

BODE

Rope Brake

Operating Instructions for the Extension Module

SMC14

Table of Contents

Functional Description:.....	3
Program Routine (NORMAL – Mode):.....	3
Messages indicated by the LEDs	4
Error messages:	4
Parameters / Inputs:	4
SET button	5
Clearing of Errors.....	5
LEARN – Mode.....	5
Mounting instructions:	6
Commissioning:.....	6
Test instructions:	6
Maintenance:.....	7
Technical Data	7
Sensor inputs:	7
Conditions of Use:	7
Ambient Temperature:	7
Approvals:.....	7
Dimensions:.....	7
Operating Voltage:.....	7
Heat Dissipation.....	8
Input Signal „Active“ (Terminals 3 – 4)	8

Functional Description:

The extension module SMC14 serves for two main purposes:

1. The monitoring of the maximum speed and
2. The prevention of uncontrolled cabin movements.

In addition, the electronic monitors the correct functioning of its components:

- The functioning of the motion sensors (during normal travel)
- The functional equality of the redundant components
- The plausibility of the input signals

The circuitry has been designed completely redundant.

Each of the two sensors supplies a rectangular signal (quadrature pulse) phase-shifted by 90 degrees by means of which the electronic determines the direction of rotation and the speed.

Furthermore, the module features an input for the travel signal (e.g. NOC on the main contactors) for distinguishing regular from irregular movements.

Program Routine (NORMAL – Mode):

In principle, the electronic distinguishes two modes: „Travel“ and „No Motion“:

During travel, the speed is permanently measured. If the speed measured in the learn mode is exceeded by 20% ($V_{max} = 1,2 V_n$) the brake is immediately released.

In case one sensor fails, the module is switched off once the travel has been completed.

Should the direction of rotation be changed in „Travel“ mode, the control assumes one „active“ input to be defect and the module is also switched off.

In „No Motion“ condition (aggregate de-energized) the module tolerates a half turn of the pressure roller in both directions which equals ca. ± 10 cm.

(Roller with 80 mm in diameter and 10 sensor fields or 25mm per pulse respectively)

Exception:

Upon cancellation of travel (e.g. emergency stop) the lift system needs time to relieve the kinetic energy. This period of time is a parameter determined in learn mode but will, however, be softwarewise optimized (reduced) for the respective situation.

All error conditions permanently lock the „Travel“ mode and have to be cleared on the unit by either pressing the SET button or switching off the operational voltage.

SET button

The SET button serves for clearing/de-locking errors and for confirming inputs in the learn mode.

Clearing of Errors

If an error is indicated by the yellow LED (see above) this error can be cleared by pressing the SET button.

LEARN – Mode

The respective system parameters are determined during a so-called assessment travel. Note: The **release speed has been preset to 120% of the nominal speed** as have the numbers of pulses per unlocking zone.

The following parameter is required for measuring the speed:

- Nominal speed or **pulse rate at Vn** respectively

Furthermore, due to the kinetic energy the following is required for handling the cabin movement:

- The **brake retardation Tb** of the regular brake at Vn (emergency braking)

The assessment travel comprises the following steps:

1. Travel the lift to the lowest halt.
2. Set mode selector to „LEARN“ LED is flashing fast
Warning: The monitoring functions are still active.
Pressing the SET button starts the LEARN mode.
3. Press SET – button LED then flashes rhythmically 1 x
1st phase of the assessment travel: An upwards travel at Vn is expected.
(The monitoring functions are from now on inactive!)
4. Travel at Vn to the top stop LED then flashes rhythmically 2 x
2nd phase of the assessment travel: A downwards travel at Vn is now expected
5. Travel at Vn to the lowest stop LED then flashes rhythmically 3 x
3rd phase of the assessment travel: An upwards travel incl. emergency stop is expected
6. Emergency stop w. empty cabin (upwards) LED then flashes rhythmically 4 x
4th phase of the assessment travel: A downwards travel incl. emergency stop is expected
7. Emergency stop w. empty cabin (downwards) LED then slowly flashes
Assessment travel completed. For saving the parameters press the SET button
8. Press SET button LED then flashes fast
9. Set switch to „NORMAL“ LED turns off

If the mode selector is set to „LEARN“ in a no error condition, the LED flashes quickly to warn against any unintended setting. The assessment travel can be cancelled at any time by resetting the selector to „NORMAL“.

Mounting instructions:

The unit is mounted on a top hat rail (profile TS35).

The wiring to the plug-in terminal screws is to be made in accordance with the wiring diagram.

The cutoff output (terminals G – H, „Main-Line“) is a floating contact.

External voltages must not be applied to the inputs „Active“, „Sensor1“, and „Sensor2“ (terminals 3 – 8)! ¹⁾

Switched inductive loads such as contactor coils, valve coils, etc. are to be equipped with suitable interference suppression devices.

Function	Connection with	Terminal number
Power supply	0V , 24V	1 , 2
Active	NOC main contactors	3 , 4
Sensor A	Sensor A	5 , 6
Sensor B	Sensor B	7 , 8
Cutoff output	Safety chain	G , H

Commissioning:

The units have been factorywise pre-initialized for high Vn and Tb values to allow for an initial travel operation.

After mounting the unit, the above described assessment travel has to be made. Upon final checking (see test instructions) the commissioning is completed.

No further actions are required.

Test Instructions:

For comprehensively testing the installed unit, the following steps have to be completed:

- Set lift out of operation (prevent from normal travel operation, e.g. by switching off the outside control panel. Do not switch off the operational voltage!)
- Open the mechanical brake and manually operate the cabin (i.e. without power). After ca. 10 cm both relays must cut off and error 3 or 4 is indicated.
- Loosen or short-circuit one sensor input and travel the cabin by means of the electrical emergency operation.
The unit first signals error 5 or 6.
Stop the lift; both relays must cut off now.
Re-install the sensor and clear the error.

The option to test the response to an overspeed condition is system specific and can not be described in general in this manual.

¹⁾ Exception see page 10: The input signal „active“

Maintenance:

The unit should be tested as described above and together with the other safety devices in the usual intervals.

Except for this testing the unit is maintenance-free. Repairs at the electronic are not permitted; defect units are to be replaced in full.

Technical Data**Sensor inputs:**

Input frequencies 0.3 – 800 Hz , pulse lengths 1,25 – 3400 ms , resolution 50 μ s

Measuring tolerance at 400Hz (10m/s) = 1,9%

Measuring tolerance at 40Hz (1m/s) = 0,2%

Conditions of Use:

Use in dangerous environments of up to IP40; the requirements of higher protection classes can be met by installing the unit in a housing having been approved for higher protection classes (closed cabinets up to IP55 acc. to EN60529/10.91).

Ambient Temperature:

-20 to 50°C

Approvals:

Type certificate no.

Dimensions:

Length: 115mm Width: 75mm Height: 58mm

Operating Voltage:

18V AC or 24V DC

Messages indicated by the LEDs

There are two LEDs on the unit.

The green LED is permanently lit if the operational voltage is supplied.

The yellow LED indicates several conditions:

Error messages:

The electronic distinguishes eight different errors:

Error	No.	Locking	Description
Vmax Up	1	Immediately	Overspeed in upwards direction
Vmax Down	2	Immediately	Overspeed in downwards direction
Motion Up	3	Immediately	Uncontrolled movement in upwards direction
Motion Down	4	Immediately	Uncontrolled movement in downwards dir.
Sensor 1	5	After end of travel	Sensor 1 defect
Sensor 2	6	After end of travel	Sensor 2 defect
Lift active	7	Immediately	„Active“ input defect
Redundancy	8	After end of travel	Hardware error
Time out	9	After end of travel	Both sensors do not send signals during travel

The electronic indicates the errors by means of a long pulse of the yellow LED followed by a number of short pulses representing the respective error number.



Parameters / Inputs:

Inputs and queries made using the SET button are also indicated by the yellow LED. More details can be found in the following section.

Additional Notes

Heat Dissipation

In the upper left corner of the pc board there is a voltage control generating lost heat. Touching this component during operation can be unpleasant.

Input Signal „Active“ (Terminals 3 – 4)

The electronic requires information about whether the lift is currently in (normal) motion.

There are several options to generate this signal. The most simple and safest way is to use a NOC on the main contactors (recommended). Also limit switches on the conventional brake (on the aggregate) can be used.

It is important that the signal is exclusively generated when the safety chain is closed.

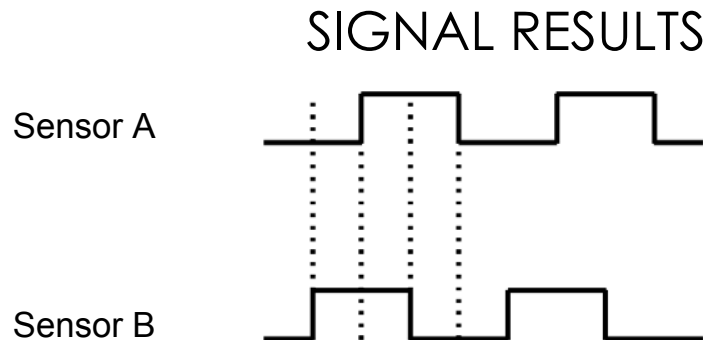
A „Travel“ signal as it is provided by modern systems is therefore only recommendable to a limited extent.

The signal is to be applied to terminals 3 and 4 by means of a floating contact.

If the rope brake's electronic is anyhow fed via the lift control's signal operating voltage or if 0V (minus, GND) of the lift control has already been connected to terminal 1 of the circuitry also a positive switching signal (24V, joint cathode, positive logic) may be directly applied to terminal 4.

Adjustment of the Sensors

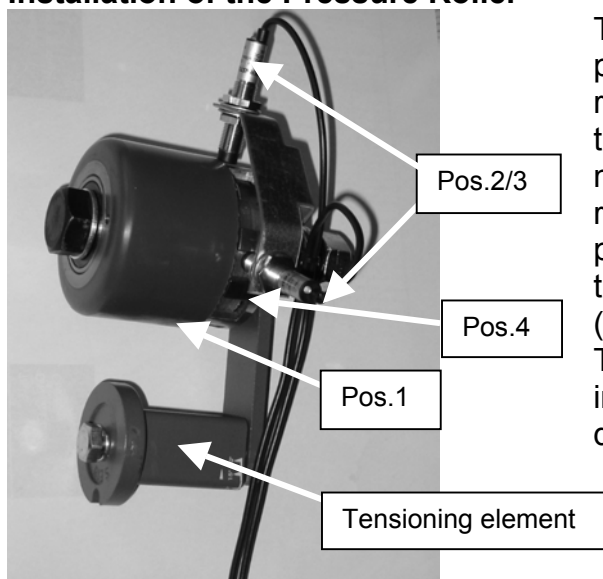
The electronic circuit at the sensor inputs (clamps 5 – 6 / 7 – 8) needs some form of signal, which can be derived from the direction of the rotation in particular. These are two rectangular signals that are shifted about 90 degrees dephased to each other.



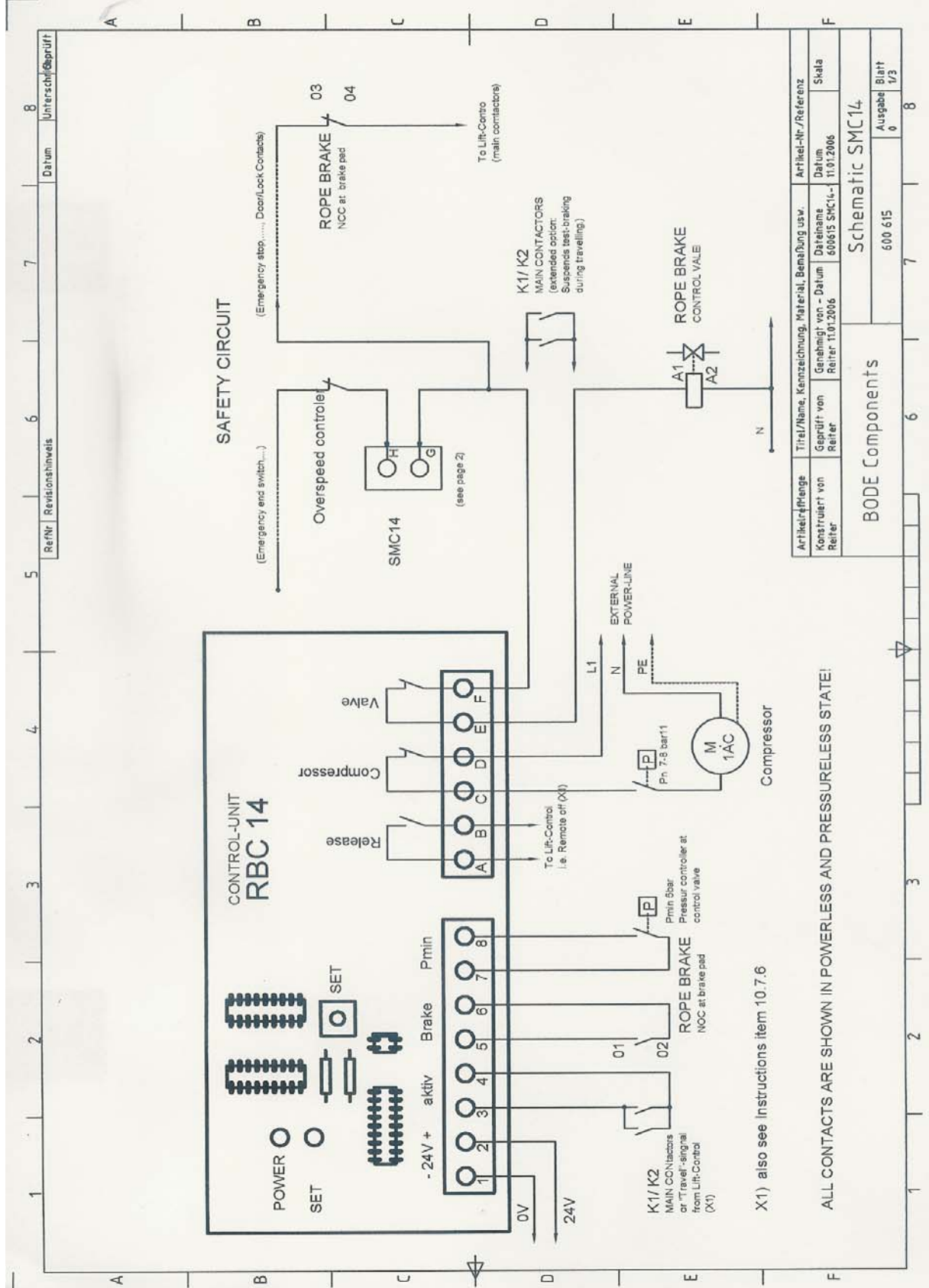
The sensors need to be adjusted mechanically, so the above shown course of signal results, meaning while slowly rotating the rope roll the following states should be monitored in cyclic order:

1. Sensor B on
2. Sensor A + B on
3. Sensor A on
4. both sensors off

Installation of the Pressure Roller



The pressure roller (pos. 1) has to be pressed against the lift's suspension ropes with sufficient pressure. During the cabin's travel, the pressure roller must be driven by the suspension ropes. The distance between the proximity switches' area (pos. 2/3) and the pressure roller's vaporization area (screw head) should not exceed 2mm. The proximity switch is to be connected in accordance with the connection diagram SMC 14.

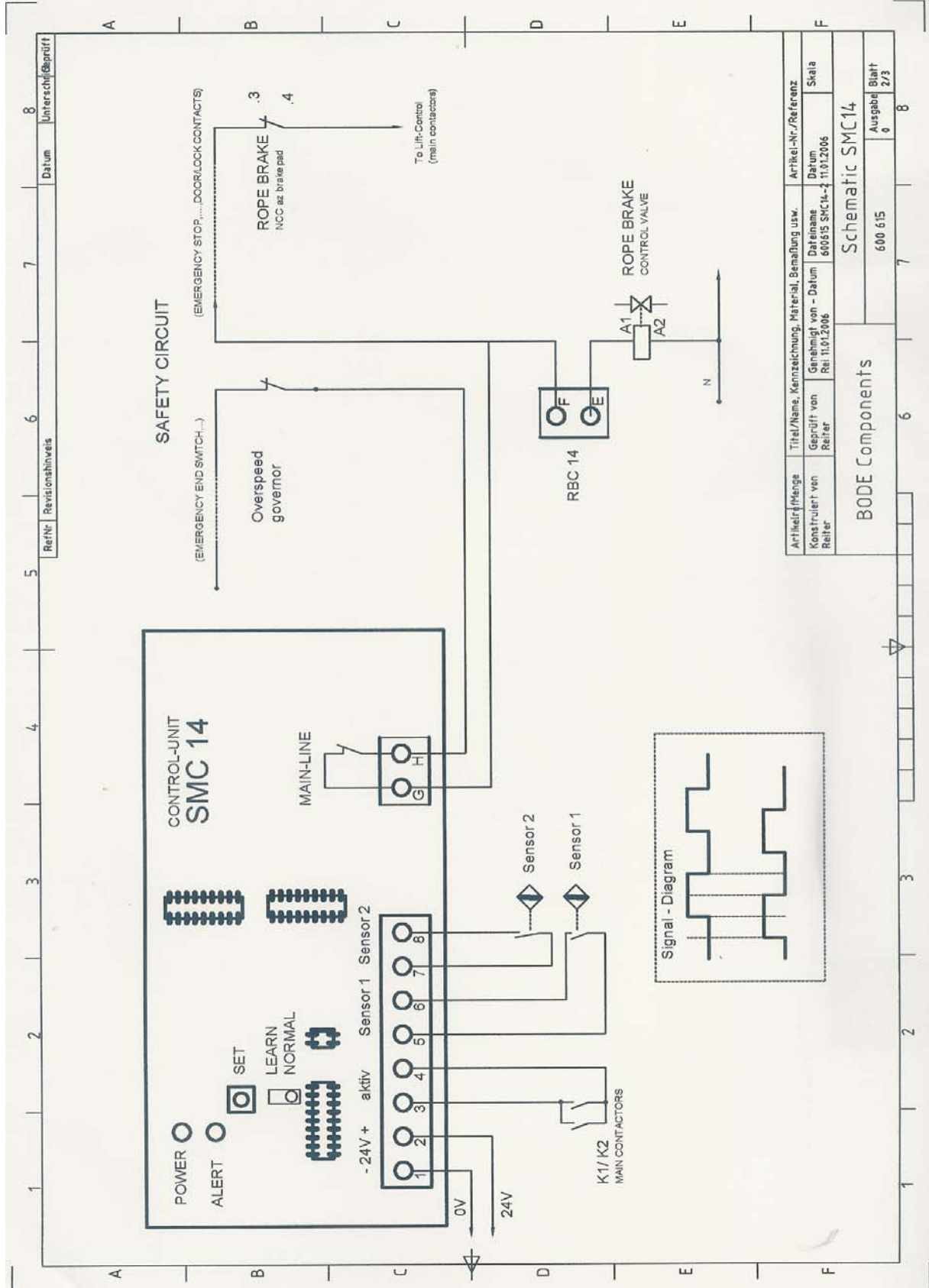


X1) also see instructions item 10.7.6

ALL CONTACTS ARE SHOWN IN POWERLESS AND PRESSURELESS STATE!

Artikel-Nr./Reife	Titel/Name, Kennzeichnung, Material, Bemessung usw.	Artikel-Nr./Referenz
Konstruiert von Reiter	Genehmigt von - Datum Reiter 11.01.2006	Datum 11.01.2006
Reifert	Reife	Stelle
Schematic SMC14		
BODE Components		
600 615		
Ausgabe Blatt 1/3		

Re/Nr	Revisionshinweis	Datum	Unterschrift/Geprüft
5			
6			
7			
8			

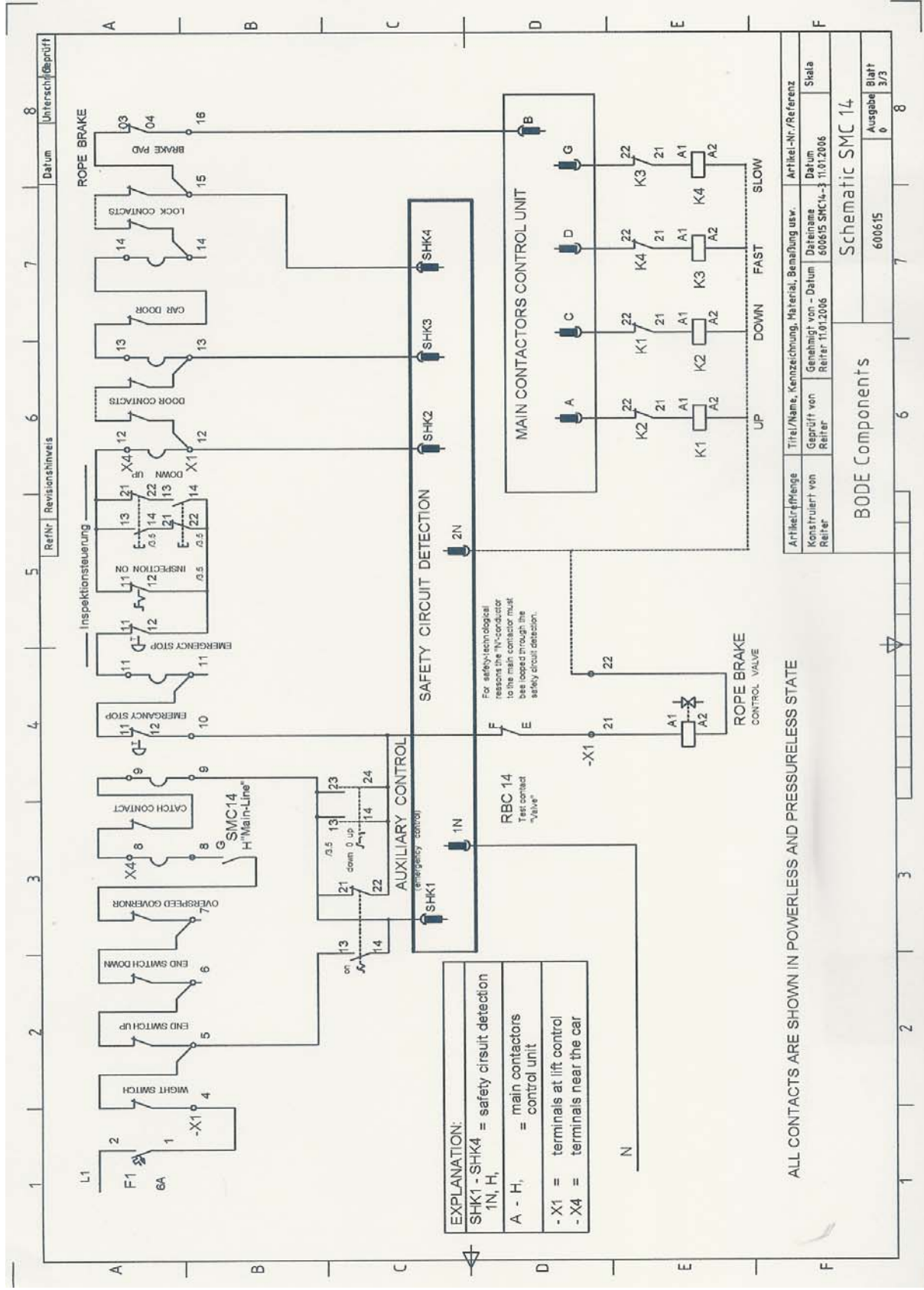


RefNr: Revisionshinweis

Datum: Unterschrift/überprüft

Artikel/Menge	Titel/Name, Kennzeichnung, Material, Bezeichnung usw.	Artikel-Nr./Referenz
Konstruiert von Reiter	Geprüft von Reiter	Datum 11.01.2006
	Genehmigt von - Datum Rei 11.01.2006	Datum 11.01.2006
		Skala

BODE Components	
600 615	6
Schematic SMC14	7
Ausgabe 0	8
Blatt 2/3	



EXPLANATION:
 SHK1 - SHK4 = safety circuit detection
 1N, H,
 A - H, = main contactors
 = control unit
 - X1 = terminals at lift control
 - X4 = terminals near the car

ALL CONTACTS ARE SHOWN IN POWERLESS AND PRESSURELESS STATE

Ref.Nr	Revisionshinweis	Datum	Unterschrieben/Geprüft
5		6	
6		7	
7		8	

Art/Nr./Menge	Titel/Name, Kennzeichnung, Material, Bemessung usw.		Art/Nr.-Nr./Referenz
Konstruiert von	Geprüft von	Datum	Skala
Reifer	Reifer	600615 SMC14-3 11.01.2006	
BODE Components			Schematic SMC 14
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