



# FSSG Training Guide for NYC DOB Elevator Inspectors

New York, September 2015

Dear DOB Elevator Inspector,

This paper intends to introduce to you the Fail Safe Safety Guard (FSSG) device and to provide the related information as per the set guidelines and regulations required for the testing and verification of its functioning during elevator inspection.

The FSSG presents a new, innovative concept in Elevator safety. It eliminates the possibility of negligent door locks and gate switch by-pass. As you'll see, the FSSG devices prioritize the safety of users and operators alike by ensuring that there is NO possibility of door locks and gate switch by-pass during elevator NORMAL operation. More importantly, the FSSG device has been designed to eliminate any form of manipulation that would otherwise override its protective functions.

It is important to note from the onset that the device I present at this time is not the final version. While it still works adequately to ensure elevator safety, I'm working to enhance its features and capabilities for comprehensive Elevator Safety.

As such, this documentation was prepared, especially for your department, to help introduce you to the FSSG device's functions and capabilities. I'm ready to address any queries for submission arising from this submission, or any other concerns about the FSSG device. As for the presentation of the FSSG device, I will be available next month, whereby I will have an opportunity to expound further on the device.

Respectfully submitted,

Yoram Madar, CEO

ROLLS ELEVATOR SAFETY



## INTRODUCTION

The **FSSG-v3** is a Patented, safety device that is permanently installed outside the elevator controller to monitor and detect Door Locks Circuit and Gate Switch Bypass performed on an elevator controller's input terminals or at the landings\*, either by the elevator mechanic, or as a result of a short-circuit.

The device is designed in compliance with the new NYC Rule (A17.1 Section 2.26.5) that requires the detection of door lock bypass depending on Car door position only. The FSSG not only incorporates the required function(s) but also monitors the door locks while the door is closing.

Although the device is **serially** connected to the hall locks and car gate switch circuits, its unique capability allows constant by-pass detection and monitoring to prevent automatic operation. The FSSG detects all types of by-passing or short-circuits as well as the one caused by a grounded door lock.

Although the normal operation is automatically disabled during a By-pass, Inspection Operation remains active, allowing the elevator mechanic to ride the elevator with a by-pass ON, to look for the faulty door lock. Yet, once the door lock circuit is made (ON), the **FSSG** alerts the mechanic to remove the jumper, as it's no longer necessary.



### GUIDE OBJECTIVES

This guide seeks to introduce the FSSG device to the NYC DOB Inspectors, with focus on:

- Enhancing the inspectors' understanding of the FSSG's technical specifications as pertains to the NYC Building Codes, particularly **SECTION 3.10.12 of K3**.
- Facilitating the inspection of elevator units with the **FSSG** device installed.
- Providing elevator inspectors with pre-requisite information and best practices for the installation, maintenance and inspection of **FSSG** devices in elevators.
- Making available the various design and engineering methods integrated into the **FSSG** device and its relation to compliance with the NYC building code for existing elevators.



## GENERAL DESCRIPTION

The **FSSG** device is by design adaptable for installation and use with all types of elevator safety circuits, including those that incorporate separate circuits for bottom; top; and, intermediate landing doors as well as those that include pre-opening & re-leveling with open door, such as MCE & Swift Controllers.

Therefore, the design and installation both support the concept of safety at all levels, including:

1. The **FSSG** is installed adjacent to the elevator controller and serially connected to the safety circuit(s).
2. The **FSSG** does not in any way interfere with, nor modify any of the controller wiring or functions on the elevator.
3. The **FSSG** serves as a filter between the controller and its input wiring to prevent dangerous manipulation known as “door locks/gate by-pass.”
4. The **FSSG** continually monitors for any intentional or accidental By-pass of the **FSSG** device when the elevator is in use.
5. The **FSSG** meets the safety chain requirements for both modern and old elevators, with a feature to automatically disable Normal elevator operational and keep it out of public use until the Bypass is removed.

### FSSG Update

As of July 2015, as part of continuous elevator security advancements, the **FSSG-v3** now has the capability to monitor both types of elevator doors, manually operated swing doors, and automatically operated slide doors. This is in addition to the ability to submit failure messages through GSM (text message notification over a cellular network).



## FSSG CODE COMPLIANCE

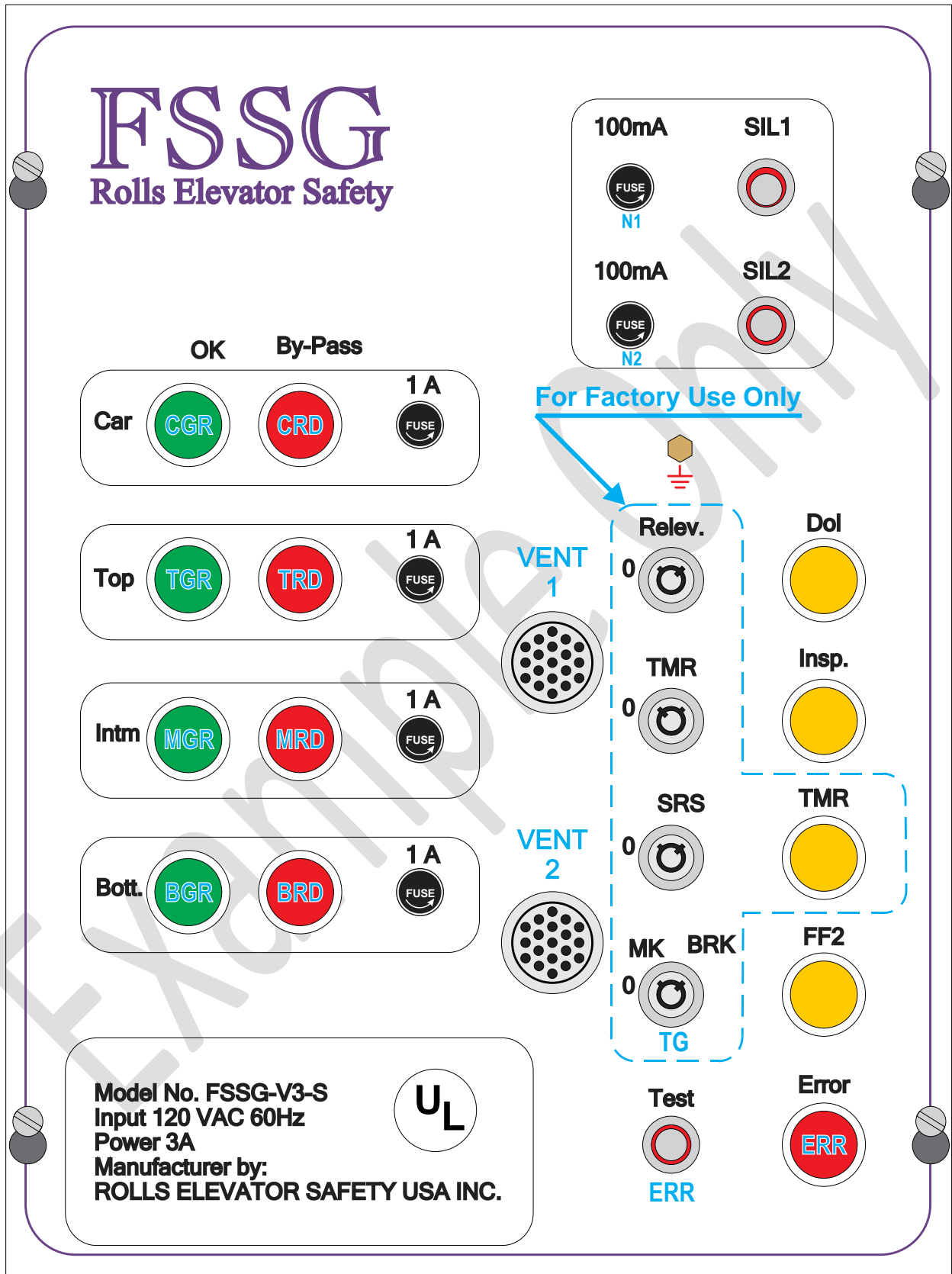
All automatic passenger and freight elevators are subject to various safety compliance guidelines meant to monitor faulty door contact circuits while ensuring elevator safety. The **FSSG** device is designed based on these guidelines including:

1. **FSSG-v3** is **UL** listed under the UL 508 standard for industrial control equipment as "elevator controls and accessories," ASME A17.5/CSA B44.1 and Canadian standard for industrial control equipment C22.2 No 14-13. The approvals refer to all kind of elevators and escalators, as well as other moving equipment that employs safety circuits subject to bypass.
2. FSSG-v3 is a Safety Integrity Level (**SIL**) 2 certified device according to the Electro-Technical Commission (IEC) standards: IEC 61508:2010-*Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems standard*. Additionally, the device meets **SIL** 3 requirements for "Safe Failure Fraction."
3. The **FSSG** is code compliant according to New York City's new rule, **NYCBC-2014, Section 3.10.12 of Appendix K3** (System to monitor and prevent automatic operation of passenger and freight elevators with faulty door Contact circuits), which took effect October 1, 2014.

As per the NYC Elevator Building Code outlined in **Section 3.10.12 of Appendix K3**, all automatic passenger, and freight elevators are expected to comply with the section requirements by January 1, 2020.



## Fail Safe Safety Guard





## Fail Safe Safety Guard

### Prior to commencing Inspection verify the following:

Elevator Safety is a concern in NYC for passengers and inspectors alike. As part of the inspection process, the inspectors and maintenance personnel are expected to comply with the safety guidelines, all of which have been included in the FSSG design. They include:

- The Elevator is out of public service, under Inspection operation mode. This eliminates the risk of unexpected movements with by-passed gate switch or door locks.
- Verify the FSSG is firmly attached to the outside of the controller frame.

## FSSG FUNCTIONS DESCRIPTION

- a) **When a jumper is placed on the door locks in the controller terminal the elevator is removed from automatic operation and moved to inspection mode. This is performed while the door is fully opened (as required by law) and while closing (above law requirement).**
- i. Detect and alert on a by-pass of the door locks circuit of the Bottom, Intermediate, and/or Top landing doors.
  - ii. Detect and alert on a by-pass of the car gate switch.
  - iii. Detect and alert on a by-pass of both the car gate switch and the door locks circuit.
  - iv. Detect and alert the mechanic to remove the jumper when the defective door lock is fixed.
  - v. Self-protection against an attempt to jump out (bypass) the **FSSG** unit.
  - vi. Self-diagnostic for an **FSSG** internal failure.
- b) **When a hoistway door lock is jumped out at a landing. Detection is performed when the car door is closing or open.**



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- vii. Detect and alert on a by-pass of a landing door interlock.

### The result:

For each of the above, upon by-pass detection the FSSG disables "Normal" operation until the by-pass is removed but enables "Inspection" operation while by-pass exists.

### Note:

As required by NYC Rule, while, under [Firemen Phase 2](#), the FSSG allows Normal Operation with a landing door By-passed.





## Fail Safe Safety Guard

## TESTING THE OPERATION OF THE FSSG

Whenever the RED or Yellow LED's are on, it means that a By-pass has been detected, and Normal operation is disabled.

### Front panel description

Type	Title	Color	Description	Normal status
Led	BGR	Green	Bottom door lock is closed.	Yes
Led	BRD	Red	Bottom door lock is By-passed.	No
Led	MGR	Green	Intermediate door lock is closed.	Yes
Led	MRD	Red	Intermediate door lock circuit is by-passed.	No
Led	TGR	Green	Top door lock is closed.	Yes
Led	TRD	Red	Top door lock is by-passed.	No
Led	CGR	Green	Car gate is closed.	Yes
Led	CRD	Red	Car gate is by-passed.	No
Led	INS.	Yellow	ON means Normal operation is disabled. (Insp.)	No
Led	ERR	Red	FSSG internal failure.	No
Led	DOL	Yellow	Car door is fully open.	Yes
Led	FF2	Yellow	Firefighter Phase 2 is active.	Yes
Led	TMR	Yellow	Error Activation Delay. Factory use only.	
Push button	SIL1	N/A	Not in use.	No
Push button	SIL2	N/A	Not in use.	No
Fuse –holder	N1	N/A	Use Fuse 100 mA only. (Type FST Tile-Lag)	N/A
Fuse –holder	N2	N/A	Use Fuse 100 mA only. (Type FST Tile-Lag)	N/A
Key Switch	TG	N/A	Determine use of DOL Switch (Make or Break). Factory use only.	Yes
Push button	ERR	N/A	Press to verify ERROR Led. (Test Push Button)	No
Key Switch	TMR	N/A	Factory use only.	
Key Switch	SRS	N/A	Factory use only.	
Key Switch	Relev.	N/A	Factory use only.	



## TESTING THE OPERATION OF THE FSSG CONTINUED

1. Position the elevator at a landing with the cab door and hall landing doors closed and verify that the **four** green LED's are ON: BGR, MGR, TGR, and CGR.
2. Verify that when a door opens the applicable Green Led goes OFF.
3. Remove the elevator from passenger service / NORMAL Operation. Station an employee outside the cab to prevent members of the public from trying to use the elevator (lift) during testing.

### Testing in Machine Room

#### Detecting a Door Locks circuit By-pass

4. For each of the 3 landing door circuits (Bottom, Intermediate and Top) with the Landing door open, (and the Car Door open) Place a jumper/ By-pass across the door lock safety string at the controller terminals. Verify that **RED** Indicator for the door lock safety string is ON and NORMAL operation is disabled, (INS Yellow LED is ON).
5. With the Jumper still ON (under inspection mode) close the Landing and Car doors. Verify that the **Alarm** is ON, the **Green** LED is ON and that Normal Operation is disabled (INS Yellow LED is ON). To shut off the alarm, remove the Jumper/By-pass from the door lock safety string and open the Landing door. Verify that the elevator (lift) is back to NORMAL operation. INS Yellow LED is OFF.

#### Detecting a Gate Switch Bypass

6. With open Doors (Landing door and Car door), place a jumper/By-pass across the Car Gate Switch on the controller terminals. Repeat action / verification according to paragraphs 4 and 5 above.



### Detecting a Door Locks circuit and Gate Switch Bypass

7. With open doors (Landing door and Car door), place a single jumper/By-pass across the Landing door and Car gate switch on controller terminals. Verify that the **RED** LED Indicator for the Car Gate (depending on the safety chain order) is ON and NORMAL Operation is disabled. INS Yellow LED is ON.

### Testing at Landing

#### Detecting a single Landing Door By-pass, when its fully opened and closing

8. With Landing Door and Car Door open, place a By-pass on the Landing Door lock, or close the Landing Door leaving the car door open, then verify that The **Red** LED light for Landing Door is ON and the elevators NORMAL Operation is disabled. Remove the By-pass from the Landing Door Lock to return to the elevator to NORMAL Operation.
9. Repeat paragraph 8 for the Car Gate Switch in place of the Car Door Lock.

#### Detecting a Car Gate Switch Bypass, dependent on Car Door position

10. Close both doors (Landing and Car doors), then operate the Car Door Maximum Open Limit Switch (DOL). Now verify that the **RED** LED light on the car gate has turned ON and Normal Operation is disabled. Restore the limit switch and open the Landing Door. Test elevator operation and return the elevator to NORMAL Operation.

#### Detecting an attempt to By-pass the FSSG unit

11. With the Landing Door open, place a By-pass across the **FSSG** unit (CONSULT ATTACHED DRAWING), which is part of the device's capabilities, that will enable you verify that upon closing of Landing Door circuit the **RED** LED light is ON and NORMAL Operation is disabled.



### Detecting a Door Locks circuit By-pass with Fireman service Phase II

12. Place the elevator on actual Fireman Service Phase 2 operation. By-pass only the Hall Landing door(s), leave the Car Door open, the Green and RED LEDs for the Door Locks should now be **ON**. Verify that Normal **Operation IS NOT DISABLED**. Remove the By-pass and switch **OFF** Fireman Service to return elevator to Normal Operation.

### Verifying the FSSG ignores the normal By-passing of the Door Locks and Gate Switch during Pre-opening and Re-leveling

13. Let the elevator run under Normal operation, confirm that during the by-pass when the elevator controller bypasses the Door Locks and Car Gate Contact the elevator remains under Normal Operation.

### Testing Door lock for Swing Door at Landing

14. Open a Landing door and by-pass its door lock contact, verify that upon landing door closing, landing Door circuit the **RED** LED light is **ON** and **NORMAL** Operation is disabled

### Testing Fire inspection mode (Phase 2)

15. Is allowed, activate Fire Service phase1 and phase2, verify that upon any jumper placed the landing door the elevator will not be switched to inspection mode.



### ERROR Messages

16. In case of **FSSG** internal failure **Red** LED, **ERR** is ON. In such case, Normal operation is disabled, and the **INS** Yellow LED is also ON. **Report condition to local FSSG service.**

17. Verify Error Led: Press **ERR** Button, verify that **ERR LED** is **ON** (RED)

### SIL Testing

18. With car and landing door in the closed position and elevator is **NOT RUNNING**,

- i. Press Pushbutton **SIL 1**, verify that 3 Green LEDs are OFF.
- ii. Press Pushbutton **SIL 2**, Verify that Green LED is OFF.

### GSM Messages

If the GSM option is installed, verify that for every **FSSG** error, a text message is transmitted to the designated cell phone number, by checking that the correct error message is received by the designated cell phone.



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If required (upon request), verify that for every Bypass, a message is transmitted to the designated cell phone number, by checking that the correct error message is received by the designated cell phone.

## MAINTENANCE OF THE FSSG

The FSSG requires no maintenance, however at the minimum, checking the operation of the FSSG at yearly intervals will show if any problems exist.

The FSSG front panel includes 6 fuses

- a. 2 units of **100mA** each for the SIL testing
- b. 4 units **1Amp** for each circuit (Bottom, Intermediate, Top & Car gate)

**In case of a short circuit on the door locks or car gate to ground**, if there is need to replace the 2 protection fuses (**N1 & N2**) mounted on **FSSG** Front Panel, both fuses are rated **100mA**. Be sure to use only 100mA fuses (Type FST Time-Lag). Each **FSSG** comes with 10 spare fuses inside its enclosure.

**Verify the 1Amp fuses if a Green Led is OFF using only 1Amp replacement fuses.**

**If you encounter any malfunction during any procedure described above DO NOT Under Any Circumstances, open the FSSG enclosure. Just call your local FSSG service to replace the UNIT.**

### Prerequisite of NYC to FSSG installation

As per the NYC Building Code Section 3.10.12 in Appendix K3 (Elevator Safety Code), any design and/or controller modifications shall be approved by the controller manufacturer or a **registered design professional**. The existence of provisional inconsistencies of Chapter 1 of 28 of the Administrative Code notwithstanding, the installation of the **FSSG** device will be done in compliance with the section.