

## DESCRIPTION

The unit NCUM50 is a safety device used to detect the uncontrolled movement of elevators in accordance with EN 81-20:2014, EN 81-50:2014. The operation of this module is based on the use of guided safety relay contacts.

## SAFETY PRECAUTIONS

The inputs of the unit (C11-C12-C13-S41-S42) must be safety contacts comply with paragraph 5.11.2 of the standards EN81-20:2014 and perform a function of personal protection; they should not be bypassed (by shorting the contacts), moved, removed or rendered ineffective by other means. Incorrect installation or manipulation can cause serious personal injury. The manufacturer or installer of the machine is responsible for the proper and safe operation.

The auxiliary outputs 31-32-33/61-62-63/VC1-VC2 provide an indication on the status of the device, so they must not be used in any way as a safety output.

The NCUM50 is not suitable for operation in the presence of ionizing and non ionizing radiation (X-rays, microwaves, lasers, ultraviolet rays).

The safe output 13-14 is the uncontrolled movement output and activates the solenoid to lock the over speed limiter. The safe output 23-24 must cut the safety chain downstream of the contact car doors.

IF THE OUTPUT 23-24 AND INPUT C14 ARE NOT WIRED THE RECOGNITION OF UNCONTROLLED MOVEMENT WILL NOT BE POSSIBLE AND CAUSING THE FAILURE TO OPEN OUTPUT 13-14. Therefore, it is obligatory, for safety reasons, the use NCUM50 in accordance with requirements of the manual: in particular the outputs 13-14 and 23-24 must always be used both to ensure an adequate protection against malfunctions due to faults.

**In the following case you must use a IP54 cabinet:**

- If the voltages to outputs 13-14, 23-24, 43-44 and to the inputs C11, C13, C14 are greater than 160V.

## OPERATION (Fig. 1, 2, 3)

The safety control unit NCUM50 integrates, in addition to the safety module for the uncontrolled movement, also a leveling unit.

It is specifically dedicated to applications with the over speed limiter, as it is able to discriminate an uncontrolled movement from a power supply failure on the safety circuit or the opening of a contact upstream of the door contact. The unit monitors the status of the inputs C11, C12, C13, C14:

- If there is voltage at the terminals C13, C14, but not on the C11 terminals means that the car door is open, in which case if the lift will move out of the door zone, an uncontrolled movement is detected, the outputs 13-14 and 23-24 will open engaging the locking electromechanical system (OSG and safety gear).

- If there is no voltage at terminal C14, means that there may have been a power supply failure or accidental contact opening upstream of the door contacts: in this situation, the output 13-14 remains closed avoiding the dangerous engaging of the safety gear during the elevator stopping, meanwhile the output 23-24 will open.

The missing wiring or a fault in the input C14, inhibits the system from the recognition of the uncontrolled movement, but in this case since the output 23-24 (in series on the safety circuit) is open, the departure of the lift is inhibited.

- If voltage is present at terminal C14, but lacks to terminal C13 means that there was an opening of the landing door, in this case occurs the opening 13-14 output with a delay of about 2 seconds allowing the lift to stop using the brakes and avoiding activate the safety gear. If there was a temporary failure on the power supply, the module will continue to operate as it relates to the battery, the output 13-14 will be closed allowing the manual rescue operation. Using the connection diagram of Fig.2, the control unit NCUM50 allows to perform the operations of levelling with doors open. By monitoring the inputs S11-S12 and S21-S22 will open safety contacts 43-44 when the car is moving out of the door zone (details on the operation of leveling in fig.9-10).

## OPERATION (Fig. 4)

To completely exclude (also with  $T > 2,5s$ ) the opening of the outputs 13-14 and 23-24 in case of opening of a landing door (out of floor with elevator car) refer to the wiring connection of Figure 4 that involves the use of a second contact on the car door.

## OPERATION (Fig. 5)

If the OSG manufacturer suggest the release of the electromagnet when the lift is stopped at the floor, the lift control panel should cut the power supply to the electromagnet by means of a relay contact (relay KX).

The normally close contact of the position sensor of the electromagnet must be wired in series with the safety chain to avoid the actuation of the safety gear.

## START

As required by law, if a hazardous event occurs, the safety outputs will remain open until the operation by a skilled person will bring the system in safety conditions and send a signal to start contacts (S31-S32).

## STOPPING DEVICE

The stopping elements is a solenoid lock to activate the overspeed governor.

The stopping element have to comply the EN 81-20:2014. If the switching current to energize the electromagnet is greater than 3A, appropriate contactors in accordance to the point 5.11.2 of the EN81-20, have to be installed between NCUM and the coil of the braking elements. The response time of the contactors have to be considered in the global system response time calculation.

## HAZARDOUS EVENT - UCM

Is considered an Hazardous event, a car movement with the doors open out of the door zone. Therefore the positioning of the magnet for the leveling must be due to guarantee the car stop within one meter in case of uncontrolled movement as indicated in the normative.

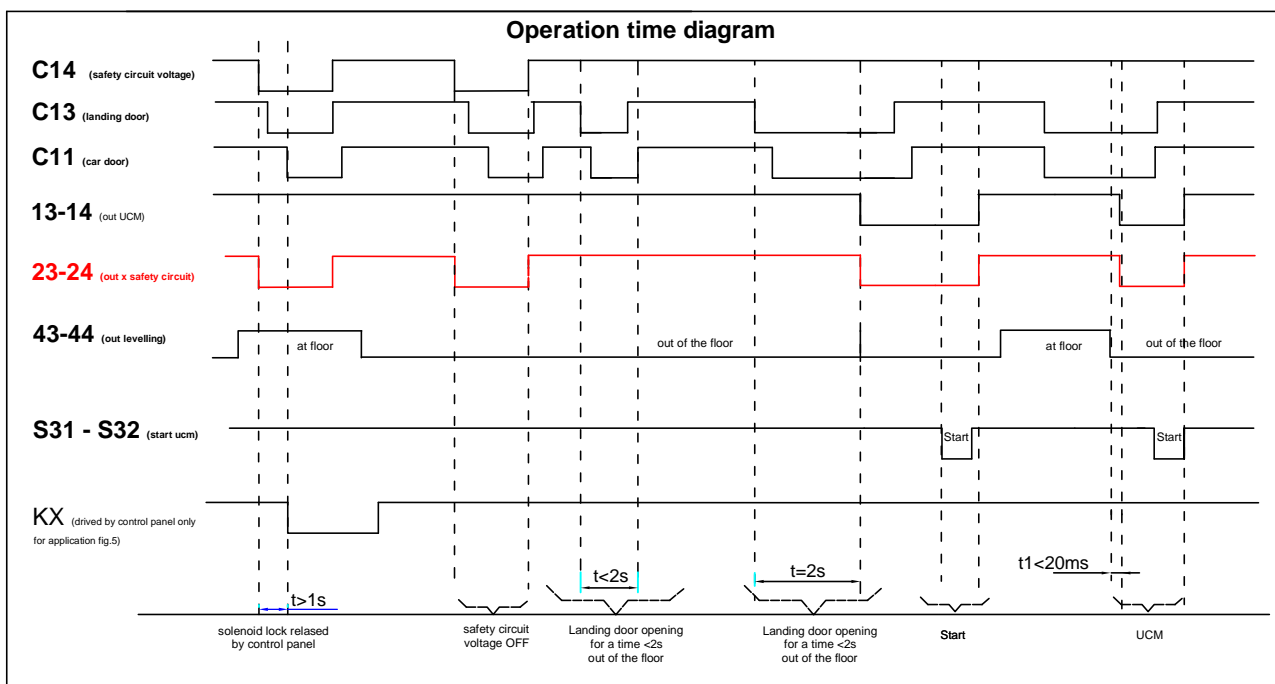


FIG. 1 Operation time diagram

## STOPPING DEVICES MONITORING (Fig. 6-7-8)

The control unit manages the monitoring the stopping element: sending a test pulse to the inputs T, the safety output contacts 13-14 will open activating the solenoids lock of the overspeed governor. If it works properly, a signal of successful implementation will be send to R input and the NCUM50 will close again the safety outputs 13-14. The feedback signal on the OT output, allows to check the correct stopping device activation by the lift controller, while the impulse on the microswitch M1 will check its correct functioning and it can be used to check the returning to the off position of the solenoid lock. The periodical activation of the monitoring procedure (using input T) is in charge of the final user when required by EN81-20:2014

Microswitch M1 has to be positive opening contacts

The certified control unit STEM NCBM01 allows you to manage monitoring procedures

## ASSEMBLY

Installation must be performed by authorized personnel only.

The NCUM50 control unit must be assembled in a suitable operating area.

The unit is installed by clipping it to a standard 35 mm top-hat rail.

## ELECTRICAL CONNECTIONS

Electrical connection must be performed by authorized personnel only.

All the electrical inputs must either be isolated from the mains supply by a separate coils safety transformer in accordance with EN IEC 61558-2-6 with limited output voltage in the event of a defect or by another equivalent movable mechanism.

Each safety relay output (13-14/23-24/43-44) has a maximum current of 3 A; the supply connected to the outputs must be protected from overcurrents by devices adequate to the loads that have to be protected.

If a common power supply is used, all the inductive and capacitive loads (e.g. relay contactors) connected to the power supply must be connected to appropriate interference suppressors.

## SERVICE AND INSPECTION

The correct functioning of the NCUM50 safety unit must be controlled by the operator and/or by the control circuit of the elevator periodically by checking:

- correct switching function
- secure mounting of components
- correct connection fixing.

The monitoring function of the unit is done at every switching.

In the event of damage or wear and tear, the damaged system component must be replaced.

**Liability coverage is void under the following circumstances:**

- if instructions are not followed
- non-compliance with safety regulations
- installation and electrical connection not performed by authorized personnel
- non-implementation of functional checks.

## SETUP

If the control unit does not appear to function when operating voltage is applied (green "Power" LED does not light up), the unit must be returned unopened to the manufacturer.

Check whether the safety outputs are being switched (see LED display) by activating the two inputs and START.

## CONNECTORS PINS FUNCTIONALITY

C11	Safety circuit input AC/DC downstream to door contacts
C12	Safety circuit voltage reference AC/DC
C13	Input downstream to landing door
C14	Input upstream to doors contacts
S11 - S12	Leveling unit first sensor input
S21 - S22	Leveling unit second sensor input
S12 - S33	Start levelling contact
S31 - S32	Start UCM contact
S41 - S42	Input second door contact or for levelling unit output (43-44)
A1	Power supply module 24VDC positive / 24VAC
A2	Power supply module 24VDC negative / 24VAC
A3	Positive 12V battery power supply
A4	Negative 12V DC battery voltage
V+	UCM internal supply positive supply voltage
G	Internal voltage reference
VC1	Output safety chain voltage OFF (optoisolated - collector)
VC2	Output safety chain voltage OFF (optoisolated - emitter)
T	Test input (opening 13-14, VMAX 30VDC)
CT	Common for test impulse (GND)
R	Feedback contact from solenoid lock (output 13-14, 0-10V)
OT	Feedback Test stopping device 1 (0-12V)
13 - 14	UCM safety output
23 - 24	Safety output for elevator safety circuit
31	Auxiliary output UCM: Common
32	Auxiliary output UCM: NC
33	Auxiliary output UCM: NO
43 - 44	Levelling unit safety output1
61	Levelling auxiliary output: Common
62	Levelling auxiliary output: NC
63	Levelling auxiliary output: NO

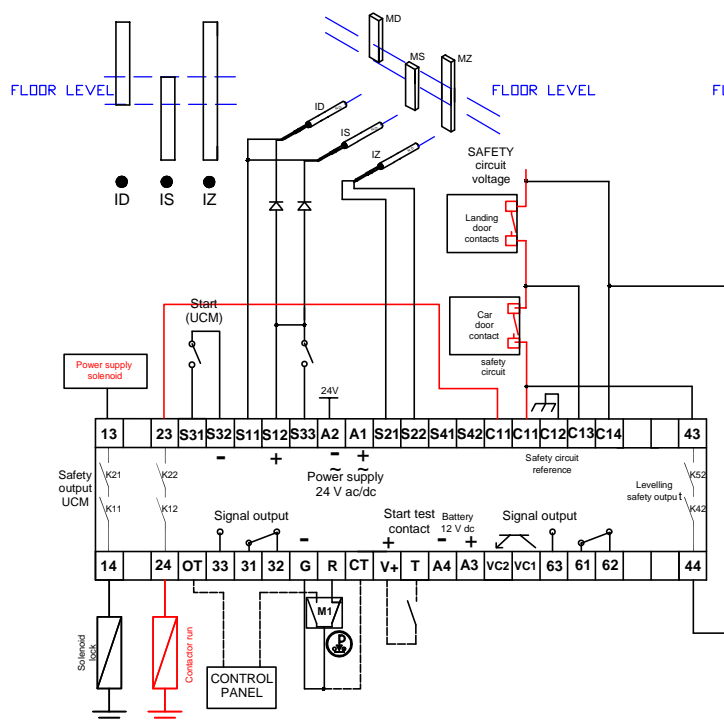


FIG. 2 Connection scheme with levelling

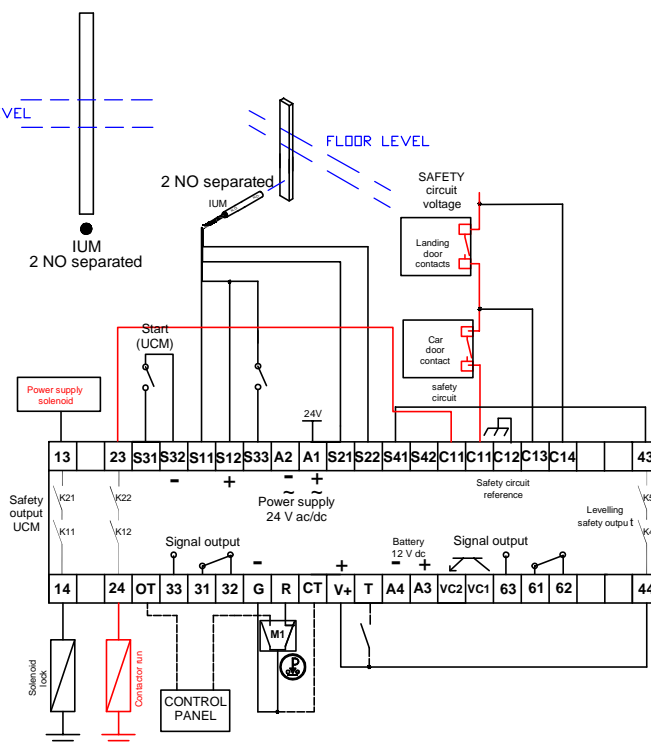


FIG. 3 Connection scheme without levelling with 2 contacts sensor

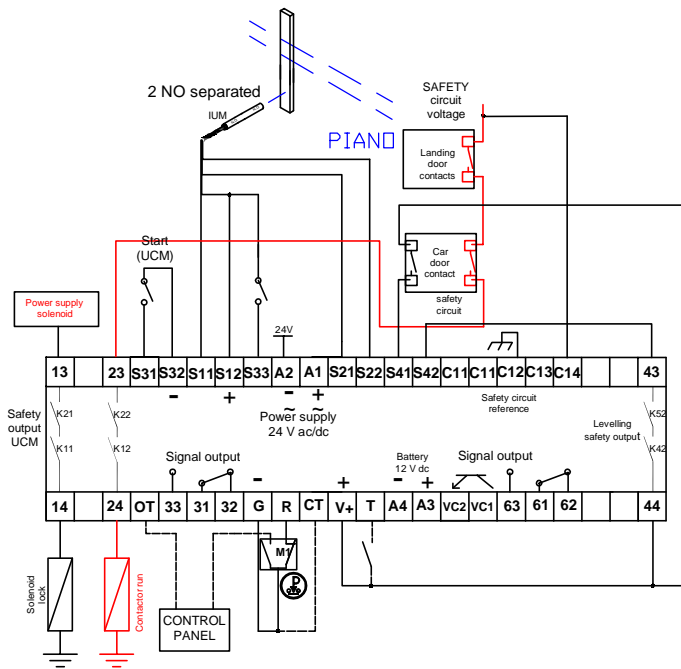


FIG. 4 Connection scheme with second car door contact

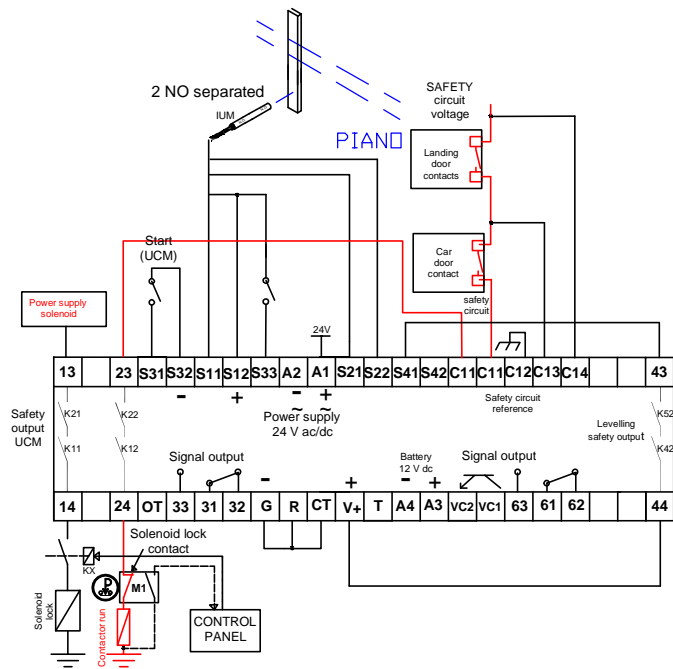


FIG. 5 Connection scheme without levelling a with 2 contacts sensor and relay (KX) for the releasing of the solenoid lock driven by the control panel

## Monitoring timing diagram

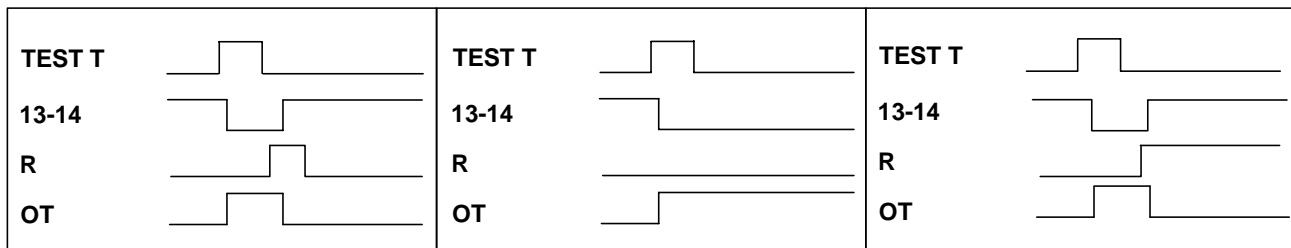


FIG. 6: TEST OK

FIG. 7: FAILED TEST  
SOLENOID LOCK IS NOT WORKING, SAFETY  
OUTPUT REMAIN OPEN

FIG. 8: FAILED TEST  
SOLENOID LOCK IS WORKING  
BUT MICROSWITCH IS BROKEN OR SOLENOID LOCK  
DOESN'T COME BACK TO THE OFF POSITION

## Leveling unit functionality

The safety module NCUM50 has integrated a levelling unit and it is able to check the status of the contacts (S11-S12/S21-S22): the leveling output (43-44) are activated if the sensors are in the correct position and if the start button S41 has been activated. The opening of even only one input contact (S11-S12/S21-S22), leads to a safety situation opening the safety outputs 43-44 and by preventing its closing even after the re-closing of the contact and the pressure of the START button.

For the automatic start, please check the following scheme.

The responsibility to choose the adequate components for safety applications, for example guided contacts safety relays, falls to the user.

## Leveling unit sensors positioning

Sensors and leveling unit have to comply EN81-20. The sensor targets (typically a magnet) have to be positioned in the door zone and their length have to be appropriate in order to guarantee the car stopping within 1m from the landing sill as required by EN81-20. The trimming of the target length (i.e. magnet) is in charge of the user in accordance to the response time of the stopping element and the elevator speed.

## Manual levelling start

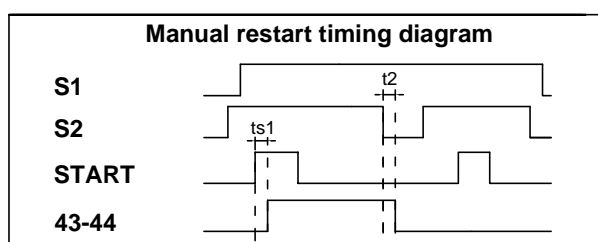
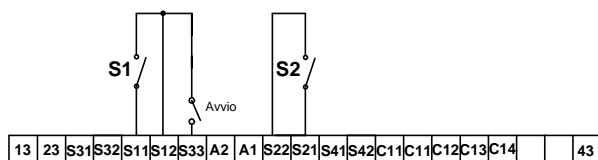


FIG. 9 Connections and timing diagram for manual restart

## Automatic levelling start

If the scheme of Fig. 2 is used, make sure to respect the closing sequence shown in the timing diagram of Fig. 10: the first contact that have to close is the one connected to the inputs S21-S22.

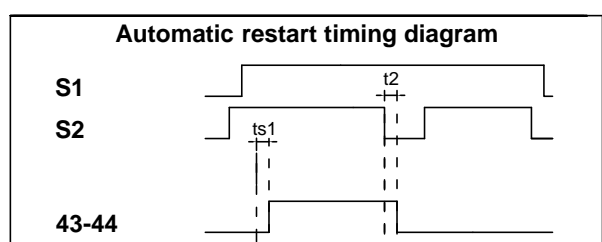
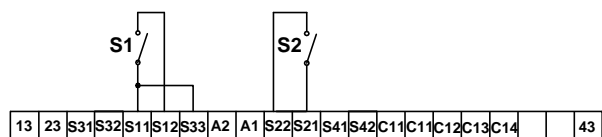


FIG. 10 Connections and timing diagram for automatic restart

TECHNICAL DATA		
Parameter	Value	Unit
Housing material	PA	
Dimensions	160,5 x 96,8 x 63 (altezza)	mm
Weight	360	g
Operating conditions	Temperature: -5 ... +55	°C
	Relative humidity: 4% ... 100%	
	Pressure: 86 ... 106	kPa
Housing conditions	Temperature: -25 ... +70	°C
	Relative humidity: 5% ... 95%	
	Pressure: 86 ... 106	kPa
Degree of protection (IEC 60529)	IP20	
Degree of contamination (see note 1)	3	
Overvoltage Category	III	
Assembly	35 mm DIN standard rail	
Connection type	Screw terminals	
Supply voltage	24 -15% / +10% (AC 50 ÷ 60 Hz)	V ac/dc
Battery supply voltage	12 -15% / +10%	V dc
Fuse on inputs S1X	50 mA fast action fuse	
Internal fuse on the supply	750 mA PTC Fuse	
Current consumption	@24Vdc: 80 min, 220 max; @24Vac: 190 min, 480 max	mA
Tensione di commutazione in uscita	240 (max) (Safety output)	V ac
Switching current AC-1 / Electrical life	3 (Safety output) > 10 <sup>5</sup> cycles	A
Minimum switching current @ 10 V	10	mA
Safety output switching power	720 (max)	VA
External fuse on outputs 13-14, 23-24, 43-44	4 A gG (According to IEC EN 60269-1)	
A3 uncontrolled movement safety output contacts	13 -14	
A3 uncontrolled movement auxiliary output contacts	31 - 32 NC 31 - 33 NO	
Safety levelling output contacts	43 -44	
Auxiliary levelling output contacts	61 - 62 NC 61 - 63 NO	
Elevator safety circuit output contact	23 -24	
Usage category / Electrical life (SAFETY outputs)	AC-15: 1,4 A / 240 V (inductive load, cos Φ=0,3)/10 <sup>5</sup> cycles DC-13: 1A / 24 V / 10 <sup>5</sup> cicli	
Auxiliary outputs parameters	max: 0,5A @ 24 Vdc	
Output (13-14) response time in case of uncontrolled movement	30	ms
Output (13-14) response time in case of landing door opening outside the floor level	2,5	s
Output (13-14) response time in case of car door opening outside the floor level	30	ms
Output (43-44) response time for the levelling	20	ms
Max input sensor resistance	200	ohm
Vibration resistance	IEC 60068-2-6:2007, CEI EN 60068-2-27:2012-01 EN 81-20:2014, EN 81-50:2014	
Mechanical life	10 <sup>7</sup>	cycles
EMC compliance	EN 12015: 2004, EN 12016: 2004 + A1: 2008	
In accordance with	EN 81-20:2014, EN 81-50:2014	
Approval	TÜV SUD EDES 011	

## NOTE 1

Condition met if:

-- If the voltages to outputs 13-14, 23-24, 43-44 and to the inputs C11,C13,C14 are lower than 160V.

LED TABLE

Function	LED	Colour	Stato
Power supply	PWR	Green	on
Input S41 - S42 : CLOSED *	CP	Green	on
Output 13-14 : Closed **	OUT	Green	on
TEST: running	T	Green	on
Levelling sensor S1	S1	Green	on
Levelling sensor S2	S2	Green	on
Out 43-44: CLOSED	OUTL	Green	on
Voltage on the safety circuit OFF	VC	Green	on

\* Second contact of a double door contacts and/or 43-44 closed on 12V of the NCUM50.

\*\* LED OUT indicates the activation of the safety circuit; during the stopping device test, LED OUT remains ON even if output 13-14 open.

## ANNEX A TESTING PROCEDURE ACCORDING TO EN81-50:2014

### Testing procedure according to §5.8.3.2.4

- 1) Install all the appropriate out of serving signalling at each floor
- 2) Check that nobody is in the car
- 3) Deactivate the landing call
- 4) Change the electrical connection as indicated in fig.1 (AnnexA)
- 5) Using the maintenance panel send a landing call
- 6) The NCUM will open the outputs 13-14
- 7) The solenoid lock will be activated
- 8) Measure the braking trip distance

### Testing procedure according §5.8.3.2.5

Monitoring test with a working solenoid lock

- 1) Install all the appropriate out of serving signalling at each floor
- 2) Check that nobody is in the car
- 3) Deactivate the landing call
- 4) Send an impulse to T
- 5) The NCUM will open the outputs 13-14
- 6) The signals R will change logical state and if everything works correctly the output 13-14 will be closed
- 7) Check the system functionality monitoring the signals as indicated in the figures 6,7,8 (pag. 3 manual)

Monitoring with a simulation of faulty braking element

- 1) Install all the appropriate out of serving signalling at each floor
- 2) Check that nobody is in the car
- 3) Deactivate the landing call
- 4) Shortcircuit the input R as indicated fig.2 (Annex A)
- 5) Send an impulse to T
- 6) The NCUM will open the outputs 13-14 that there will be not closed automatically
- 7) Check the system functionality monitoring the signals as indicated in the figures 6,7,8 (pag. 3 manual)

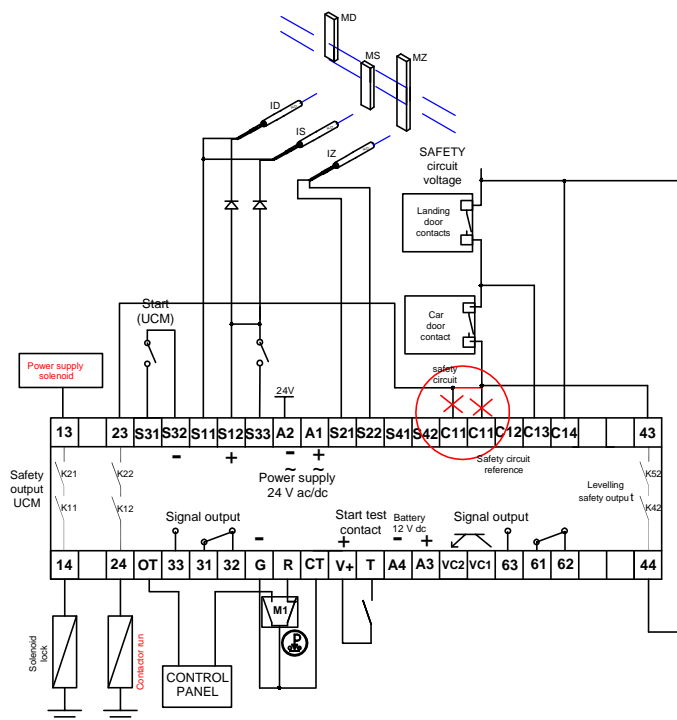


FIG. 1 Uncontrolled movement test

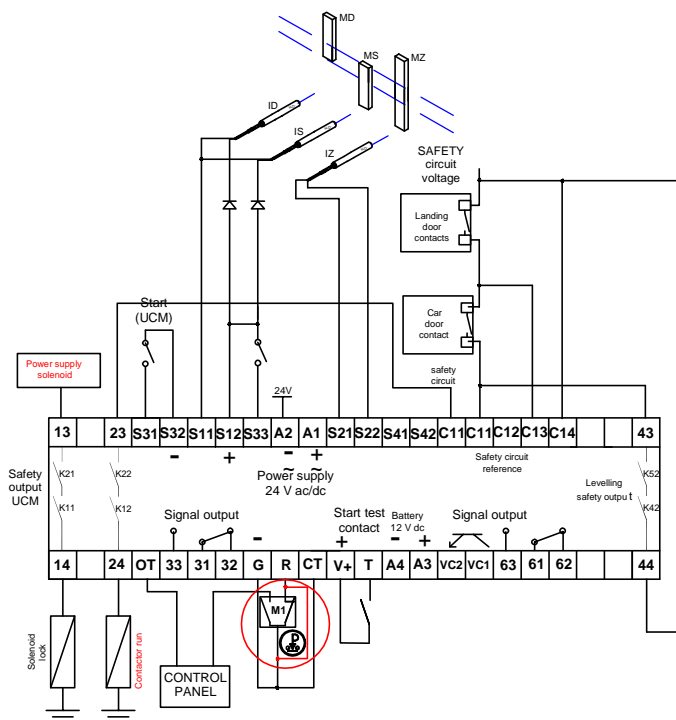


FIG. 2 Fault simulation of the solenoid lock