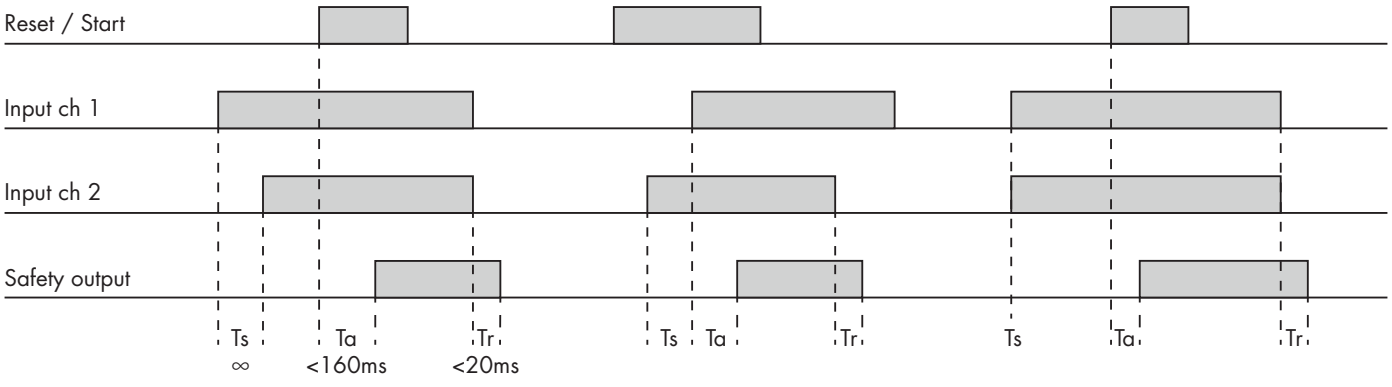
3-4: NO safety output
7-8: NO safety output

6.2 Operating modes

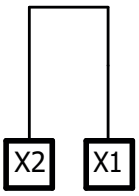
6.2.1 Manual start



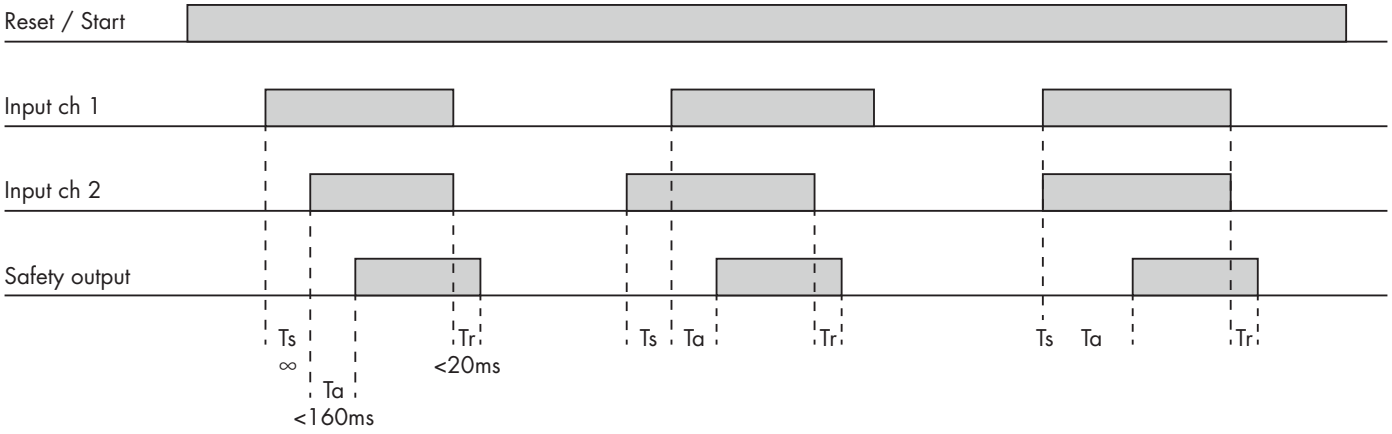
A	The start button is connected between X1 and X2. The safety inputs 2 and 5 are operated: • contact closed between 2 and 6 • contact closed between 5 and 6 The start button is pressed and the safety outputs switch ON
B	The opening of at least one safety input contact forces immediately the safety outputs to the open state
C	A new operating cycle is possible only after releasing both input contacts and then operating them again



6.2.2 Automatic start



A	Connection between X1 and X2. The safety inputs 2 and 5 are operated: • contact closed between 2 and 6 • contact closed between 5 and 6 The safety outputs switch ON
B	The opening of at least one safety input contact forces immediately the safety outputs to the open state
C	A new operating cycle is possible only after releasing both input contacts and then operating them again



6.3 Technical data

6.3.1 Timing specification

Activation time Ta	< 160ms
Release time Tr	Double channel mode: < 20ms
Simultaneity Ts	Infinite

6.3.2 Safety specification

Safety outputs	3-4 and 7-8
Safe state of outputs	Open
Safety inputs	2-6 and 5-6
Safe state of inputs	Open
Safety function	1. The release of either one or both safety inputs will release the safety outputs. 2. The re-activation of the safety outputs is only possible after the release of both safety inputs.

6.3.3 Safety parameters

DIN EN 81-20	Certified
DIN EN 81-50	Certified
$MTTF_D$ [a]	420,8
PFH_D [1/h]	1,85 E-10
DCavg	99%
ß	5,00 E-02
$ß_D$	2,00 E-02

Warning:
EN 81-20 defines the technical requirements for lift construction.
EN 81-50 provides the framework for design and testing of lift components

6.3.4 Power supply

Power supply	24 Vdc ±10%, 2 W, Class 2 24 Vac -15/+10% 50÷60 Hz, 4.5 VA, Class 2
	Overvoltage category III
	Short circuit protection internal PTC
	Rated insulation voltage 4 kV

6.3.5 Inputs	
Number of safety channels	2
Safety inputs (contact inputs)	2-6 and 5-6
Loop resistance	Max. 1 kΩ
Input current	Typical 2-5 mA

6.3.6 Outputs	
Number of NO safety outputs	2
Type	Voltage free contact output, relays with forcibly guided contacts
Max current rating - single output:	@ 60°C (140°F) operating temperature:
EN60947-5-1	AC 1: 250V / 6A / 2000 VA - AC 15: 230V / 3A DC 1: 24V / 6A - DC 13: 24V / 2.5A / 0.1 Hz
UL508	Pilot duty: B300 / R300
Max. total current Σ I_{th}^2:	Spacing between modules ≥100mm: 72A^2 @40°C (104°F) ambient temperature
EN60947-5-1	Modules mounted stacked: 26A^2 @25°C (77°F) ambient temperature Please refer to the derating curves in chapter 7
UL508	Pilot duty: B300 / R300
Mechanical life	> 10^7 operations
Electrical life AC1 (360 s/h)	~ 10^5 operations

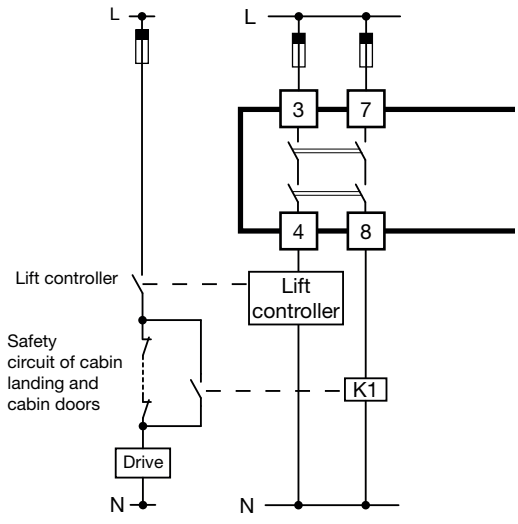
6.3.7 Compatibility and conformity	
Low Voltage Directive 2014/35/EU	
EN 60947-5-1	Low-voltage switchgear and controlgear - Control circuit devices and switching elements - Electromechanical control circuit devices
EMC Directive 2014/30/EU	
EN 60947-5-1	Low-voltage switchgear and controlgear - Control circuit devices and switching elements - Electromechanical control circuit devices
Lift Directive 2014/33/EU	EU type examined by **TÜV** - Cert. no. 44 208 15058309
EN 81-20	Safety rules for the construction and installation of lifts. Part 20: passenger and goods passenger lifts
EN 81-50	Safety rules for the construction and installation of lifts. Part 50: design rules, calculations, examinations and tests of lift components
EN 12015	Electromagnetic compatibility. Product family standard for lifts, escalators and passenger. Emission
EN 12016	Electromagnetic compatibility. Product family standard for lifts, escalators and passenger. Immunity
Approvals	CE RoHS COMPLIANT c UL us LISTED

6.3.8 Environmental	
Protection grade	IP40 on frontal part of the housing, IP20 on the terminals.
Pollution degree	3
Operating Temperature	-25 ÷ +60°C (-13 ÷ 140°F), UL: +40°C (104°F); (tested @ temp 65°C (149 °F) as per lift norm)
Storage Temperature	-30 ÷ +70°C (-22 ÷ 158°F)
Ambient humidity range	R.H. ≤95% non condensing

6.4 Function description

Not only must the output be safe, but also the complete wiring and surroundings. So wiring similar to the following has to be done:

6.4.1 Outputs function



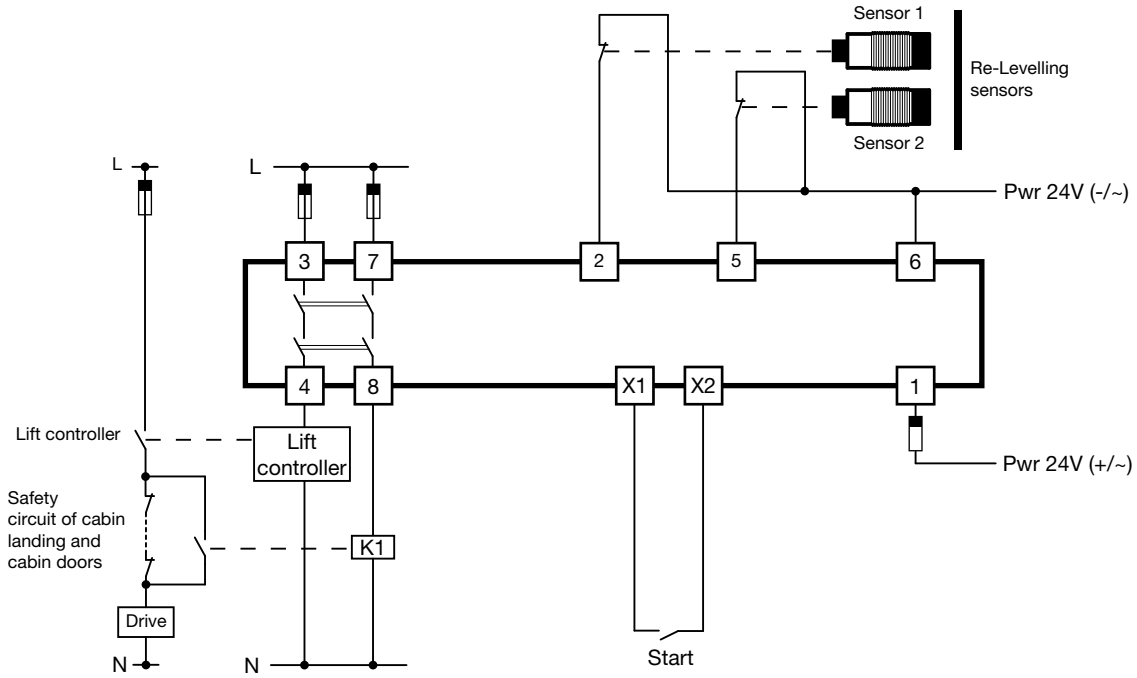
A	The NO safety outputs switch on (contact closes) when the safety inputs are active and the start/reset is pressed.
B	In case of intervention of the safety inputs, the NO safety outputs are switched off
C	If the power supply fails, the NO safety outputs are switched off

6.5 Application

The SMXL20 is designed to be employed in lift plants for floor levelling and relevelling of the cabin, according to the requirements of EN 81-20 and EN 81-50 Standards, and according to the 2014/33/EU Lift Directive.

Lift levelling with magnetic sensors

A	The module monitors the two re-levelling sensors and when the cabin is in the re-levelling zone, it enables the safety outputs. One safety output must be connected to bypass the circuit that monitors the cabin landing and cabin doors, when the lift cabin is inside the re-levelling zone; further to the landing and re-levelling of the cabin at the floor, the safety module detects eventual faults and the lift controller will stop the lift.
B	The inputs 2, 5 are connected to the re-levelling zone sensors



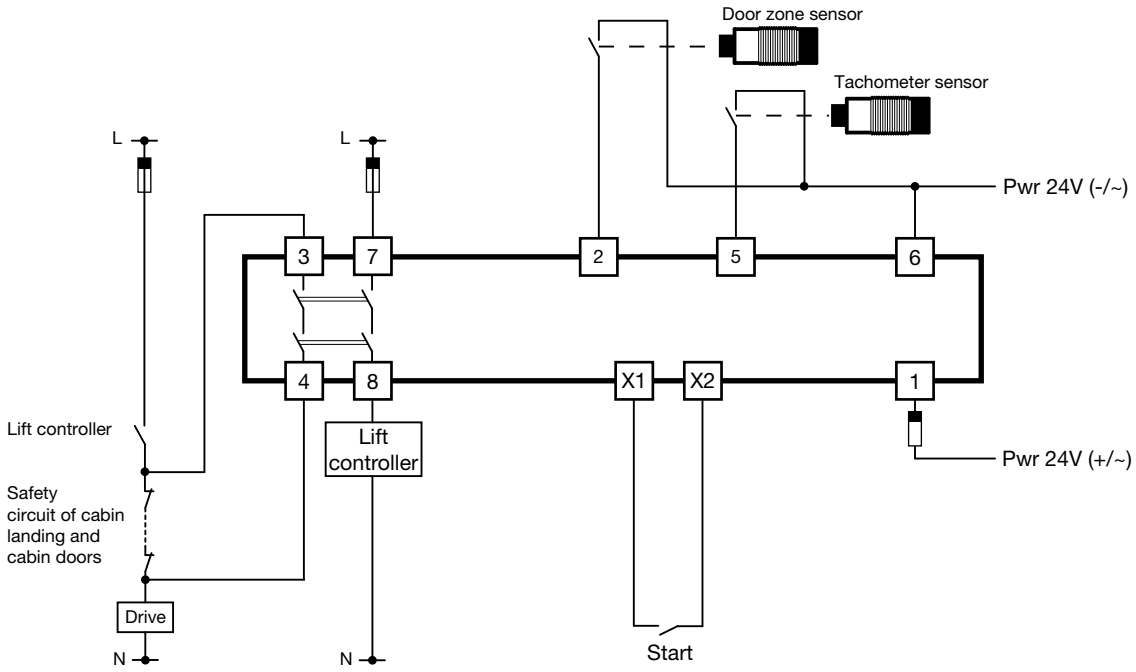
Lift levelling with door zone and tachometer sensors

A

Upon receiving the signal from the door zone sensor and the tachometer sensors, the module enables the safety outputs.
One safety output must be connected to bypass the circuit that monitors the cabin landing and cabin doors, when the lift cabin is inside the re-levelling zone; further to the landing and re-levelling of the cabin at the floor, the safety module detects eventual faults and the lift controller will stop the lift.

B

The inputs 2, 5 are connected to the door zone and tachometer sensors



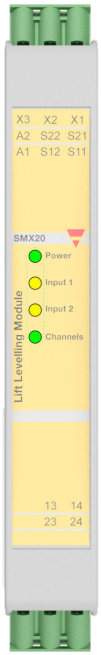
Information:
Lift car levelling safety module, designed according to Lift Directive 2014/33/EU and to safety circuit requirements of EN 81-20, EN 81-50 Standards.

Information:
EN 81-20: Safety rules for the construction and installation of lifts. Part 20: passenger and goods/passenger lifts.
EN 81-50: Safety rules for the construction and installation of lifts. Part 50: design rules, calculations, examinations and tests of lift components.

7. SMX20

The SMX20 is used for floor levelling and relevelling of lift cabin, according to the 2014/33/EU Lift Directive, in lift applications.

7.1 Terminal layout

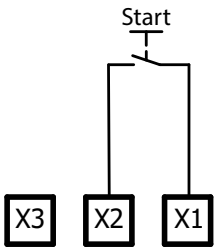


X1-X2: manual start / automatic start
X1-X3: monitored manual start
S11-S12: channel 1 NO input
S21-S22: channel 2 NO input
A1: power supply 24 Vdc (+)/Vac(~)
A2: power supply 24 Vdc (-)/Vac(~)

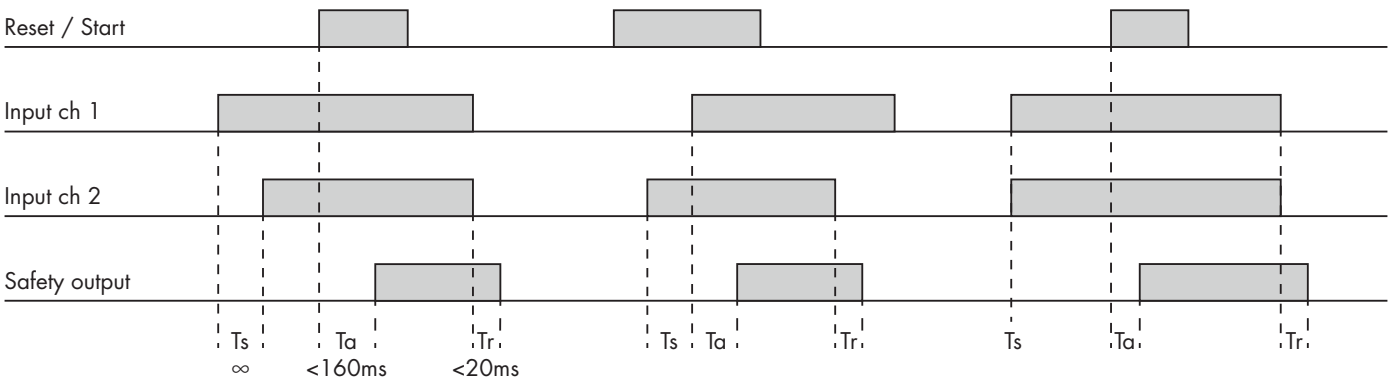
13-14: NO safety output
23-24: NO safety output

7.2 Operating modes

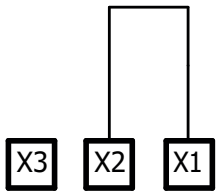
7.2.1 Manual start



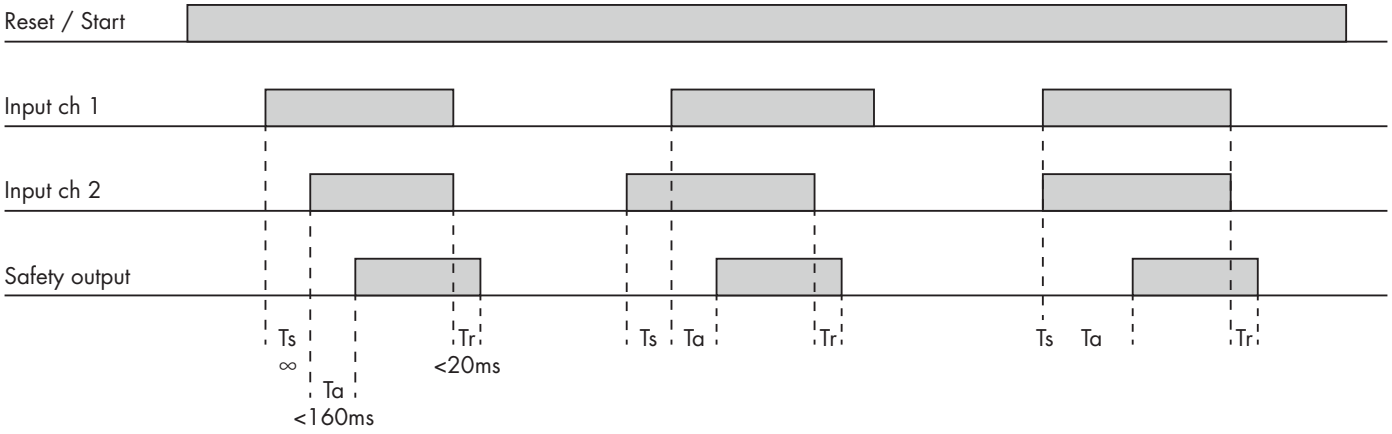
A	The start button is connected between X1 and X2. The safety inputs S12 and S22 are operated: • contact closed between S11 and S12 • contact closed between S21 and S22 The start button is pressed and the safety outputs switch ON
B	The opening of at least one safety input contact forces immediately the safety outputs to the open state
C	A new operating cycle is possible only after releasing both input contacts and then operating them again



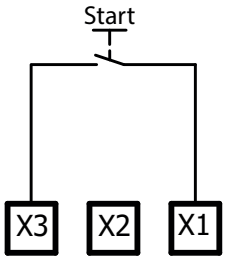
7.2.2 Automatic start



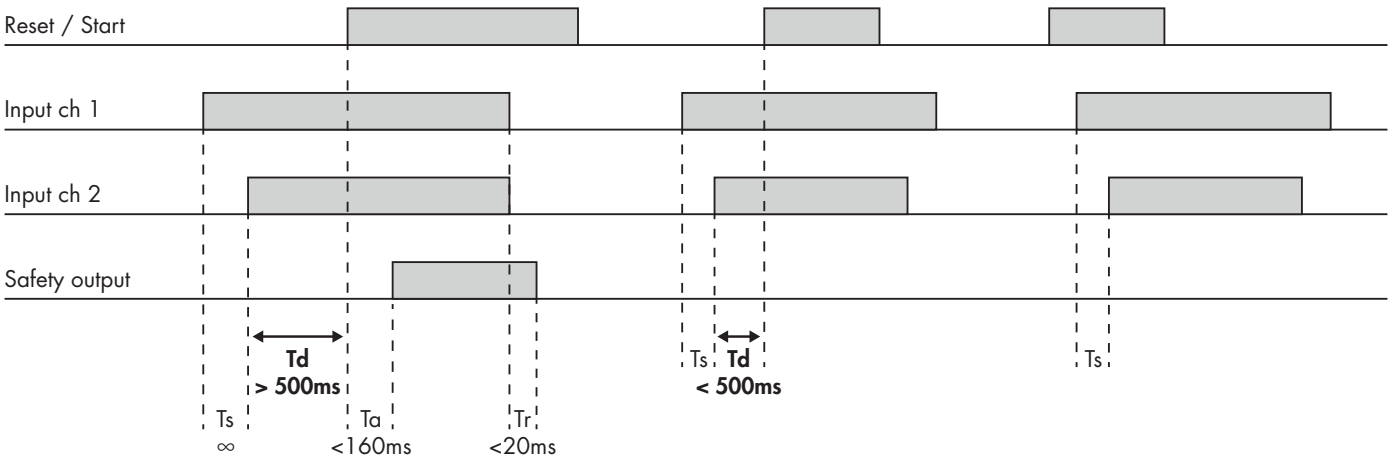
A	Connection between X1 and X2. The safety inputs S12 and S22 are operated: • contact closed between S11 and S12 • contact closed between S21 and S22 The safety outputs switch ON
B	The opening of at least one safety input contact forces immediately the safety outputs to the open state
C	A new operating cycle is possible only after releasing both input contacts and then operating them again



7.2.3 Monitored manual start



A	The start button is connected between X1 and X3. The safety inputs S12 and S22 are operated: • contact closed between S11 and S12 • contact closed between S21 and S22 The start button can be pressed at least 500ms after the safety inputs are operated, to enable the safety outputs to the active state
B	The opening of at least one safety input contact forces immediately the safety outputs to the open state
C	A new operating cycle is possible only after releasing both input contacts and then operating them again



7.3 Technical data

7.3.1 Timing specification

Activation time Ta	< 160ms
Release time Tr	Double channel mode: < 20ms Single channel mode: < 160ms
Simultaneity Ts	Infinite
Monitored manual start delay Td	> 500ms

7.3.2 Safety specification

Safety outputs	13-14 and 23-24
Safe state of outputs	Open
Safety inputs	S12-S11 and S22-S21
Safe state of inputs	Open
Safety function	1. The release of either one or both safety inputs will release the safety outputs. 2. The re-activation of the safety outputs is only possible after the release of both safety inputs.

7.3.3 Safety parameters

DIN EN 81-20	Certified
DIN EN 81-50	Certified
MTTFD [a]	420,8
PFHD [1/h]	1,85 E-10
DCavg	99%
ß	5,00 E-02
ßD	2,00 E-02

Warning:
EN 81-20 defines the technical requirements for lift construction.
EN 81-50 provides the framework for design and testing of lift components

7.3.4 Power supply

Power supply	24 Vdc ±10%, 2 W, Class 2 24 Vac -15/+10% 50÷60 Hz, 4.5 VA, Class 2
	Overvoltage category III
	Short circuit protection internal PTC
	Rated insulation voltage 4 kV

7.3.5 Inputs	
Number of safety channels	2
Safety inputs (contact inputs)	S11-S12 and S21-S22
Loop resistance	Max. 1 kΩ
Input current	Typical 5 mA

7.3.6 Outputs	
Number of NO safety outputs	2
Type	Voltage free contact output, relays with forcibly guided contacts
Max current rating - single output:	@ 60°C (140°F) operating temperature:
EN60947-5-1	AC 1: 250V / 6A / 2000 VA - AC 15: 230V / 3A DC 1: 24V / 6A - DC 13: 24V / 2.5A / 0.1 Hz
UL508	Pilot duty: B300 / R300
Max. total current Σ I_{th}^2:	Spacing between modules ≥100mm: 72A² @40°C (104°F) ambient temperature
EN60947-5-1	Modules mounted stacked: 26A² @25°C (77°F) ambient temperature Please refer to the derating curves in chapter 12
UL508	Pilot duty: B300 / R300
Mechanical life	> 10^7 operations
Electrical life AC1 (360 s/h)	~ 10^5 operations

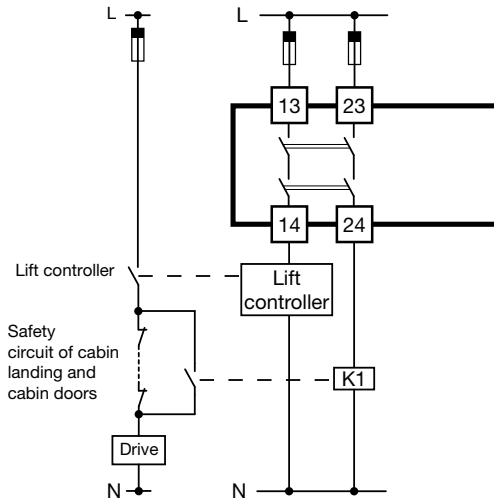
7.3.7 Compatibility and conformity	
Low Voltage Directive 2014/35/EU	
EN 60947-5-1	Low-voltage switchgear and controlgear - Control circuit devices and switching elements - Electromechanical control circuit devices
EMC Directive 2014/30/EU	
EN 60947-5-1	Low-voltage switchgear and controlgear - Control circuit devices and switching elements - Electromechanical control circuit devices
Lift Directive 2014/33/EU	EU type examined by **TÜV** - Cert. no. 44 208 15058309
EN 81-20	Safety rules for the construction and installation of lifts. Part 20: passenger and goods passenger lifts
EN 81-50	Safety rules for the construction and installation of lifts. Part 50: design rules, calculations, examinations and tests of lift components
EN 12015	Electromagnetic compatibility. Product family standard for lifts, escalators and passenger. Emission
EN 12016	Electromagnetic compatibility. Product family standard for lifts, escalators and passenger. Immunity
Approvals	CE RoHS COMPLIANT c UL us LISTED

7.3.8 Environmental	
Protection grade	IP40 on frontal part of the housing, IP20 on the terminals.
Pollution degree	3
Operating Temperature	-25 ÷ +60°C (-13 ÷ 140°F), UL: +40°C (104°F); (tested @ temp 65°C (149 °F) as per lift norm)
Storage Temperature	-30 ÷ +70°C (-22 ÷ 158°F)
Ambient humidity range	R.H. ≤95% non condensing

7.4 Function description

Not only must the output be safe, but also the complete wiring and surroundings. So wiring similar to the following has to be done:

7.4.1 Outputs function



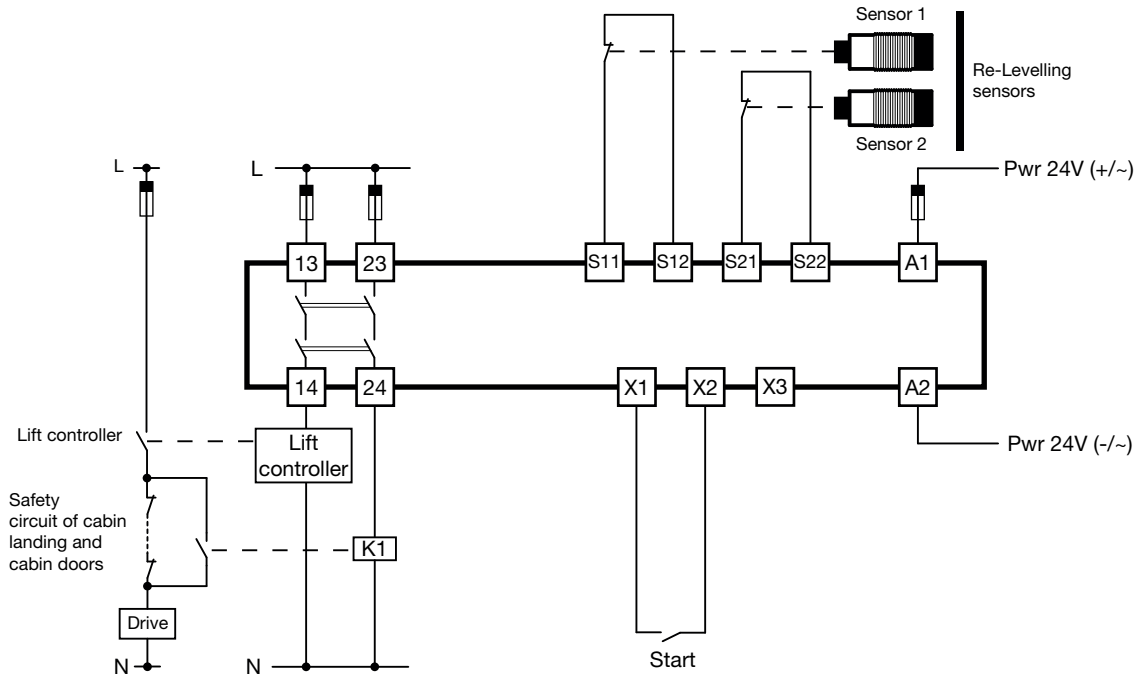
A	The NO safety outputs switch on (contact closes) when the safety inputs are active and the start/reset is pressed.
B	In case of intervention of the safety inputs, the NO safety outputs are switched off
C	If the power supply fails, the NO safety outputs are switched off

7.5 Application

The SMX20 is designed to be employed in lift plants for floor levelling and relevelling of the cabin, according to the requirements of EN 81-20 and EN 81-50 Standards, and according to the 2014/33/EU Lift Directive.

Lift levelling with magnetic sensors

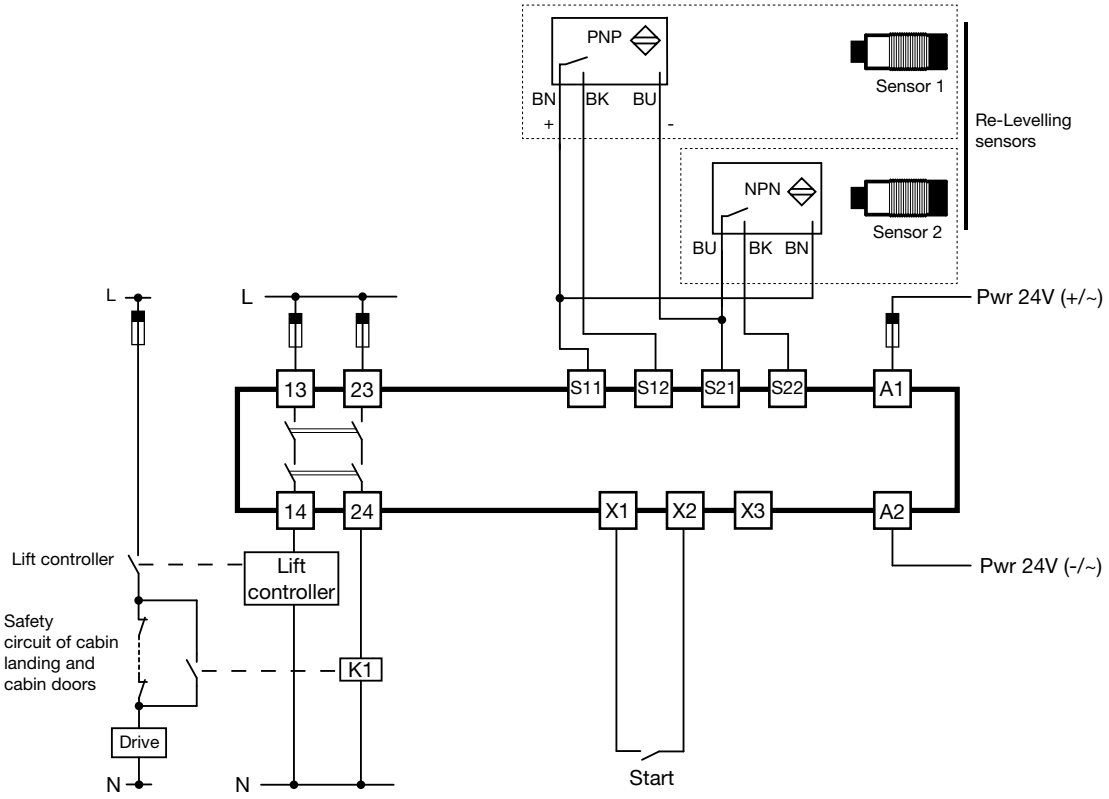
A	The module monitors the two re-levelling sensors and when the cabin is in the re-levelling zone, it enables the safety outputs. One safety output must be connected to bypass the circuit that monitors the cabin landing and cabin doors, when the lift cabin is inside the re-levelling zone; further to the landing and re-levelling of the cabin at the floor, the safety module detects eventual faults and the lift controller will stop the lift.
B	The inputs S12, S22 are connected to the re-levelling zone sensors



Lift levelling with photosensors

A The module monitors the two re-levelling sensors and when the cabin is in the re-levelling zone, it enables the safety outputs. One safety output must be connected to bypass the circuit that monitors the cabin landing and cabin doors, when the lift cabin is inside the re-levelling zone; further to the landing and re-levelling of the cabin at the floor, the safety module detects eventual faults and the lift controller will stop the lift.

B The inputs S12, S22 are connected to the re-levelling zone sensors



Information:
Lift car levelling safety module, designed according to Lift Directive 2014/33/EU and to safety circuit requirements of EN 81-20, EN 81-50 Standards.

Information:
EN 81-20: Safety rules for the construction and installation of lifts. Part 20: passenger and goods/passenger lifts.
EN 81-50: Safety rules for the construction and installation of lifts. Part 50: design rules, calculations, examinations and tests of lift components.

8. LED information

4 LEDs on the front panel indicate the status and any errors during operation:

Status indicator			
LED	**Colour**	**Status**	**Meaning**
Power 	**Green**	ON	Device is powered
IN1, IN2 	**Yellow**	Input 1 OFF Input 2 OFF	The safety switches connected to the inputs 1 and 2 are not active (e.g. contacts open); the module cannot enable the safety outputs
		Input 1 ON Input 2 OFF	The safety switch connected to the input 1 is active (e.g. contact closed), while the input 2 is not active (e.g. contact open); the module cannot enable the safety outputs
		Input 1 OFF Input 2 ON	The safety switch connected to the input 2 is active (e.g. contact closed), while the input 1 is not active (e.g. contact open); the module cannot enable the safety outputs
		Input 1 ON Input 2 ON	The safety switches connected to the inputs 1 and 2 are active (e.g. contacts closed); the module can enable the safety outputs
Channels 	**Green**	OFF	The NO safety outputs are open
		ON	The NO safety outputs are closed

9. Total current Σ Ith²

Quadratic total current [A²] = Output 1 current[A]² + Output 2 current[A]²