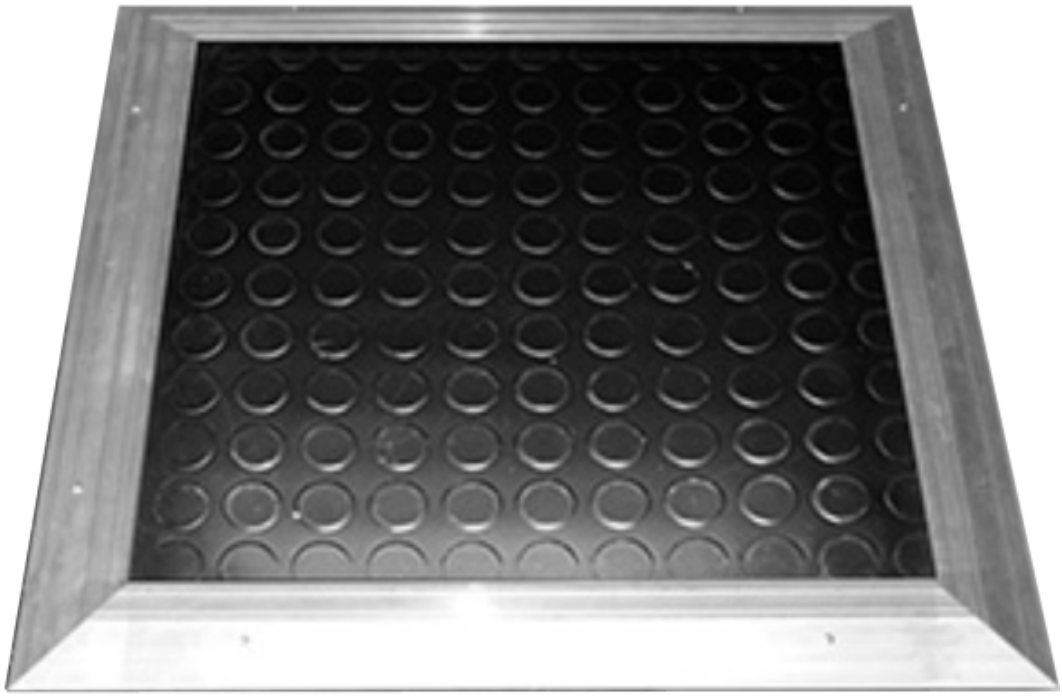
SAFETY MATS

“TO-MO-MZ”

Instruction use and maintenance

READ BEFORE ANY INSTALLATION



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IMPORTANT REMARKS ON SAFETY

The user is obliged to observe the new European international standards in order to make best use of the equipment for the safety of machines and plants to be protected. For this purpose it is necessary for a responsible that takes care the installation and setup of the system according to various criteria mentioned in this manual. The safety mat is only a part of the safety equipment of the machine. Therefore the safety mat, is inserted in the machinery where the overall management responsibility are by final user and manufacturer of the machine. Please observe all the technical details and the various suggestions reported in this manual without exception and with strict compliance with local and national regulations on the safety of industrial machines. This manual must accompany the product throughout its working life. Those persons responsible for the use of the product must ensure that all persons involved in the installation, commissioning, operation, maintenance and servicing of the product have access to all the information supplied by the manufacturers of the machine and its safety system.

The GREIN company is not responsible for injury or damage resulting from failure to observe these directions in the use of its products.

GENERAL INFORMATIONS

The **GREIN** safety mats are protections for the operators that work on the dangerous machines.
Are formed by two elements: a sensor located internally to the mat (see figure 1) and a control unit connected with it.
The sensor is like a normal open switch. In normal operation condition, the switch is open and the safety relays of the control unit are closed. When pressure is applied to the mat, the two conductors are forced together closing the switch. In this condition the safety relays are open.
The top and bottom layers are sheets of ribbed, heavy duty matting material. This material is of laminated construction and is PVC based with special additives and fillers to increase its abrasion and chemical resistance. The mat is encapsulated between two layers of PVC with special carbon additives such as to confer greater resistance to abrasion and to chemical agents.
They are particularly resistant to shock, vibration and flammability being a product of self-extinguishing.
The safety mat is provided in any size and shape.
A particular section of the aluminum profile with a ramp of 20 degrees is used for fixing to the floor.

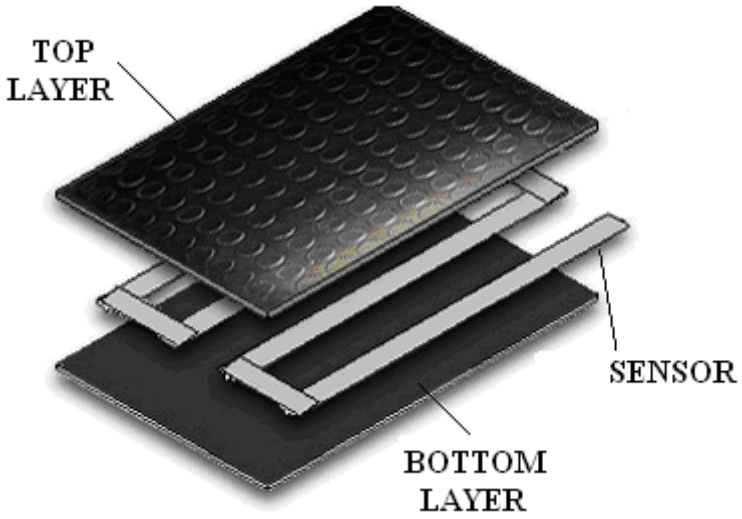


FIGURE 1 – Structure of the mat

The safety mats are divided into three categories:

- **TO** PVC standard type;
- **MO** standard plus aluminium protection cover;
- **MZ** standard as MO, plus zinc metal sheet on the bottom.

The output position and cable length is a customer specification.

The applications include: dangerous area for operators, automatic store, conveyor systems, tube bending machines and others applications.

THE MAT PERFORMANCE LEVEL VALUE IS " PL = e " ONLY COMBINED WITH CONTROL MODULE PS3-Ax PRODUCED BY GREIN.

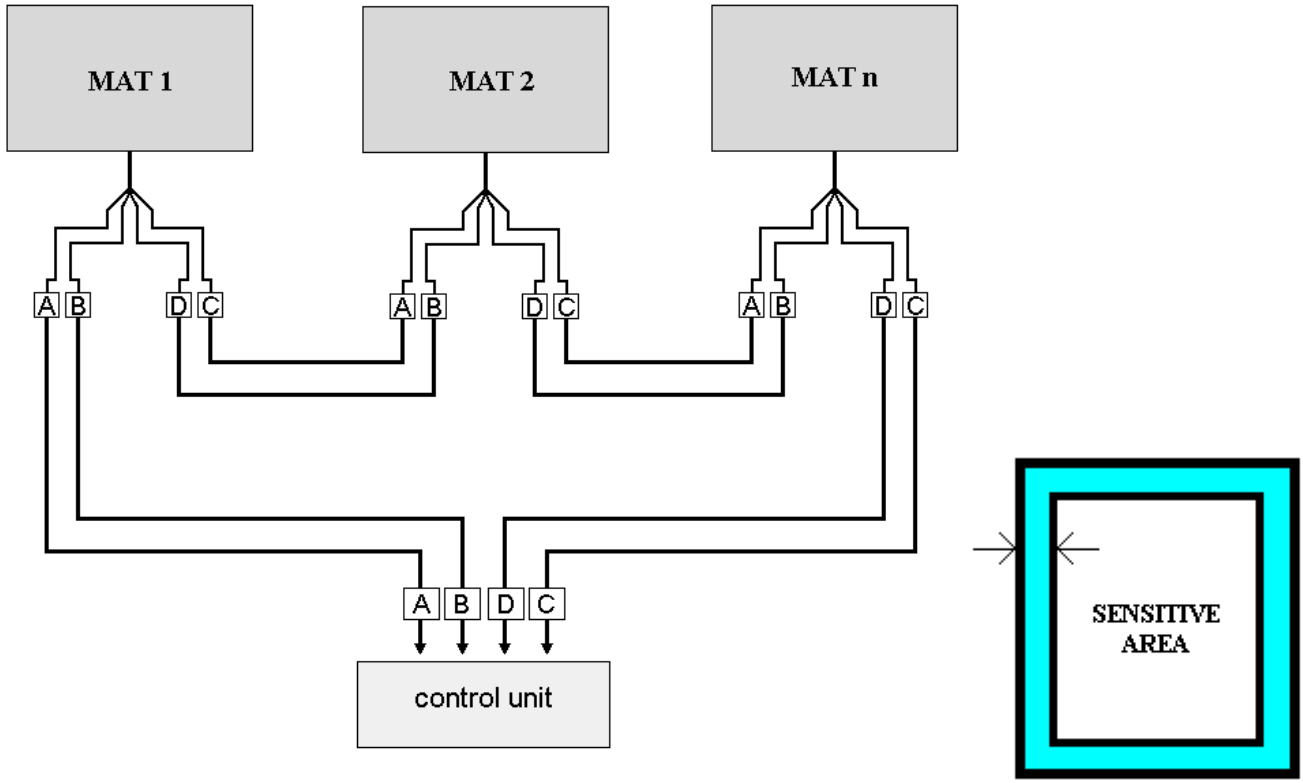
THE MAT SHOULD NOT BE USED FOR DETECTION OF PEOPLE WITH WEIGHT LESS THAN 35 Kg

COMBINATION OF SENSORS

The safaety mats can be produced in any shape and size within the following limits:

- all corners, internal or external, should be 90° ;
- the maximum possible width of a mat is 1500 mm;
- the maximum possible length of a mat is 2500 mm;
- the maximum total area is 15 m^2 for every PS3-Ax control unit ;
- rectangular shapes are preferred although any shape which meets the restrictions outlined above is possible;
- there is 30 mm wide dead zone around the outer edges (see blue zone in the figure below).

The dimensions of these mats and their shape should be chosen in function of the area to be protected, in such a way as not to be able to have access to the machine without treading on the mat. The blue zone, indicated in the figure below, represents the dead zone of the carpet. In white the sensitive area.



CABLE CONNECTION

The maximum length of the connections between individual mats and the machine must not exceed the maximum length of connection between individual mat and PS3-Ax control unit.
There are no connectors for the connection between each mats.

DETERMINING DIMENSIONS OF MATS

Le dimensioni dell'area pericolosa dipendono dalla sua applicazione.
Alcuni dei parametri da considerare sono i seguenti:

- response time of system
- position of dead zones
- overtravel of dangerous parts after stop signal is generated.

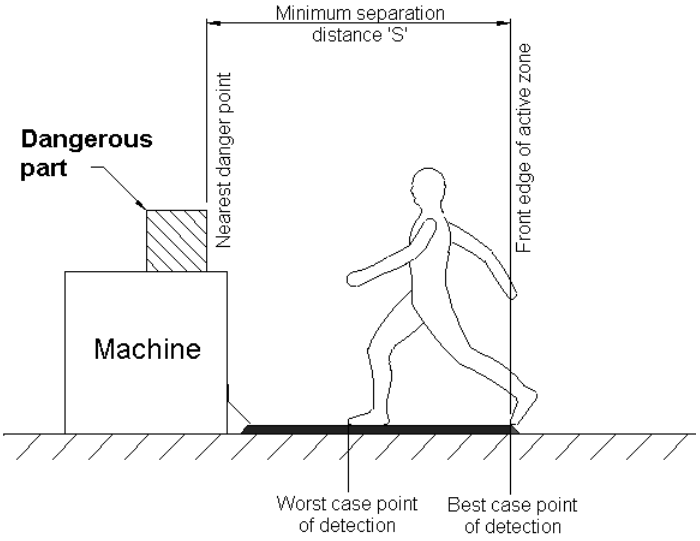
Where possible, the shape and size of the dangerous area should be designed such that a single rectangular sensor, preferably of a standard size, can be used. Where this is not possible, non-standard rectangular shapes, irregular shapes and combinations of sensors will be required.
In this case the following rules should be applied:

a) If possible all mat sensors in a combination should be the same shape and size. This makes it possible for the user organization to hold spare sensors and simplifies the ordering of replacements

b) If possible the mat sensors should be arranged in a single row with joints perpendicular to the normal direction of approach of the operator.

DETERMINATION OF SAFETY DISTANCE

In accordance with standard EN ISO 13856-1 the determination of the safety distance S is calculated using the following formula:



S = (1600 x T) + 1200

In order to determine the position of the front edge of the active zone is necessary to consider the stopping performance of the machine.
Any machine, depending of the efficiency of its braking system, will take a certain time to stop after that the stop signal is generated.
From the instant that a person's foot touches the mat to the instant that dangerous motion actually ceases, is called the overall system response time.
The overall system response time T, is given by the following calculation:

T = t1 + t2

Where:
t1 = the maximum response time of the safety device between the actuation of the sensor and the generation of the stop signal.
t2 = the response time of the machine between receiving a stop signal from the safety device and the dangerous parts coming to rest.

The dangerous parts will obviously continue to move during this time. The sensor must therefore be dimensioned such that the nearest point at which a person could first touch the mat is at a certain minimum distance from the dangerous parts, to prevent the person from reaching the dangerous parts before they have stopped.

MAT INSTALLATION

The mats must be positioned permanently in the position required for the protection of the machine and the aluminum profiles should be used around the mat for attachment to the floor. Usually, the mats, are sold with aluminum border already cut to size, on request can be supplied by customer specification. These accessories must be rigidly secured to the ground with suitable screws, it is recommended to use 6 mm screws every 500-600 mm. The surface on which the mat is mounted must be flat. The sensor can tolerate minor irregularities but sharp edges or projections may cause premature degradation. To simplify the installation in case of non regular surface can be used a zinc plate on bottom (MZ series). Make sure that the cables are housed and protected within the grooves and are not ruined by the fixing screws. Connect the cables of the mat to the PS3-Ax unit control following the PS3-AX manual instruction. In case, the mat is subject to the transit of vehicles (eg forklift trucks), prevent rotation operations on it and assessing the weight / cm^2 which can accept.
To avoid the problems of the rotation of wheels or other on its surface, to equip the mat of a temporary cover or aluminum fixed (see model M0). As a final step, clean the mat from any metal parts. For more notes on the application refer to Appendix B of the EN 13856-1.

FINAL CHECK BEFORE STARTING

An authorized and qualified person, should test the mat prior to its being put into service for the first time, and periodically. Check:

- that the mat is free of obstacles, not damaged / no wear on the surface;
- that there is not wear and damage to cables that connect the mat and the control unit.

After checked the previous points:

- apply the power supply;
- deposit a weight of 300N (30kg) inside the sensitive area, verify that the control module detects the presence;
- If you encounter any abnormality, check the above operations to find the cause of the trouble, otherwise contact the GREIN customer service.

PERIODICAL TEST

Periodical tests serve the purpose of systematically detecting and removing safety-relevant deficiencies (e.g. in the event of modification or manipulation) of the protective equipment of the machine or facility which occur after the machine/facility having been put into service. Follow the "FINAL CHECK BEFORE STARTING" to check the mat and the unit control. The test results shall be recorded and writing in a report which is to be signed by the inspector. The report shall be kept at the installation site of the machine or facility, respectively.

MAINTENANCE

The maintenance instructions must be read before any maintenance to the machine and the control unit and mat.

All machine parts removed for maintenance operations must be restored, if these parts are not properly attached, the device performance may be affected.

The mat do not need any maintenance, however, the life of the mat will be considerably increased if a basic cleaning routine is observed. Daily, the mat should be clean from materials that may scratch or dent the rubber and oil and grease should be removed. Do not use solvents that can damage the outer surface (see table of the chemical properties).
It must be verified that no load in addition to that established by the technical characteristics (such as wheels of forklifts or other heavy loads) are applied on the mat. If there is need for means movement over the carpet, it is necessary that never occur rotatory movements to avoid internal sensor damage. If this is a necessity must protect the mat with a layer of wood or metal.

SPARE PARTS

Only parts approved by the manufacturer may be substituted; if used unauthorized parts or changes are made to the control unit edge or mat, the device performance may be affected.

PACKING AND UNPACKING

Always observe the standards and regulations regarding the prevention of accidents when handling the product.

PRODUCT PACKAGING

The shape, size and contents of the package varies depending on the number and type of mats to be delivered to the customer.

UNPACKING GUIDELINES

When unpacking the product, follow these guidelines:

1 Inspect the package for check to damaged or missing items;
2 Proceed with unpacking paying particular attention to the opening of the package, if it used the cutter or other cutting instruments, be careful not to damage the surface of the product;
3 Do not pull out from the pack by pulling the mat for the connection cables.

HANDLING GUIDELINES

To prevent damage or personal injury follow these guidelines when handling the product:

1) pay attention during handling of the product;
2) leave the product in its original packaging;
3) if the product has been stored, pay attention to the connecting cables during handling.
4) during handling not bend or flex the mat; always carry it by holding it in an right position.

STORAGE

If the product is not installed immediately after delivery, store it as follows:

1) remove the product from the packaging;
2) stretching the product throughout its length;
3) make sure that the products are not stacked on top of each other;
4) store the product in a dry place at a constant temperature as a temperature range between -10 and 60 ° C.

DISPOSAL

Dispose of this product and its components in accordance with state and local laws / regulations.

MAT CODE IDENTIFICATION

TIPO	CODICE
For surfaces in PVC up to 1 m^2	T0-1
For surfaces in alluminium up to 1 m^2	M0-1
For surfaces with zinc metal sheet up to 1 m^2	MZ-1
For surfaces width 1 m and lenght up to 2.5 in PVC	T0-2
For surfaces width 1 m in alluminium and lenght up to 2.5	M0-2
For surfaces width 1 m with zinc metal and lenght up to 2.5	MZ-2
For surfaces width 1.5 m and lenght up to 2.5 in PVC	T0-3
For surfaces width 1.5 m in alluminium and lenght up to 2.5	M0-3
For surfaces width 1.5 m with zinc metal sheet lenght up to 2.5	MZ-3
Alluminium edging	GUITP1
Alluminium edging	GUITP2
Type of mat without aluminium edging	SB
Type of mat with aluminium edging fixed on the unit	BM
Type of mat with aluminium edging not fixed	BS

The standard cable length is 3000mm, 4-wire.

ORDER CODE

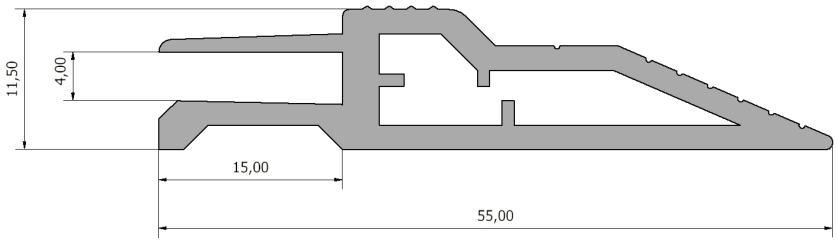
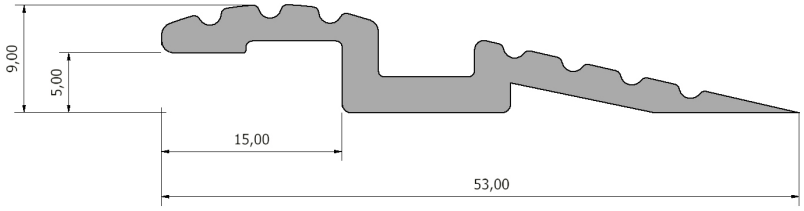
MODEL --LENGTH WIDTH - LENGTH CABLE - PROFILE - TYPE

EXAMPLE: TO-1 – 0800 – 0800 – 3000 - GUITP1 - BM

The ordering code identifies a carpet model TO-1 of size 800x800mm with the output cable length 3000mm, aluminum profile for fixing GUITP1 and execution of the carpet edges mounted.

ACCESSORIES

The aluminum profile is provided for fastening the carpet to the floor or other surfaces. There are two models listed in the table below.

Aluminum profile TYPE GUITP1	
Aluminum profile TYPE GUITP2	

TECHNICAL CHARATTERISTICS

Performance Level	PL = e with PS3-Ax unit control
Maximum dimensions of single mat	1500 X 2500 mm
Top layer	PVC nero da 4 mm
Bottom layer	PVC nero da 2 mm
Overall thickness	9 mm
Weight	12 Kg / m^2
Actuating force with 80 mm test rod	25 Kg
Actuating force with 200 mm test rod	45 Kg
static load	60 Kg/cm^2
Dead zone	30 mm perimetrale
Working temperature	-10° a + 60°C
Protection rating	IP65
B10d	3 milioni di operazioni
Response time	50 ms
Max. voltage	32 Vdc
Max. current	100 mA
Output contact	N.O. quattro fili
Max length connections mat/control unit	100 m, rame 0.35 mm^2

CHEMICAL PROPERTIES

SUBSTANCE	**EFFECT (NOTA 1)**	**CONTACT (NOTA 2)**
Alcohol	Few effects	Some effects
Water	No effect	Permanent contact
Dilutes ammonia	Few effects	Some effects
Hydorcarbons aliphatic/benzene	Extreme effects	Avoid contact
Dilutes acid	Few effects	Some contact
hydrochloric acid	Few effects	Some contact
Trichloroethylene	Extreme effects	Avoid contact
Ethyl	Extreme effects	Avoid contact

This list is only a guideline. The customer, in critical applications, should test the mat with the substance. The reference temperature is 20 °C with diluted substances.

NOTE 1 - Effects that are found on the surface of the mat after contact with the substance.
NOTE 2 - Type of compatibility between mat and the substance.

Warranty

A guarantee is provided for a period of 12 months from the delivery date and terminates at the expiration of this term, even if the materials have not been used for any reason.

Our company undertakes to repair or replace, during this period, free of charge, within the shortest possible time, those parts which owing to poor quality of material or defective workman-ship or inaccurate assembly should prove defective. This is providing that defects are not due to:

- wear and tear
- failure caused by inexperience or negligence
- unauthorized intervention or tampering
- overloads behind contract limits
- accidental causes or "force major"

These repairs of replacements shall be performed AT OUR WORKSHOP in MILANO.
Transport and workman-ship will be completely charged to purchaser.

Nothing will be owed to the purchaser for the time during which the plant may remain idle, nor shall he make claims or ask indemnity for charges, accidents or direct or indirect damages.

For anything else not specified or that becomes a subject of dispute, the ANIE (Italian Electrotechnical Industries Association) general sale conditions will be applied.

GREIN S.r.l. Milan

NOTE: characteristics and dimensions reported in this manual are for reference only and they can be subject to change without notice.