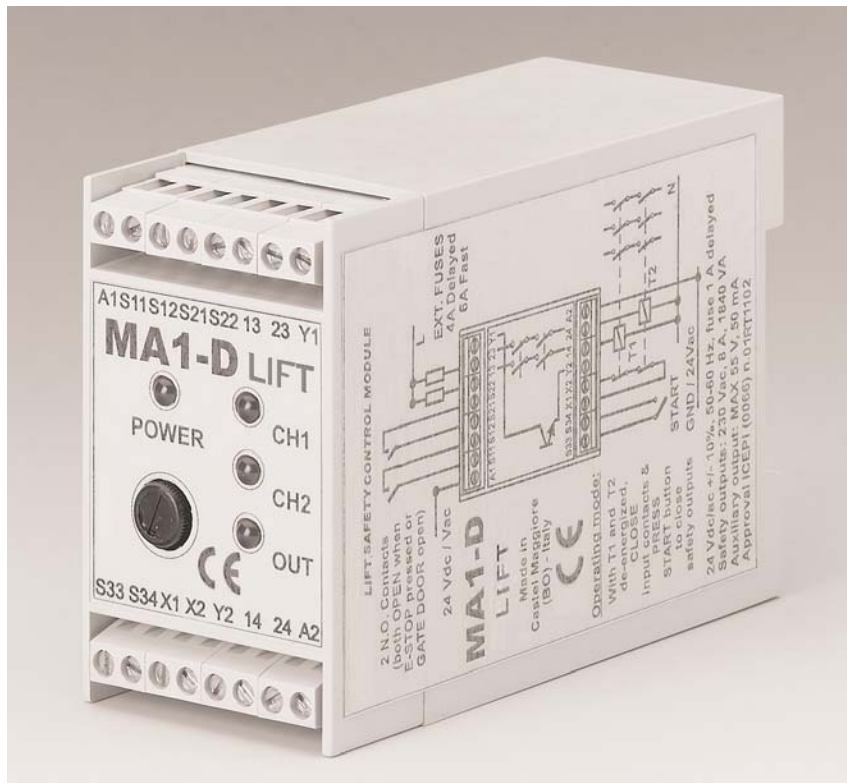


SAFETY MODULE MA1-D LIFT



USER MANUAL

CARLO GAVAZZI

SAIET Elettronica S.p.A. - A Member of CARLO GAVAZZI Group
Via Serenari, 1 - 40013 Castel Maggiore (BO), Italy
Tel. +39 051 4178811 - Fax +39 051 4178800
<http://www.saiet.it/elettronica> e-mail: sales.el@saiet.it



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1. INTRODUCTION

This “User Manual” must be read and understood completely, prior to carrying out any operation on the module, by personnel dealing with all the activities of the **MA1-D LIFT** safety module. It must be stored in a dry clean place close to where the module is used for easy consultation.

All the operations described in this manual must be carried out by carefully following all the indications given exclusively by specialised personnel.

Contact SAIET Elettronica and do not carry out any operations on the safety module, ensuring the safety of the operators, if there are any doubts over the contents of this manual, or if there is a fault or a malfunction.

The user of the module is responsible for the evaluation of the risks of the entire system. Based on the evaluation and on the standards in force in the country of use, the user decides with complete responsibility that the functions described in the user manual are suitable for use on his plant.

He must also ensure that the installation, the wiring and the regular inspections take place according to the requested risk reduction level.

Whenever the **MA1-D LIFT** module is improperly used, by not following only and all the indications of this manual or whenever these indications are partially, incorrectly or incompletely applied by personnel unspecialised and/or insufficiently informed on the contents of this manual and the machine safety directives, SAIET Elettronica is not responsible for the functioning of the **MA1-D LIFT** and its capacity to guarantee its safety functions.

The **MA1-D LIFT** module does not require internal maintenance: if it is tampered or if the case is opened, the module loses its safety functions and the guarantee is annulled.

2. PACKAGE CONTENTS

The package contains:

- 1 safety module model **MA1-D LIFT**
- 1 1A, 250V spare fuse
- 1 user manual

If any anomalies are found with the package, its contents or with the safety module do not install and contact SAIET Elettronica.

3. CERTIFICATION

The MA1-D LIFT safety module is certified as conforming to the indications for safety circuits in accordance with standards EN 81-1 and EN 81-2 (matched according to the Lift Directive EC/95/16).

BODY	ICEPI srl
DATE	26/11/01
CERTIFICATE	01RT1102

4. CONTROL UNIT FUNCTIONS

The MA1-D LIFT safety module is designed for use in safety circuits to adjust the cabin level in control systems for lift plants according to the prescriptions of the EN 81-1 and EN 81-2 standards.

5. REFERENCE STANDARDS

EN 81-1	1999
EN 81-2	1999
EN 60947-5-1	1998
EN 12015	1999
EN 12016	1999
EN 292-1	1991
EN 292-2	1991
EN 954-1	1998
EN 60204-1	1998
EN 1088	1995

6. TECHNICAL DATA

GENERAL FEATURES	VALUES
Supply voltage	24 Vac \pm 10% 50 \div 60 Hz, 24 Vdc \pm 10%
Current consumption	100 mA(@24Vdc, without load)
Power consumption	\leq 7 VA
Inputs	4 terminals input (2 contacts voltage free)
Safety category (EN 954-1)	Up to 4 (depending on the application)
Emergency stop category (EN 60204-1)	0
Short circuit protection	1A 250 V delayed fuse (internal)

GENERAL FEATURES	VALUES
Housing	ABS (NORYL) Flammability class VO-UL94
Connection terminals	16 terminals in PA 6.6 Flammability class VO-UL94
Fixing	OMEGA-DIN EN 50022 guide
<u>Degree of protection:</u> Safety module Installation location minimum	IP-30 IP-54
Electromagnetic compatibility	EN 50081-1; EN 50082-2; EN 12015; EN 12016
Operating temperature	0 ÷ 65°C
Storage temperature	-25 ÷ 65°C
Relative operating humidity	30 ÷ 95%
Relative storage humidity	30 ÷ 95%
Cable section that can be connected to the terminals	0.2 ÷ 4 mm ² (rigid) 0.2 ÷ 2.5 mm ² (flexible)
Torque setting on connection terminals	0.5 Nm
Dimensions	75 x 45 x 110 mm
Weight	240 g

TIMING	VALUES
Response time (Input/s open ⇒ safety outputs open)	≤ 25 ms
START procedure delay (START contact pressed ⇒ safety outputs closed)	≤ 150 ms
Contemporeinity (in closing) between the two input channels	≤ 200 ms

NPN OPTOCOUPLED AUXILIARY OUTPUT⁽¹⁾	VALUES
Maximum phototransistor collector current	50 mA
Maximum phototransistor collector / emitter voltage	55 V

⁽¹⁾: The optocoupled auxiliary output status coincides with the safety output status; it can only be used for non-safety secondary warnings or controls.

SAFETY OUTPUTS	VALUES /FEATURES
Function	<p>Contacts open: safety outputs disabled (Open circuit between 13-14 and between 23-24 due to a danger or fault detected or a missing power supply condition)</p> <p>Contacts closed: safety outputs enabled (short-circuit between 13-14 and between 23-24: safety condition)</p>
Maximum switching voltage	230 Vac, 300 Vdc AC 15: 230/240 V, 4 A DC 13: 24 V, 1.2 A
Maximum switching current	8 A
Maximum switching power (ohmic load)	1840 VA
Contacts protection	External fuse: 4 A delayed /6 A fast
Mechanical life	$> 10^7$ switchings
Electrical life (with maximum load)	$> 10^5$ switchings

LED WARNINGS	VALUES	
	ON	OFF
POWER	module powered	module not powered
CH1	contact on channel S21-S22 closed	contact on channel S21-S22 open
CH2	contact on channel S11-S12 closed	contact on channel S11-S12 open
OUT	safety outputs closed	safety outputs open

7. INSTALLATION

7.1 Warnings

- The **MA1-D LIFT** module must be installed following the standards in force in the country of use, when the plant is not powered and with no dangers for the operator, on the machine's electrical board in a dry and clean place, fixed on the special DIN rail.
- Install the module in an electrical board with a minimum protection degree equal to IP54.
- Ensure that close to the module installation point there are no conductors, cables or free materials that can come into contact with the module.
- To avoid interference due to coupling, run the limit switches connecting conductors separately from the power conductors.
- Ensure that the lift plant can operate in temperature and humidity conditions according to the technical data of this manual.
- Avoid installation during storms.
- Do not dispose of the packaging in the environment.

7.2 Wiring

It is recommended to use conductors with section and length

adequate to the currents and distances involved (see section 13.5 of the standards EN 81-1 and EN 81-2), ensuring that the conductors are not excessively tight, that their positioning avoids potential cuts or squashing and that they are not in the way of people or things.

Conductors with section no smaller than 0.75 mm² must be used, particularly if the module is used in safety circuits of doors on the floors.

To carry out the level control of the cabin on the floor/unlock doors, the **MA1-D LIFT** module must be connected to two sensors **Z1** and **Z2** (connected respectively to the S11-S12 and S21-S22 terminals of the module) that detect the correct position of the cabin at the floor.

Z1 and **Z2** sensors must be N.O.: their contacts must open when the sensor is not operated.

Functionally,

- When **Z1** and/or **Z2** are not operated, the module is not enabled to close the output contacts;
- When both **Z1** and **Z2** are operated, the module is enabled to close the safety outputs.

The module is started by the START contact: when the START contact closes, with **Z1** and **Z2** operated (contacts closed), the

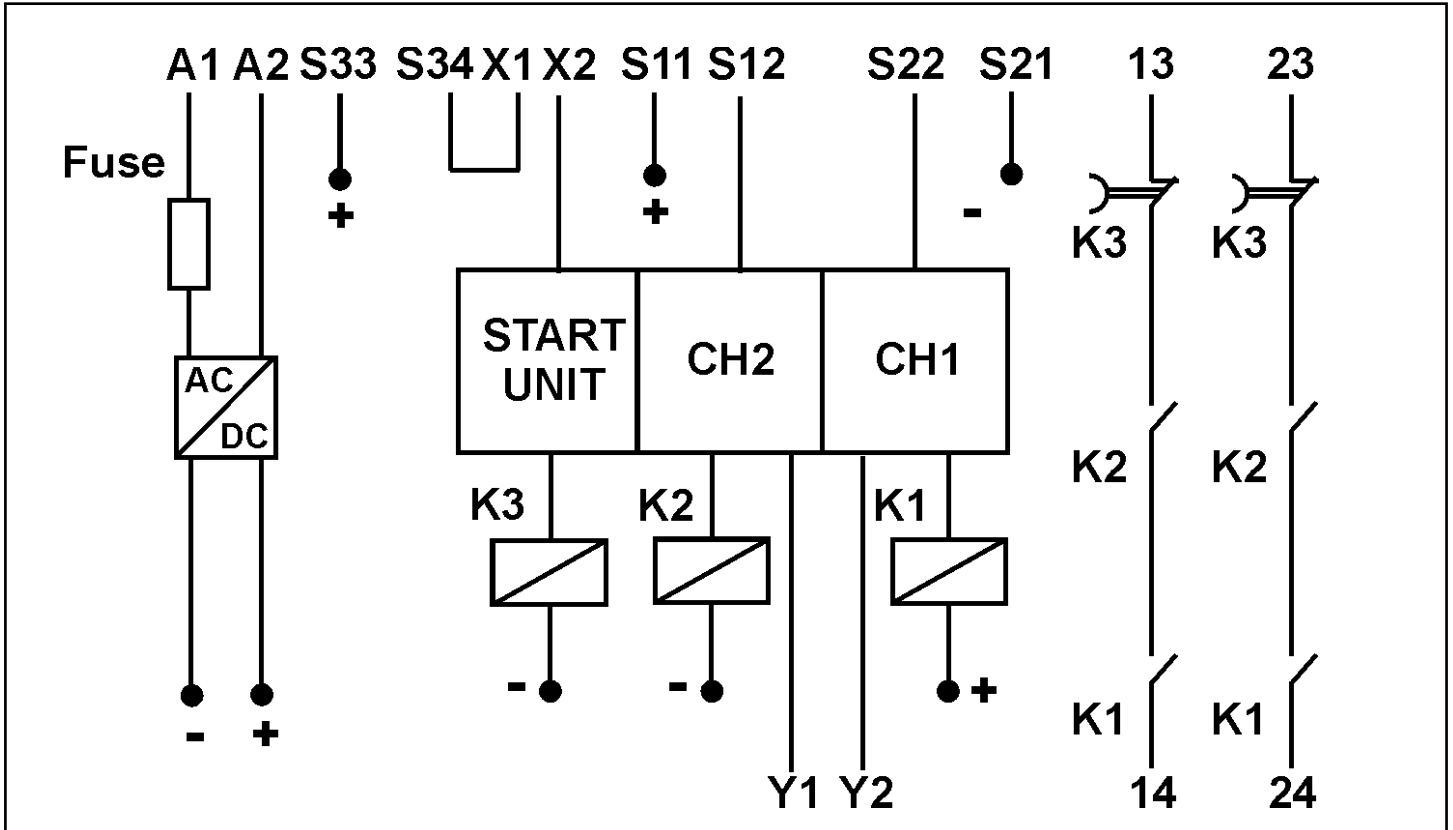


Fig 1 – MA1-D LIFT module block diagram

module closes the safety outputs and the optocoupled output. If the START contact is short-circuited the safety outputs close as soon as the **Z1** and **Z2** sensors are operated.

Opening even just one input contact (**Z1** and/or **Z2**) leads to a safety situation, forcing the safety outputs into an opening status (open circuit) and avoiding their closure even if the START contact closes.

The user is completely responsible for choosing the devices to connect to the MA1-D LIFT module, evaluating the risks on the plant and deciding the devices suitable for the application.

7.3 Installation Examples

In the example set out in Figure 2, the magnetic actuators keep the sensors **Z1** and **Z2** operated until the cabin is leveled with the floor (within the tolerances permitted by the standards EN 81-1 and EN 81-2). As soon as the cabin should exceed the levelling limits set by the standards, **Z1** and/or **Z2** release, releasing the safety outputs.

NOTE: The external relays T1 and T2, illustrated in the examples, must be force guided relays, so that the module can check their status by the feedback on terminals X1 and X2. If non force guided

TERMINAL	FUNCTION / CONNECTION
A1 (<i>Power supply</i>)	+24 Vdc / 24 Vac
A2 (<i>Power supply</i>)	GND / 24 Vac
S11-S12 (<i>Input</i>)	First channel (first leveling sensor) Contact: <u>CLOSED</u> ⇒ safety outputs closing enabling condition (if also S21-S22 contact is closed); <u>OPEN</u> ⇒ safety outputs open and disabled from closing
S21-S22 (<i>Input</i>)	Second channel (second leveling sensor) Contact: <u>CLOSED</u> ⇒ safety outputs closing enabling condition (if also S11-S12 contact is closed); <u>OPEN</u> ⇒ safety outputs open and disabled from closing
X1-X2 (<i>Inputs for external contactors or relays feedback</i>)	N.C. contacts of force guided external contactors
13-14 (<i>Redundant safety outputs</i>)	First safety output (contact OPEN in case of danger or fault detected or in absence of power supply; contact CLOSED in safety condition)
23-24 (<i>Redundant safety outputs</i>)	Second safety output (contact OPEN in case of danger or fault detected or in absence of power supply; contact CLOSED in safety condition)
Y1 (<i>Non safety auxiliary output</i>)	Optocoupled output phototransistor collector
Y2 (<i>Non safety auxiliary output</i>)	Optocoupled output phototransistor emitter
S33-S34 (<i>START</i>)	START contact (to be short-circuited in case of automatic START)(*)

(*) the START pushbutton is not monitored, so that if the pushbutton gets welded, the machine START is no longer manual but becomes automatic.

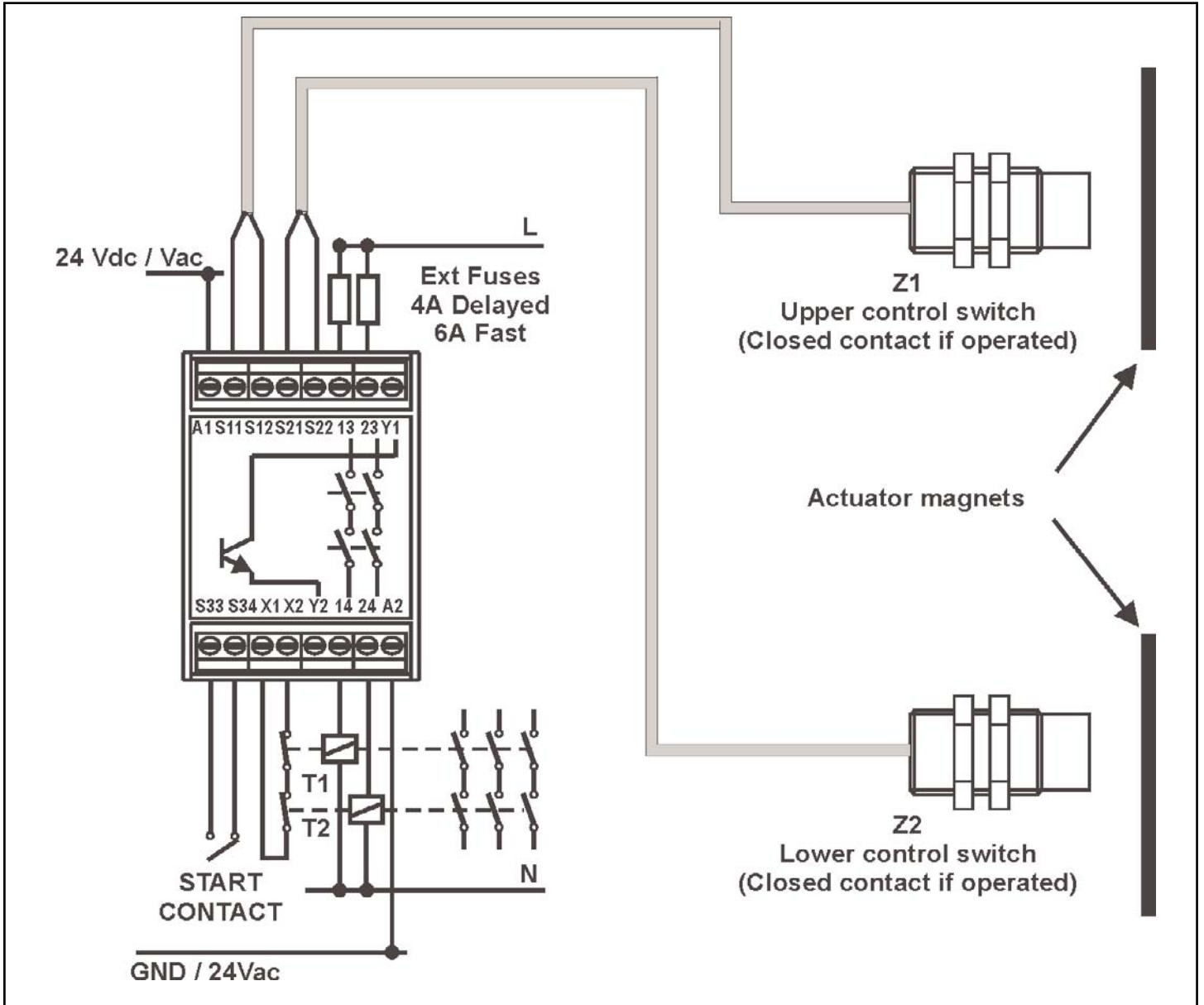


Fig.2: Possible application for a lift plant.

relays are used the module can no longer guarantee the detection of faults to the T1 and/or T2 relays increasing the risk of injury for the operator.

8. INSTALLATION PROCEDURE

The installation procedure of the safety module must be repeated every time it is installed and every time the wiring is changed and at regular intervals by carrying out *in sequence all* the steps described below without any type of dangerous condition for the operators.

STEP 1: Check of the wirings and of the assembly

The inspection includes the visual control, the integrity control, the correct positioning in the plant control, the correct installation control and the correct functioning of all the devices that control or are controlled by the **MA1-D LIFT** safety module as well as the correct tightening of the cables and that they are not squashed or excessively pulled.

STEP 2: Activation

- Connect the power supply to the terminals **A1** and **A2** and check that the safety outputs are open, the **POWER** LED is on and the **CH1**, **CH2** and **OUT** led are off.
- Close the input contacts S11-S12 and S21-S22 and check that the safety outputs are open, the **POWER**, **CH1** and **CH2** LED are on and the **OUT** led is off.
- Close the **START** contact and check that the safety outputs are closed and the **POWER**, **CH1**, **CH2** and **OUT** LED are on.

STEP 3: Safety function check

- Open both input contacts and check that the safety outputs open, that the **POWER** led is on and the **CH1**, **CH2** and **OUT** LED are off.

- Close the input contacts S11-S12 and S12-S22; close the **START** contact and check that the safety outputs are closed and that the **POWER**, **CH1**, **CH2** and **OUT** LED are on.
- Check that the safety outputs do not close just by closing the S11-S12 and S21-S22 inputs without closing the **START** contact.

Repeat all the step 3 operations for each device connected to the input terminals.

STEP 4: Feedback circuit check

- Disconnect the conductor relative to terminal X1 (or X2), close the S11-S12 and S21-S22 inputs, close the **START** contact and check that the safety outputs are open, the **POWER**, **CH1** and **CH2** LED are on and the **OUT** LED is off.
- Reconnect the disconnected conductor and close the **START** contact, checking that the safety outputs are closed, the **POWER**, **CH1**, **CH2** and **OUT** LED are on.

STEP 5: Safety outputs and optocoupled auxiliary output control

Check that both the safety outputs are closed and that the optocoupled auxiliary output functions correctly during each STEP described above.

9. USAGE PRECAUTIONS

With automatic START configuration, S33-S34 terminals must be short-circuited. The safety outputs close immediately after closing the S11-S12 and S21-S22 input contacts.

It is recommended to connect a fuse in series to the safety outputs to reduce the risk of the safety outputs contacts welding (see outputs technical data).

Never, in any situation, connect spark quenching unit circuits in parallel to safety outputs contacts: the safety function would no longer be guaranteed.

Never, in any circumstance, exceed the electrical ratings indicated in the technical data table of this manual.

The MA1-D LIFT module must be used for safety functions along with safety devices that conform to the standards applicable for such devices.

10. REGULAR INSPECTIONS AND MAINTENANCE

The integrity of the safety module and of all the parts connected to it must be checked regularly.

The frequency of the inspections depends on the plant risks evaluation carried out by the

person responsible for such evaluations.

The functioning of the safety circuit can be compromised by the lack of regular inspections or maintenance, or if they are carried out incorrectly, or by non specialised personnel, or at lower intervals than prescribed.

Regular inspections consist of carrying out an inspection of the wiring, of the installation and of the integrity of the safety module, of its command and actuating devices and in repeating *all the operations* in the **INSTALLATION PROCEDURE** section.

Maintenance also includes a regular cleaning of the safety module (dust and other substances must be removed from the module and it must be dried of liquids or any condensation) and of all integrated command or actuating devices connected, that must be carried out whilst the machine and module are rigorously not powered.

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