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TYPE EXAMINATION CERTIFICATE
FOR LIFTCOMPONENTS

Issued by Liftinstituut B.V.

Certificate no.	: NL15-400-1002-198-01	Revision no.: 2

Description of the product
: Trip direction change counter & brake monitoring, as part of protection against unintended car movement, features.

Trademark
: Fuji Electric

Type no.
: FRENIC-Lift LM2A

Name and address of the manufacturer
: Fuji Electric Co. Ltd.
5520, Minami Tamagaki-cho, Suzuka-city, Mie 513-8633, Japan

Name and address of the certificate holder
: Fuji Electric Europe GmbH
Goethering 58
63067 Offenbach am Main
Germany

Certificate issued on the following requirements
: Lifts Directive 2014/33/EU

Certificate based on the following standard
: Parts of: EN81-1:1998 + A3:2009, EN81-20:2014

Test laboratory
: None

Date of type examination
: July 2013 – April 2015, September 2017, January - March 2020

Additional document with this certificate
: Report belonging to the type examination certificate no.: NL15-400-1002-198-01REV.2

Additional remarks
: This certificate is valid for CPU SW version L2S1_12000000 or higher together with Keypad SW version A1K6_85000000 or higher.
Furthermore see chapters 2 & 5 of the report belonging to this Type examination certificate

Conclusion
: The trip direction change counter & brake monitoring features meet the requirements referred to in this certificate taking into account any additional remarks mentioned above.

Amsterdam

Date	: 03-03-2020	ing. P.J. Peeters	Certification decision by
Valid until	: 03-03-2025	Manager Certification	

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Report type-examination

Report belonging to type-examination certificate no.	:	NL15-400-1002-198-01
Date of issue of original certificate	:	April 08, 2015
Certificate applies to	:	Component
Revision number / date	:	2; March 03, 2020
Requirements	:	Lifts Directive 2014/33/EU
		Standard: EN81-20:2014
		EN81-1:1998+A3:2009
Project no.	:	P190409

1. General specifications

Description of product	:	Trip direction change counter & Brake monitoring, as part of protection against unintended car movement, features
Trademark	:	Fuji Electric
Type	:	FRENIC-Lift LM2A
Name and address manufacturer	:	Fuji Electric Co. Ltd.
		5520, Minami Tamagaki-cho,
		Suzuka-city, Mie
		513-8633, Japan
Address of examination	:	Fuji Electric Europe GmbH
		c/ dels paletes 8, Edifici B, Primera Planta B
		Parc Tecnològic del Vallès
		08290 Cerdanyola del Vallès (Barcelona)
		Spain
Data of examination	:	July 2013 – April 2015, September 2017, January – March 2020
Examination performed by	:	W. Visser

2. Description component

Brake Monitoring (BRKE1 & BRKE2):
The brake monitoring described in this report shall be used in combination with a suitable detection system and a suitable brake to build an unintended car movement protection for lifts. (according EN81-20 clause 5.6.7 and EN81-1+A3 clause 9.11). The monitoring function that is integrated in the FRENIC LM2A inverter becomes effective after parameter **H96** is set to 1.

Check brake control 1 (**BRKE1**) and check brake control 2 (**BRKE2**) shall be assigned to general-purpose programmable input terminals X1-X8, in order to monitor the correct opening and closing of the lift brakes. (Setting 111 resp. 112) Brake control (**BRKS**) shall be assigned to general-purpose programmable output terminals Y1-Y2, Y3A/C, Y4A/C, Y5A/C or 30A/B/C to control the brake.
In case **BRKE1**, **BRKE2** and **BRKS** are not assigned to a terminal function, *Er6* occurs. Reset is only possible after correct assignment.

Brake monitoring is performed by **BRKE1** and **BRKE2**. When the status of **BRKE1** and **BRKE2** does not match with the status of BRKS, the timer of brake check time (**L84**) starts. When **BRKE1** or **BRKE2** state remains not matching with **BRKS** during the time specified in **L84**, *bbE* alarm is generated. During lift travel, alarm is not issued, alarm is generated as soon as **BRKS** function is off and **L84** timer passes.

The activated system will stop the lift when at least one programmed brake monitoring input detects one of the following situations:
- Brake feedback is not matching with brake control signal at starting. Alarm is shown at start.
- Brake feedback is not matching with brake control signal at stopping. Alarm is shown at stop.
- Brake feedback is not matching with brake control signal during travel. Alarm is shown at the end of travel.

The time parameter **L84** can be set from 0s up to 10s. (Recommended 1s).
After detection of brake malfunction, the lift remains out of service, also after switching off- and on the supply power. Resetting of the *bbE* alarm and the system is only possible by reset button after setting the parameter "**H95** = 111".

Rescue operation by motor brakes control (RBRK):
In cases where implementing an automatic rescue is not possible, rescuing is performed by opening/closing of the brakes in order to move the car due to unbalance. In order to avoid *bbE* alarms during this rescue operation, an **RBRK** function has been included.
To implement this rescue mode, a small UPS is needed as inverter input.
For safety reasons, the speed has to be monitored. Due to that, this function is only available in closed loop applications.

The Rbrk function that is integrated in the FRENIC-Lift LM2A inverter becomes effective After setting 114 to any if the digital inputs X1-X8. Due to this the **BRKS** output function behaviour changes. In that case **BRKS** output functions depend on **L117** to **L119** settings.
The actual activation of the **RBRK** function also depends on a programmable input, (one of terminals X1-X8), coming from the lift controller or an operated emergency manual brake release button. This input shall only be possible with a complete safety circuit.

Parameter **L108**, Speed detection threshold. This parameter is used as a lift speed threshold, to determine if the motor is moving or not

Parameter **L117** Speed limit. In this parameter the maximum speed allowed during rescue operation by brakes control is set. This is necessary to prevent entrapment of passengers due to engagement of the safety gear, tripped by the overspeed governor. When the motor reaches a speed above **L117** level, **BRKS** signal is changed to OFF by the inverter.

Parameter **L118** Closing time. When the brake is closed (due to **BRKS** OFF) and **RBRK** input remains activated, motor speed decelerates until 0 rpm. As soon as the motor speed is below **L108** pre-set level, timer **L118** starts to count. After **L118** time has passed, **BRKS** output signal will be activated again (Brake will open).

Parameter **L119** Speed error delay time. When the brake is opened and no speed is detected (balanced condition or broken encoder), **L119** specifies the time until the inverter trips. "No movement during rescue operation by brake control", *rbA* alarm. Timer **L119** starts as soon as speed goes below **L108** level.

Any alarm on the inverter leads to **BRKS** output switching OFF.
RBRK signal is removed by the lift controller when it reaches landing level.

Trip direction change counter (TDC):

In the FRENIC-Lift LM2A inverter it is possible to program a counter which keep track of the amount of direction changes and keeps the lift out of service when a settable limit is exceeded. Before the limit is reached a digital output gives a signal (Warning output) to able proper action to be taken.

The counter can be used, for example, to monitor or indicate a rope change interval. The trip direction change counter can under prescribed conditions, for example, be used in applications with special suspension means such as coated ropes or belts.

This function is not active in factory default settings. It means that this function has to be activated. In order to enable **TDC** function a password has to be set and entered. **TDC** keypad menu has a specific sub menu to monitor all related variables.

Name	Description
Current number of direction changes	Current value of internal counter N_{part}. Minimum unit change is 1. Maximum number shown is 10000000.
Direction changes limit	It corresponds to the value on parameter **L111**
Total number of direction changes	It corresponds to the value on parameter **L114**
Total number of direction changes counter resets	It corresponds to the value on parameter **L115**
Pre-warning level (%)	It corresponds to the value on parameter **L112**

Run forward *FWD* and Run Reverse *REV* (Function code data 98 and 99):
Each direction change (from *FWD* to *REV* or from *REV* to *FWD*) will be counted and reflected in parameter **L113** (partial counter) and **L114** (global counter).

If *EN1* and *EN2* terminals are not activated while changing from *FWD* to *REV* or from *REV* to *FWD*, internal counter will not be increased, as this cannot be counted as a travel. *EN1*, *EN2*, *REV* and *FWD* are inputs from the lift controller.

Travel Direction Changes lifetime early warning *TDCl* (Function code data 120):
This output function will go from OFF to ON when **L112** (TDC Direction change early warning level) is reached. **L112** is a percentage of **L111** (TDC Direction change limit). This level is reached when **L113** reaches the percentage of **L111** set in **L112**. When output function is in ON status, and **L113** becomes different than **L112** percentage of **L111**, output will go to OFF condition.
Early warning function is linked to a light alarm called *tCW* and a blinking warning on the keypad.

Travel Direction Changes pulse *TDCp* (Function code data 121):
This output function generates a pulse each time that **L113** is increased. In other words, output generates a pulse each time changing from *FWD* to *REV* or from *REV* to *FWD.*

TDC Password setting (Parameter **L109**):
In this parameter, password for TDC can be defined. In other words, until password is not assigned in **L109**, TDC function remains disabled.

TDC Password unlock (Parameter **L110**):
In this parameter, password can be set in order to unlock.

TDC Direction change limit (Parameter **L111**):
Maximum travel direction changes allowed are set in this parameter. When parameter **L113** reaches this level, inverter is blocked with the alarm *tCA* and a blinking alarm on the keypad.

TDC Direction change early warning level (Parameter **L112**):
The early warning level (*TDCl*) is set on this parameter. Setting range is 1%~90%. Level is a percentage of parameter **L111**. Additionally, keypad will issue a light alarm as soon as **L111** reaches percentage set on this parameter.

TDC Partial number of direction change (Parameter **L113**):
In this parameter the accumulated number of direction changes is shown. In other words, when running direction is changed from *FWD* to *REV*, or from *REV* to *FWD* counter is incremented.
This parameter can be modified and set back to 0.00. When this parameter is manipulated (changed the value) is understood that belts or coated ropes are changed, and then **L115** counter is increased by one.
By definition **L113** counter cannot be bigger than **L111** limit, in other words, inverter will trip *tCA* when **L113**=**L111**.

TDC Total number of direction change (Parameter **L114**):

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This is ONLY READ parameter. It shows total number of direction changes. In other words, when running direction is changed from **FWD** to **REV**, or from **REV** to **FWD** this counter is incremented. This parameter cannot be reset in order to detect if function is used properly. In other words, if total number of direction change, direction change limit and total number of resets doesn't match, it means that somebody is manipulating intentionally the inverter in order to avoid changing belts (or coated ropes). So sabotage can be detected.

TDC Total number of resets (Parameter **L115**):
This is ONLY READ parameter. It shows total number of reset operations. It increments to one each time that parameter **L113** is modified.

So, when **L113** counter reaches value of the percentage set on **L112** of **L111** limit a warning is shown on inverter's keypad. This warning doesn't lock the inverter functionality. The purpose is just to warn the user that life time of coated ropes (or belt) is going to be expired soon.

As soon as maximum number of direction changes allowed is reached, inverter will be blocked by *tCA* alarm. Even so, extra movements (travels) can be done. As soon as power supply is switched OFF and ON (make sure keypad is completely OFF) alarm *tCA* will be reset. After this a single travel is allowed, as soon as a single travel is finished (RUN command is removed), inverter will be blocked by *tCA* alarm again. In order to reset the alarm, coated ropes (or belt) has to be changed by a new ones. After that, direction changes counter can be reset with the use of the set password.

Travel data in the CPU is stored in the non-volatile memory and are cyclically backed up in the keypad (every 5 minutes). In case that an inverter is broken and has to be replaced, keypad can Copy and Paste (Read and Write) counters and levels from one inverter to another one. TDC keypad menu has a specific sub menu to copy/paste all related variables.

Name	Description
INV→ KP Read	L109, L111, L112, L113, L114 and L115 parameters are copied (read) from inverter to the keypad.
KP→ INV Write	L109, L111, L112, L113, L114 and L115 parameters are pasted (write) from keypad to the inverter.

GENERAL DATA

Inverter Type	-3phase	FRN0006LM2A-4 ----- FRN0091LM2A-4
	-1phase	FRN0011LM2A-7 ----- FRN0018LM2A-7
SW version CPU		L2S1 12000000 or higher
Keypad Type		TP-A1-LM2
SW version keypad		A1K6 85000000 or higher

See annex 1 for a general overview of the product.

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3.   Examinations and tests

The examination covered a check whether compliance with the Lift Directive 2014/33/EU is met, based on the harmonized product standard EN81-20:2014 and the standard EN81-1:1998+A3:2009.
Issues not covered by or not complying these Standards are directly related to the above mentioned essential requirements.
The examination included:
- – Examination of the technical file (See annex 2):
- – Examination of the representative model in order to establish conformity with the technical file.
- – Inspections and tests to check compliance with the requirements.

4.   Results

After the final examination the product and the technical file were found in accordance with the requirements. The functional tests passed without remarks.

5.   Conditions

Additional to or in deviation of the applicable demands in the considered requirements / standards (see certificate and/or page 1 of this report), the following conditions shall be taken into account:
- - After each change in the software, the proper functioning of the features mentioned in chapter 2 of this report must be checked and documented.
- - Before taking the lift into service, the proper functioning of the brake monitoring features mentioned in chapter 2 of this report must be checked.
- - SW version shall be verified with the versions in this report.
- - Connections shall be made according to Fuji Electric manuals.
- - Conditions mentioned in chapter 2 of this report have to be met.

6.   Conclusions

Based upon the results of the type-examination Liftinstituut B.V. issues a type-examination certificate.

The type-examination certificate is only valid for products which are in conformity with the same specifications as the type certified product. The type-examination certificate is issued based on the requirements that are valid at the date of issue. In case of changes of the product specifications, changes in the requirements or changes in the

state of the art the certificate holder shall request Liftinstituut B.V. to reconsider the validity of the type-examination certificate.

Prepared by: Certification decision by:

W.Visser
Product specialist Certification
Liftinstituut B.V.

Annexes

Annex 1 : LM2A

Annex 2 — Documents of the Technical File which were subject of the examination

title	document number	date
DR-Lift2-0011	V132	26-02-2015
AN-Lift2-0004	V100	26-02-2015
TR-Lift2-0002	V100	20-02-2015
TR-Lift2-0003	V100	26-02-2015
DR-Lift2-0008	V104	18-02-2014
DR-Lift2-0003	V131	12-06-2014
AN-Lift2-0002	V100	16-01-2015
TR-Lift2-0001	V100	15-01-2015

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Annex 3.   Reviewed deviations from the standards

EN xx-x par.	Requirement	Accepted design
x.x.x		

Annex 4   Revision of the certificate and its report

Rev.:	Date	Summary of revision
-	08-04-2015	Original
1	01-09-2017	Re-issue with correct end date
2	03-03-2020	Recertification after 5 years after retesting