



**MAC - srl**

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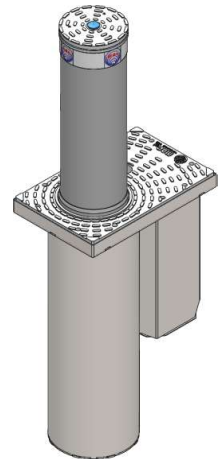
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**GBR**

# MANUAL C 200/140 A



Customer:

Installing Company:

Timbre&Signature

Timbre&Signature

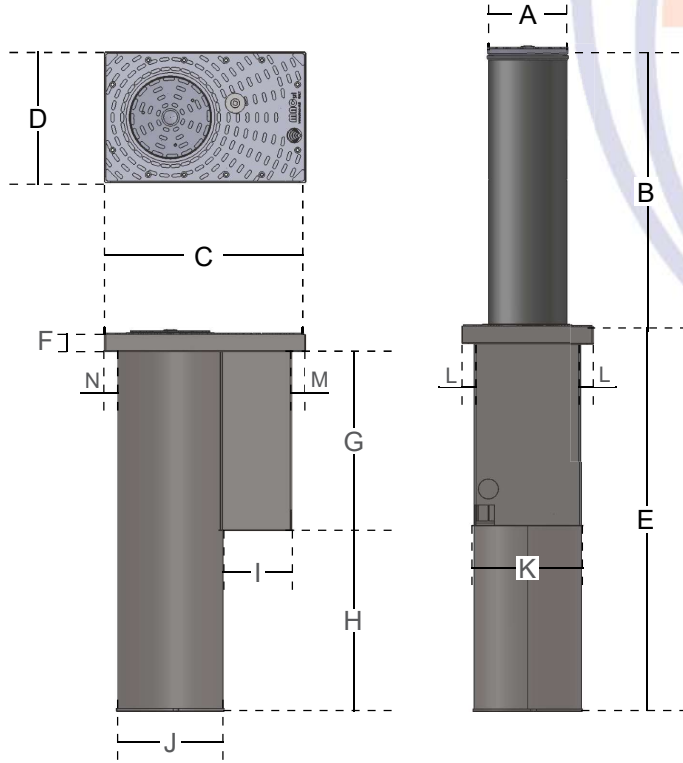
**CAREFULLY READ THE MANUAL BEFORE USE**

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# DIMENSIONS



(U.M.=MM)		
A	Ø 200/206	
B (CORSIA)	500	700
C	508	
D	328	
E	754	954
F	47	
G	452	
H	458	
I	178	
J	Ø 268	
K	275	
L	30	
M	34	
N	33	

(U.M.=MM)		
A	Ø 140	
B (CORSIA)	500	700
C	443	
D	260	
E	754	954
F	44	
G	452	
H	455	
I	187	
J	Ø 202	
K	211	
L	28	
M	28	
N	36	



# APPROXIMATELY MACHINE DECLARATION OF INCORPORATION (IN ACCORDANCE WITH THE EUROPEAN DIRECTIVE 2006/42/CE ALL. II.B)

All. II.B.1

Name of the company: MAC s.r.l.  
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## DECLARES

All. II.B.2

Name and address of who is authorized to draw up the technical file:

All. II.B.3

Description

The bollard is built to be incorporated in a machine or with other machineries in order to arrange a machinery in compliance with the Directive 2006/42/CE

General Denomination

Automatic bollard

Purpose

Avoid the transit of any vehicle.

Model

C200A

Type

C200/4/C5 - C200A/12/C5 - C200A/4/C7 - C200A/12/C7 - C140A/4/C5 - C140A/12/C5 - C140A/4/C7 - C140A/12/C7 -

Serial number

Check the silver label on the product.

Commercial Denomination

Bollard

All. II.B.4

The product is in compliance with all the dispositions related to the following Directives:

- 2006/42/CE European Directive
- 2004/108/CE; 2014/30/UE Electromagnetic Compatibility (CEM)
- 2006/95/CE; 2014/35/UE Low Tension Directive
- 1999/5/CE Radio and Telecommunications terminal Devices (upon request)
- EN 124:2015
- CEI EN 60204-1

All. II.B.5

The company MAC srl undertakes itself to transmit the information concerning the approximately machines, as answer to a question of the national authorities.

All. II.B.6

Furthermore, is not allowed to put on the machinery until the identification of the machine where it will be integrated. The machinery must be also declared in compliance with the Directive 2006/42/CE.

All. II.B.7

Morciola di Vallefoglia, 07/01/2013

All. II.B.8

Managing Director



Fausto Mezzanotti

## WARNING

- To do a correct installation of the product, is important to read and follow the instructions below carefully.
- The company MAC s.r.l descends any responsibility in the case the manual is not updated.
- In case of manual or components' modifications, it is at discretion of the customer to ask about them.
- It is not allowed reproducing partially or publishing this document without the authorization of the company MAC S.r.l..
- Any infraction will be prosecuted in accordance with the procedure prescribed by law.
- MAC s.r.l. is exclusive owner of its registered trademark. The brand is affixed on labels with CE conformity and on seals and danger adhesives.
- The removal, cancellation or modification of the label MAC s.r.l. is strictly forbidden.
- An improper installation or use of the product may cause damage to people. Everything not expected in these instructions is not allowed.
- The user must abstain from any attempt to repair or direct intervention. Furthermore, the user must only call qualified and authorized staff.
- The transit on the bollard must only occur when the device is completely lowered and the traffic light is green.
- Keep out of reach of children remote controls or any other device of control in order to avoid the accidental activation of the automation.

## SHIPPING

- All the products are accurately checked and tested by the manufacturer before the shipping.
- At the moment of delivery, check if the bollard has been damaged during the transport. Moreover, check that nothing has been rigged or removed. In case of noticing damages or missing parts, warn the courier and the manufacturer sending them related photo documentation.

## WASTE DISPOSAL

- MAC s.r.l recommends to respect the environment by promoting recycling waste.
- All the components must be disposed following the regulations of the installation's place.
- Battery, electric and electronic elements may contain noxious and polluting substances. That components must be removed and consigned to companies specialized in recycling noxious waste as indicated in the directive 2012/19/UE.

## TRANSPORT AND LIFTING

- The transport and lifting of the bollard must occur with specific equipment and in compliance with safety regulations in force in the area of the product's installation and by expert staff.
- Check the efficiency and the payload of the transportation before to proceed with the bollard's movement.
- To not cause damages to people or to materials it is necessary to implement any possible precaution. It is opportune to avoid abrupt movements that may ruin the bollard and cause damages to things or people.
- To lift the bollard or its parts, are needed means of transport with a minimum load larger than the declared weight. These means of transport must have the CE label with the related certificates in force, like cables and lifting eyebolts.
- To have a better load stability, it is necessary to keep the load as low as possible during the movements.
- Make sure that there are no people not involved in the work nearby during the installation and its operation.

## D.P.I. FOR THE OPERATOR

Pictogram				
Description	SHOES	PROTECTION GLOVES	SUITABLE CLOTHES	GLASSES / GLASSES FOR WELDING

**The personnel must use the required D.P.I. in these environments of working.**



## WARNINGS FOR THE MAINTENANCE TECHNICIAN

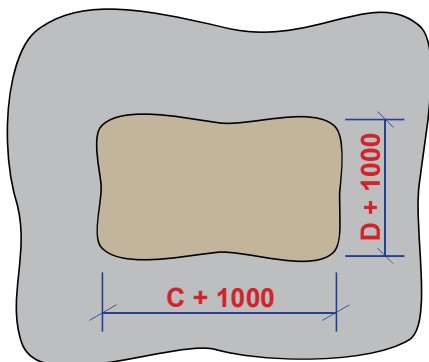
- The installation must be carried out by competent companies and experts in the field.
- The maintenance technician must be formed and informed about bollard installation.
- The maintenance technician must work using the specific protection devices and following the safety regulations in force in the place where the bollard is installed.
- To not cause damages, the maintenance technician must evaluate carefully the place where the bollard will be installed and check that all the moving parts are free from obstacles, by also checking that the handlings operate linearly.
- For what concerns the movement operations, make reference to the “Transport and lifting” chapter.
- MAC s.r.l. is not responsible about the non-compliance of its products and accessories installation methods.
- The maintenance technician must insert the protections against the indirect contacts upstream of the power line, following the regulations in force according to the installation place.
- Check that upstream of the plant there is a differential magnetomic switch with a 0,03 A threshold.
- The control unit main power line must be directly connected upstream of the specific main switch, placed inside the station itself.
- Use standard flameproof cables.
- To guarantee a correct power source (230V +/- 10% in movement); the main power line sizing must be at least 3x2,5 mm. Anyway, it must be meditated by the maintenance technician depending on the main switch sizing and on the distance from the distribution point.
- Check the grounding system is perfectly done.
- The maintenance technician must give to the client/user all the information about the bollard manual handling in case of emergency and give the user and maintenance manual.

## PREPARATION OF THE EXCAVATION

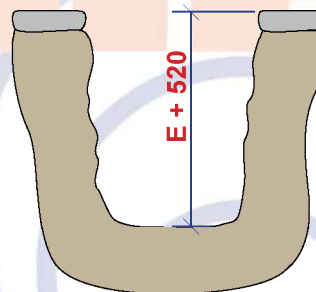
To do a proper installation of our product, we recommend to follow all the points below.

Excavate the land with the measures and depth indicated below.

Plan view



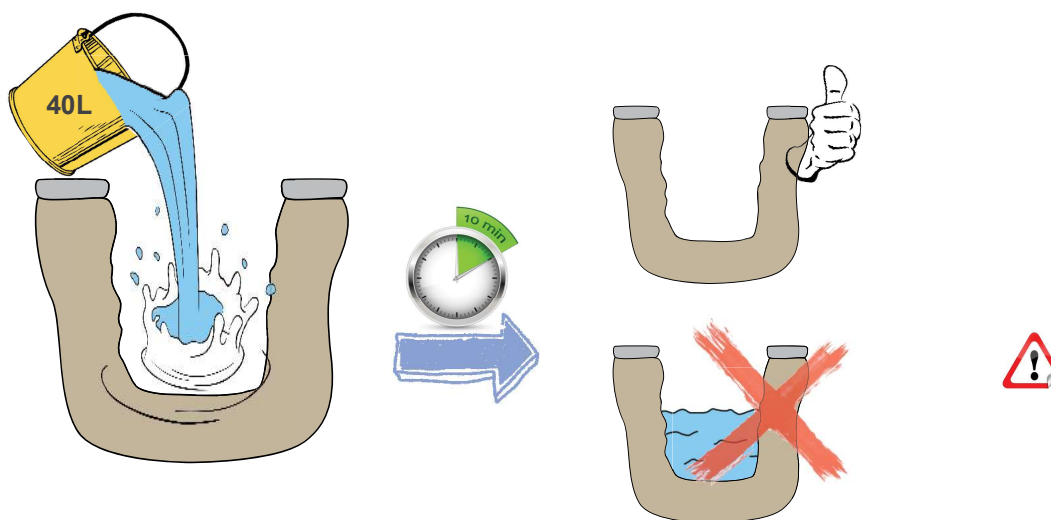
Sectional view



Make sure that the interested soil for the installation of the product is draining by pouring 40 liters of water into the excavation.

If after 10 minutes the excavation has emptied, means that it isn't necessary to install a sewage network.

Individual cases should however be evaluated, considering the soil compliance and the meteorological situations. Eventually, create a sewer system.

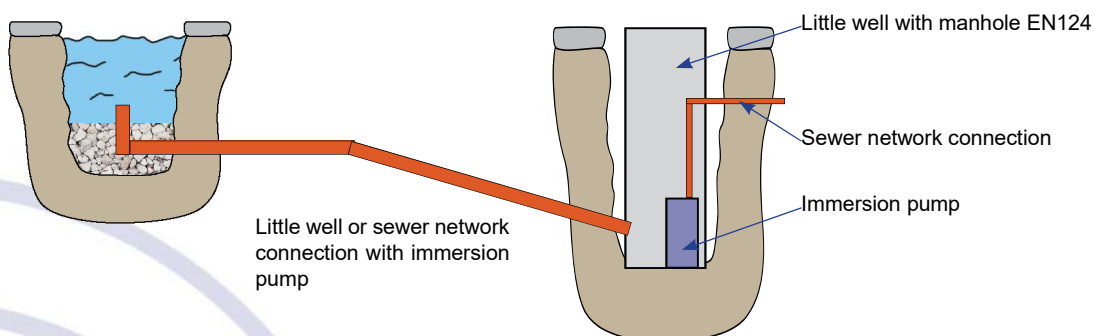


### Caution:

This type of system has been thought for land with poor draining qualities, where, digging, water is immediately found and/or where there is not the possibility to carry everything in a sewer system. The bollard will be collocated in a waterproof concrete tank so if the water level raises, the bollard remain isolated from the surrounding land.

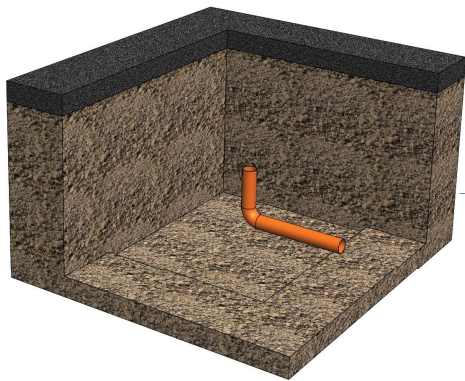
This drawing shows how to install a well for the discharge of the excessive water from the formwork of the bollard. All the concrete that covers the bollard and the well should contain special additives that isolate from water.

Even just one well can be installed to suck the water of all the bollards installed.



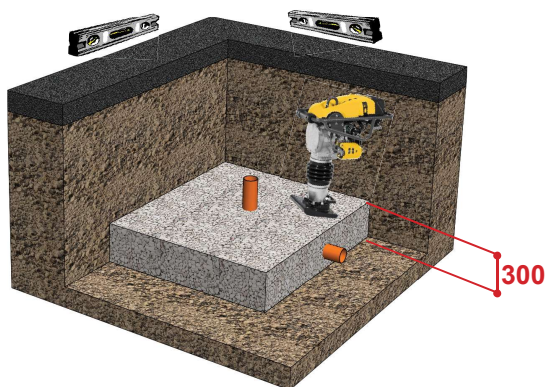
# BOLLARD LAYING PROCEDURE

1



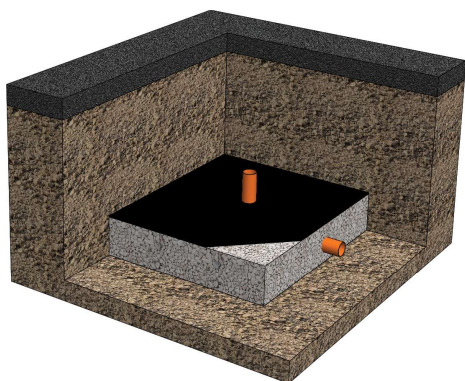
Proceed with the realization of the drain of the rainwater through the lay of a PVC pipe with 100mm diameter. This pipe must be connected to the sewer system or in alternative to a well equipped by an emptying system with a greater depth.

2



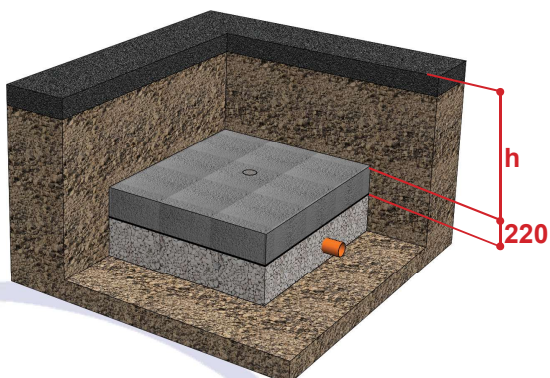
Insert gravel with grain 22/32 mm diameter and 220mm height. In order to avoid “retreats of settling”, it is advisable to compact the gravel.

3



Insert a geotextile layer (gr. 300) on the compacted gravel.

4

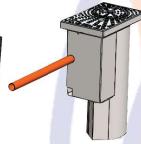
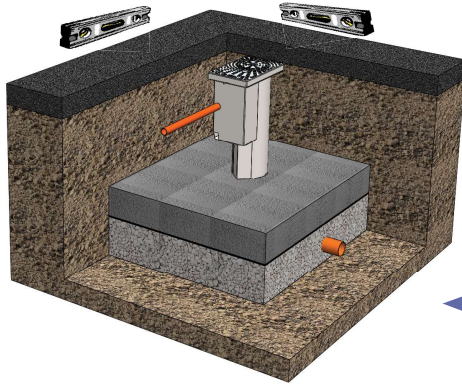


The size “h” are very important to ensure that the formwork protrudes 20mm from the trampling line.

mod.	B	h
CSA 200/140	500	734
	700	934

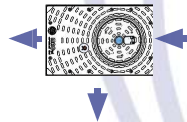


5



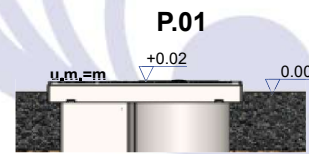
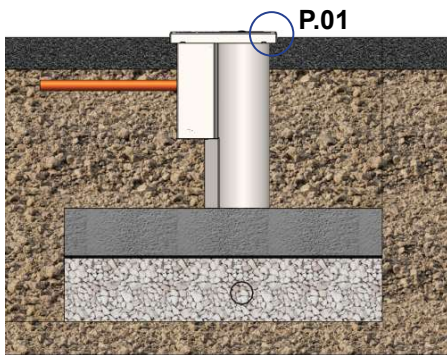
Collocate the formwork supplied taking care to place it flat (centre the bubble) compared to the road level.

Predispose a corrugated tube  $\varnothing 80$  for the passage of the electrical power cables in the pre-holes of the formwork.



**CAUTION:** place the foundation formwork based on the direction of traffic as in the view from the above.

6

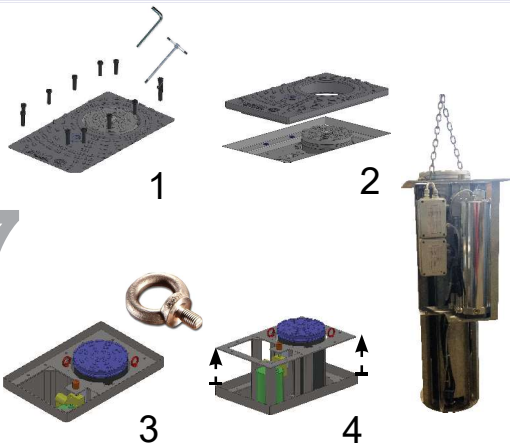


N.B:

Position the bollard so as to protrude 20mm from the floor level (in order to limit the enter of rainwater in the little well).



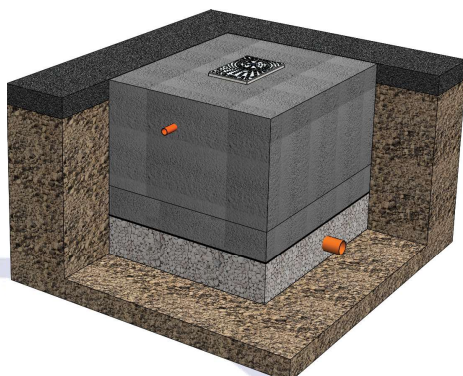
7



1. Screw off the 12 (twelve) bolts MA8x50 (using the Allen key N°6).
2. Extract the trampling platform.
3. Insert the eyebolts M8.
4. Extract the extractable structure.

To lift the extractable structure, it is necessary a lifting arm. Lead the cables from the cockpit to the buried formwork.

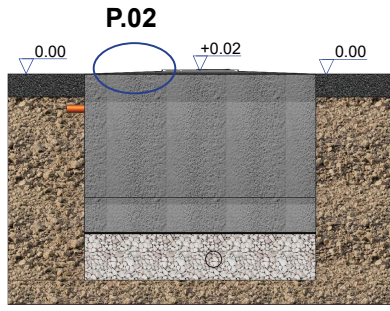
8



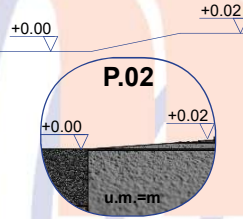
Gradually insert the concrete verifying that the hole is filled uniformly. Deal the concrete so as to not to leave empty pockets of air, especially below the bollard.



9



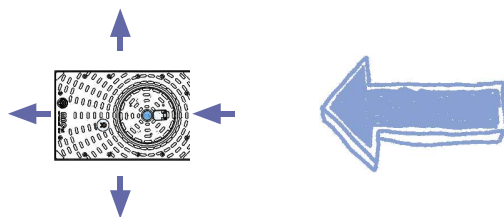
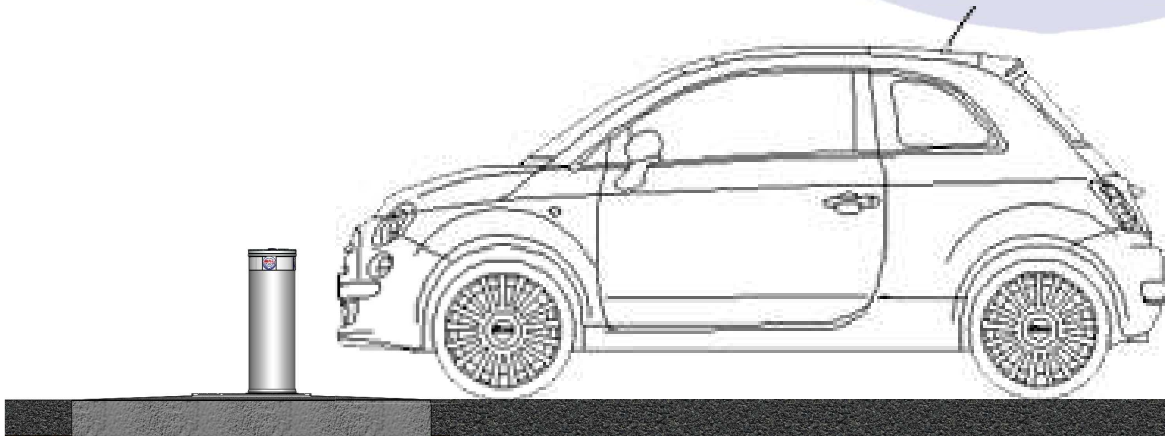
u.m.=m



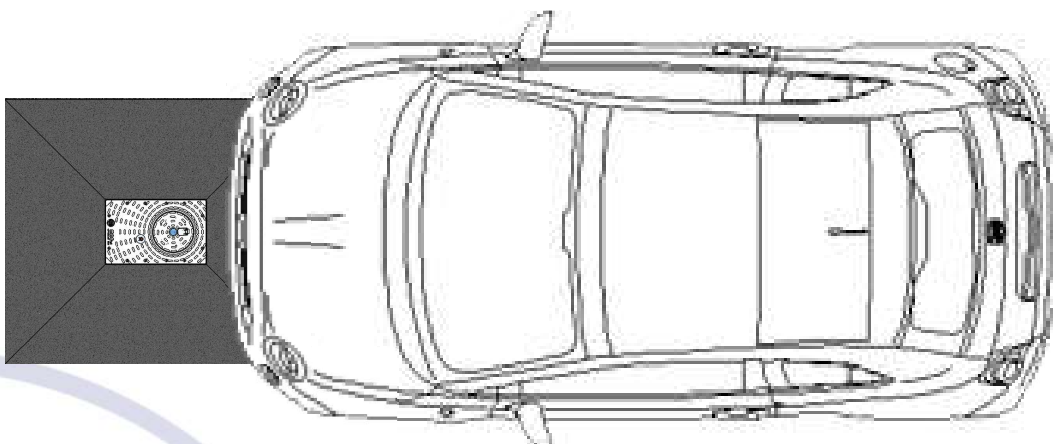
N.B. Make the connection



Make sure that the concrete is solidified before to insert the extractable structure.



N.B.:  
Remove the protections of polystyrene from the runner



## BRAIN CONNECTIONS



CABIE DESCRIPTION				
<b>1) CABLE 3G0,5 mm2 ELECTRICAL VALVE POWER SUPPLY CABLE (ELET.V.) (V=230vac) (optional)</b>				
Electrical valve grounding cable				11 / 12
Electrical valve power supply 230Vac	18	ELET.V. 19		4
Electrical valve power supply 230Vac	17	ELET.V. 20		5
<b>2) CABLE 4G1,5 mm2 CABLE FOR ENGINE ALIMENTATION (M1) (V=230vac 50Hz)</b>				
Engine ground cable	21			11 / 12
<b>COMMON</b>	22		4 / 7 / 10 / 13	8
<b>OPENING / CLOSURE</b>	23		5 / 8 / 11 / 14	9
<b>OPENING / CLOSURE</b>	24		6 / 9 / 12 / 15	10
<b>3) CABLE 7G0,5 mm2 SENSITIVE HEAD + Bright head ORION LED (V=24vdc) (optional)</b>				
Ground cable				11 / 12
ORION LED power supply (bright head)	(- 0 Vac) 13		(- 0 Vdc) 25	13
ORION LED power supply (bright head)	(+ 24 Vac) 15		(+ 24 Vdc) 26	14
N°2 NC (limit switch with contact type: positive)	4		(S2) 47	15
Limit switch sensitive head SECURITY2				
COMMON limit switch sensitive head SECURITY2			(C) 46	16
COMMON limit switch sensitive head SECURITY1			(C) 46	17
N°1 NC (limit switch with contacts type: positive)	5		(S1) 45	18
Limit switch sensitive head SECURITY1				
<b>4) CABLE 2x0,5 mm2 MAGNETIC LIMIT SWITCH1 must be placed LOWER Fn OPEN</b>				
COMMON	8		(C) 34 / 37 / 40 / 43	20
Contact NC	10		(FA) 35 / 38 / 41 / 44	21
<b>5) CABLE 2x0,5 mm2 MAGNETIC LIMIT SWITCH2 must be placed HIGH Fn CLOSE</b>				
COMMON	8		(C) 34 / 37 / 40 / 43	20
Contact NC	9		(FC) 33 / 36 / 39 / 42	19
<b>6) CABLE 3x1,5 mm2 RESISTANCE (V=230vac) (optional)</b>				
Resistance ground cable				11 / 12
Resistance alimentation 230Vac	N Linea 220		N Linea 220	1
Resistance alimentation 230Vac	F Linea 220		F Linea 220	2
<b>7) CABLE 2x1,5 mm2 BUZZER (V=230vac) (optional)</b>				
Buzzer power supply 230Vac	23		21	6
Buzzer power supply 230Vac	22		22	7
<b>8) CABLE 2x0,5 mm2 MAGNETIC LIMIT SWITCH3 FOR SECURITY (bollard high) (optional)</b>				
COMMON		Central Allarm	Central Allarm	22
NC contact (max 10W) (max150Vac/dc) (max0.5A)		Central Allarm	Central Allarm	23
<b>9) CABLE 2x0,5 mm2 MAGNETIC SENSOR FOR SECURITY (anti lifting sensor for platform) (optional)</b>				
NC Contact (max 10W) (max100Vcc) (max1A)		Central Allarm	Central Allarm	24
COMMON		Central Allarm	Central Allarm	25
* The numbers with asterisk are the numeration reported on cable, if they are not different colored one from each other.				

For any other explanation refer to Brain1 and Brain4 manuals.



## ELECTRICAL CONNECTIONS FOR BRAIN4 WITH JUNCTION BOX

Electrical connections: Electrical valve, Hydraulic power unit, Sensitive head + LED head, Magnetic limit switch.

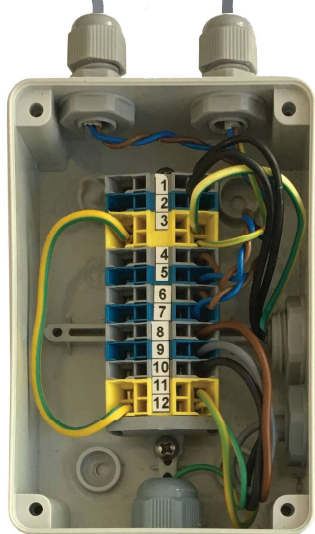
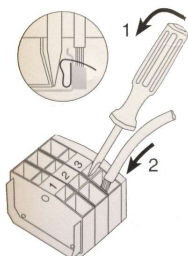


### NOTE:

It is advisable to fill the junction box with gel to avoid possible problems of condensation.

Buzzer  
2x0,5 mm<sup>2</sup>

Electrical valve Vrac=230Vac (ELET.V.)  
3 G 0,5 mm<sup>2</sup>



Power supply 220V from electrical panel

Heater resistance (connect to power supply)

Engine power supply V=230Vac (M1)  
4 G 1,5 mm<sup>2</sup>  
increase the section according to the distance

Magnetic limit switch (HIGH)  
n°1 FC (N.C.) (Limit switch2 Closure)  
2x0,5 mm<sup>2</sup>  
4x0,5 mm<sup>2</sup> only if contact alarm is installed

Magnetic limit switch (LOW)  
n°1 FA (N.C.) (Limit switch1 Opening)  
2x0,5 mm<sup>2</sup>

Sensitive head+ORION LED  
Power supply ORION LED (V= 24Vdc)+  
n°2 fn sensitive head (N.C.) (SIC2)+  
n°1 fn sensitive head (N.C.) (SIC1)+  
7 G 0,5 mm<sup>2</sup>

Low Contact Alarm  
2X0,5 mm<sup>2</sup>

Signals 24V from electrical panel





**WARNING:**

Read carefully this manual before installing the bollard.

The company MAC s.r.l. declines any responsibility in case of non respect of the Law in the country where the Installation is done.

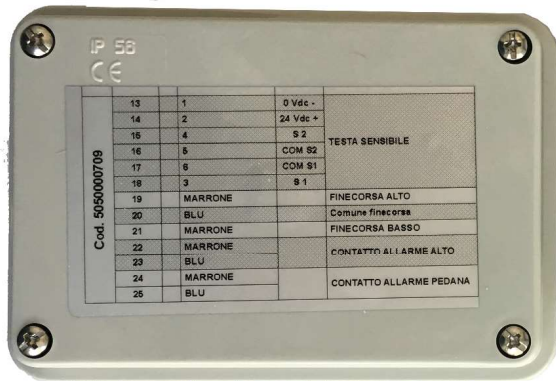
Insert the condenser 20/25mF in the terminals of the BRAIN4 between the cables black and brown of each bollard.

**230 Vac**



BRAIN1	BRAIN4	MULTI-WIRE CABLE Cod. 5050000708	CONNECTIONS JUNCTION BOX		
LINE 220 Vac =L	LINE 220 Vac =L		1		RESISTANCE (CABLE D)
LINE 220Vac =N	LINE 220Vac =N		2		
T	T		3	YELLOW	Ground Terminal
18	19		4	BROWN	ELECTRICAL VALVE (CABLE B)
17	20		5	BLUE	
23	21		6	BROWN	BUZZER (CABLE A)
22	22		7	BLUE	
22 o 24	4/7/10/13 o 6/9/12/15		8	BROWN	
COM. 23	COM. 5/8/11/14		9	GREY (COM.)	ENGINE (CABLE E)
24 o 22	6/9/12/15 o 4/7/10/13		10	BLACK	
T	T		11	YELLOW	Ground Terminal
T	T		12	YELLOW	

**24 Vdc**



BRAIN1	BRAIN4	CAVO MULTIFILARE Cod. 5050000709	CONNECTIONS JUNCTION BOX		
13	0 Vdc - = 25		13	*1	0 Vdc -
v15	24Vdc + = 26		14	*2	24 Vdc +
4	S 2 = 47		15	*4	S2
	COM = 46		16	*5	COM S2
	COM = 46		17	*6	COM S1
5	S 1 = 45		18	*3	S1
9	33/36/39/42		19	BROWN	LIMIT SWITCH HIGH (CABLE F)
8	COM 34/37/40/43		20	BLUE+BLUE	COMMON LIMIT SWITCH HIGH/LOW(CABLE F+G)
10	35/38/41/44		21	BROWN	LIMIT SWITCH LOW (CABLE G)
ALLARM	ALLARM		22		
ALLARM	ALLARM		23		ALLARM CONTACT HIGH (CABLE F)
ALLARM	ALLARM		24		
ALLARM	ALLARM		25		ALLARM CONTACT LOW (CABLE I)



## ELECTRICAL HEAD CONNECTIONS

OPTIONAL

CABLE H

SENSITIVE HEAD + BRIGHT HEAD  
Type: Multicore cable 7G 0,5 m<sup>2</sup>



**CABLE D 7G0,5 mm<sup>2</sup> must be connected to SENSITIVE HEAD + Bright head ORION LED (V=24vdc)**

Connector	Rope number	Cable colour	Description	BRAIN1	BRAIN4
8 (7cont.)		YELLOW/GREEN	Ground cable		
1 (7cont.)	*1	WHITE (-)	ORION LED Power supply (bright head)	13	-0 Vdc (25)
2 (7cont.)	*2	PINK (+)	ORION LED Power supply (bright head)	15	+24 Vdc (26)
4 (7cont.)	*4	GREY	N°2 NC Contacts (limit switch with contacts type: positive)	4	S2(47)
			Limit switch sensitive head SECURITY2		
5 (7cont.)	*5	YELLOW	COMMON Limit switch sensitive head SECURITY2		C(46)
6 (7cont.)	*6	GREEN	COMMON Limit switch sensitive head SECURITY1		C(46)
7 (7cont.)	*3	BROWN	N°1 NC Contact (limit switch with contacts type: positive)	5	S1(45)
			Limit switch sensitive head SECURITY1		

\* The numbers with asterisk are the numeration reported on cable, if they are not different colored one from each other.

## GROUND CONNECTIONS



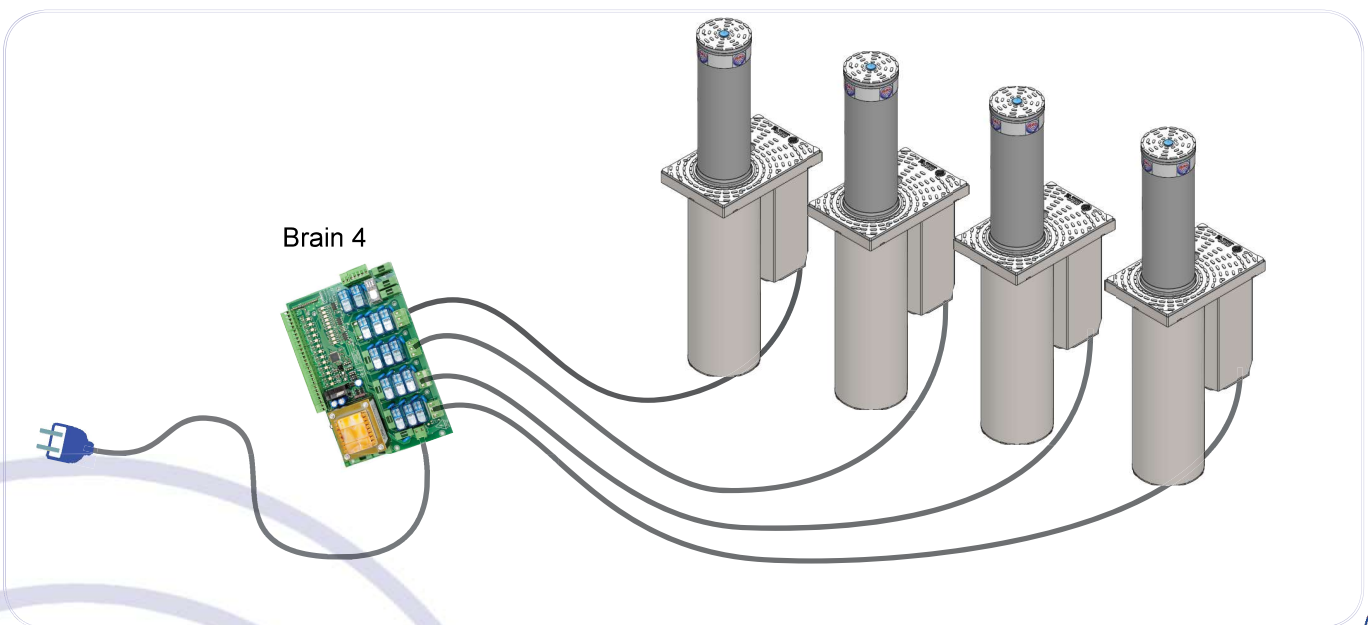
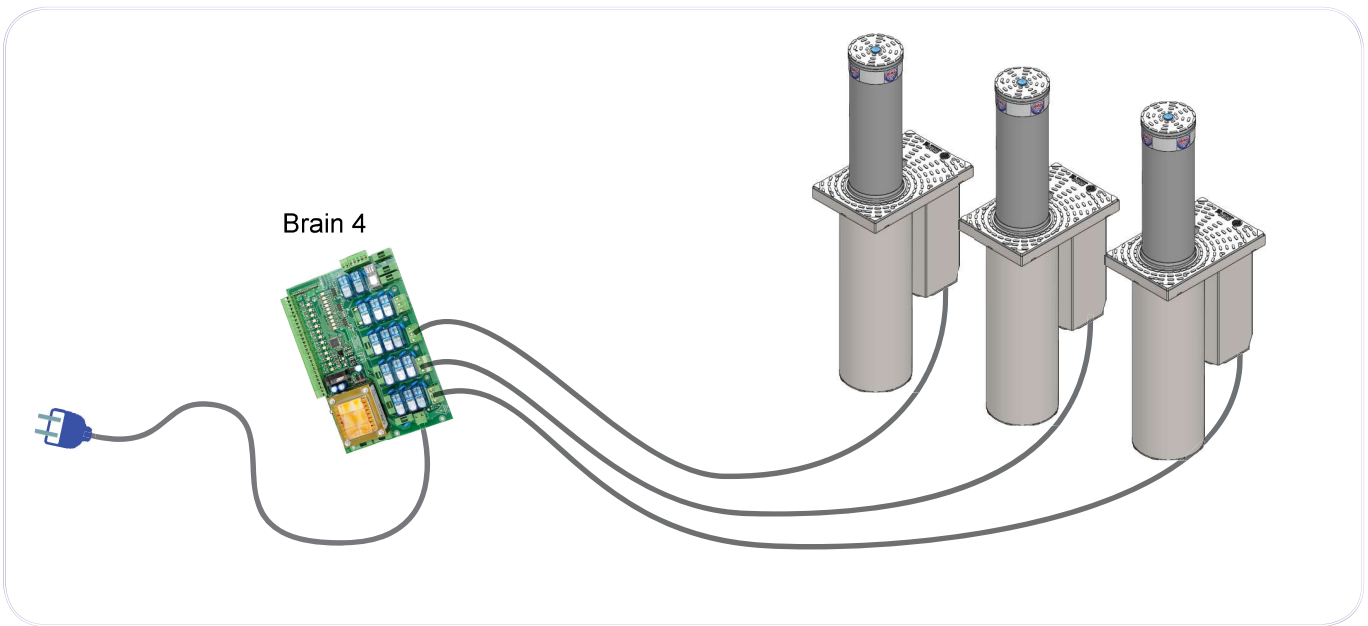
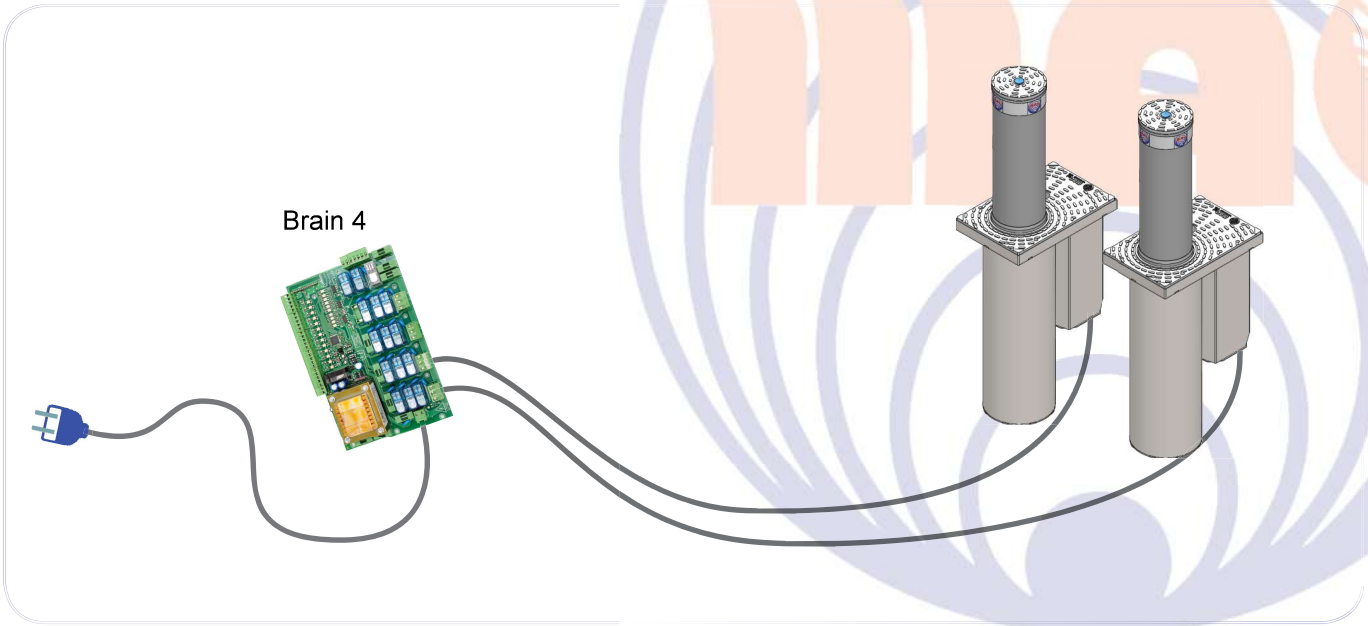
CABLE E Cable 6mm<sup>2</sup>  
Connect here the ground cable



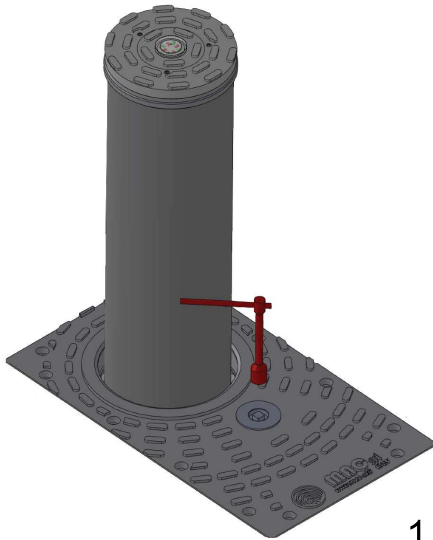
(The ground cable is not included)



The start-up of each motor involves an absorption four times higher than its nominal power (500 W).  
MAC srl recommends the use of cables that respect the laws in force in the country of installation and of an appropriate length.



## BOLLARD UNLOCK



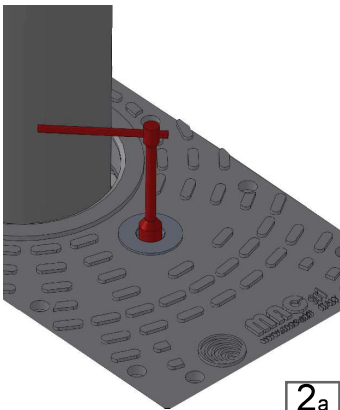
1



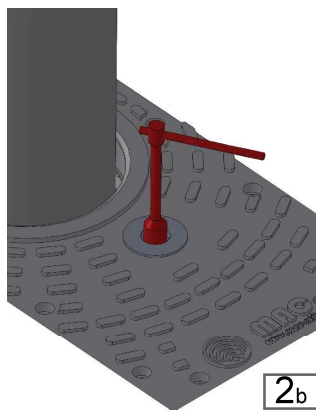
### Warning:

Use this type of unlock only in case of emergency or when the bollard is in black-out.

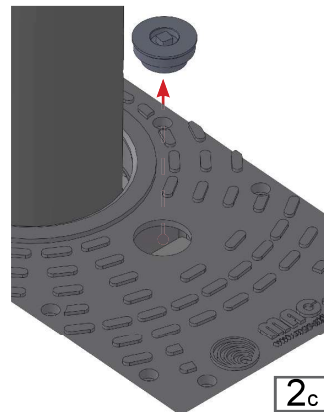
After the unlock, (when the bollard is completely down) close it by turning clockwise the key until the end.



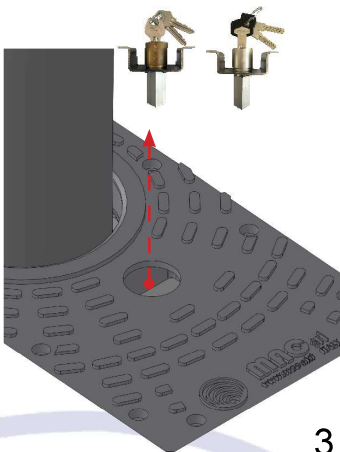
2a



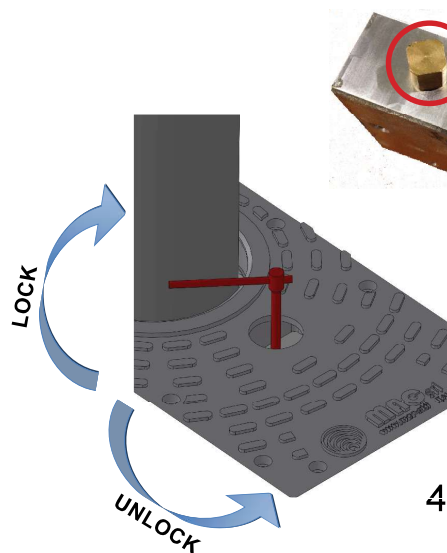
2b



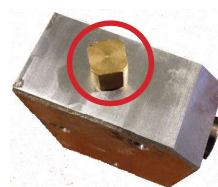
2c



3



4





## EXTRACTION OF THE EXTRACTABLE STRUCTURE FROM THE BURIED FORMWORK



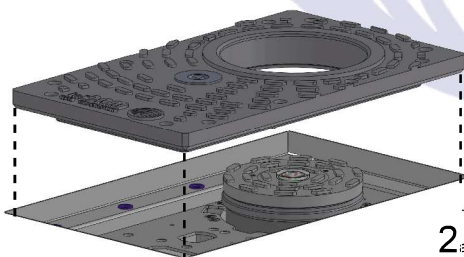
1. screw off the 12 (twelve) bolts MA10x35 (using the allen key N°6).
2. Extract the trampling platform.
3. Insert the eye bolts M8.
4. Extract the extractable structure.



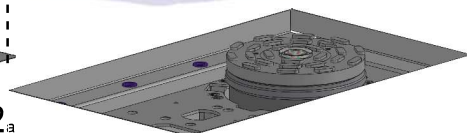
To lift the extractable structure you must use a lifting arm.  
When you extract the bollard you must pay attention to the cables, therefore, lead the cables from the cockpit to the buried formwork.



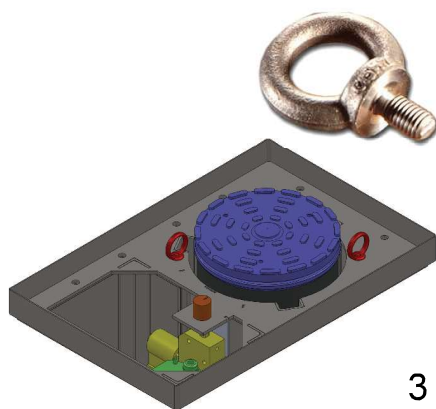
1



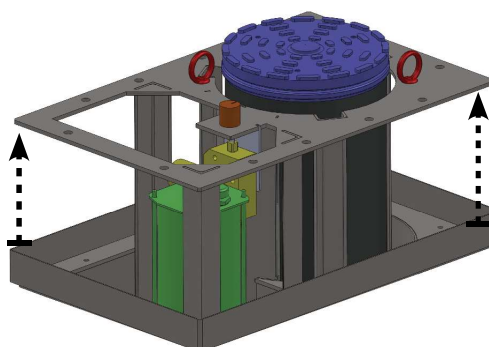
2<sub>a</sub>



2<sub>b</sub>



3



4

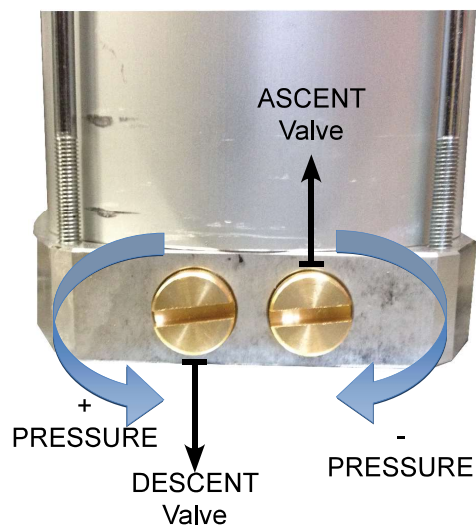


## BOLLARD'S CLIMB STRENGTH REGULATION

**Ordinary Maintenance**  
Frequency every **6 months**

After used the safety measures it's possible to regulate the lift and descent valves.  
Turning the valves clockwise using the screwdriver you increase the hydraulic pressure.  
To regulate the pressure you must operate as following:

1. Turn the valve clockwise using the screwdriver, therefore, regulate the climb pressure until the bollard goes up/down easily.



## SENSITIVE HEAD EXTRACTION

for regulation and additional centering of the bollard

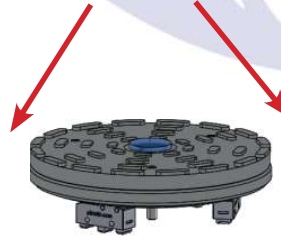
grub screws M6 anti dust



1



bolts M5x20 (Csa200)  
bolts M5x16 (Csa140)



3



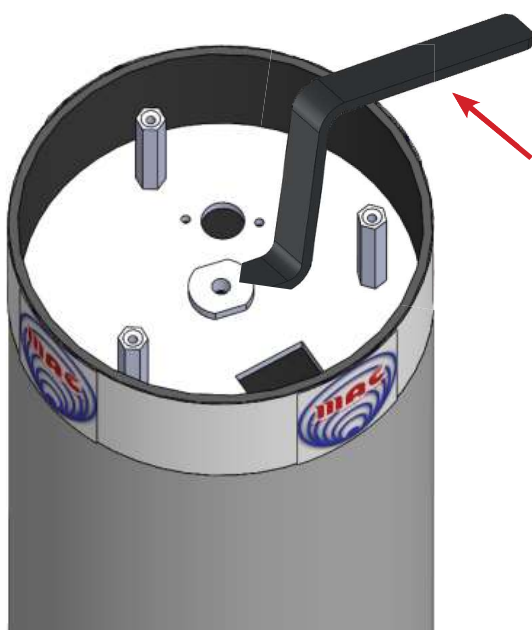
## REGULATION AND ADDITIONAL CENTERING

of the mechanical pipe with the oil-hydraulic piston



Loosening the bolt M8x25 with the allen key N°6 it's possible to move the pipe of the bollard in every direction for few centimeters.

After the mechanical pipe regulation tighten energetically (within the limits of the bolt M8) the bolt using even the KEY B (this key lock the stem of the bollard, key N°14).



KEY B

## OIL CHANGE

### Ordinary Maintenance

Periodicity every 6 months or every 1.000.000 of operations



Before every operation, carefully read the maintenance manual for hydraulic components.

Maintain the oil level until a height of 95mm observable from the cap marked in the picture.

- Oil tank capacity 1,5 liters.
- TYPE: check the label.

1 - Screw off the central connector pipe (see pictures 1-2) and the cap (see picture 3).

2 - Wait that all the oil in the tank goes out

3 - Tighten the central connector pipe (see picture 2)

4 - Fill the tank with new oil (check the oil label)

5 - Make sure that the oil level arrives to a height of 95mm from the superior part of the tank (see picture 4)

6 - Tighten the cap on the superior part of the tank (see picture 3)



## SELF REGULATING RESISTANCE

This device maintains a constant temperature within the formwork.

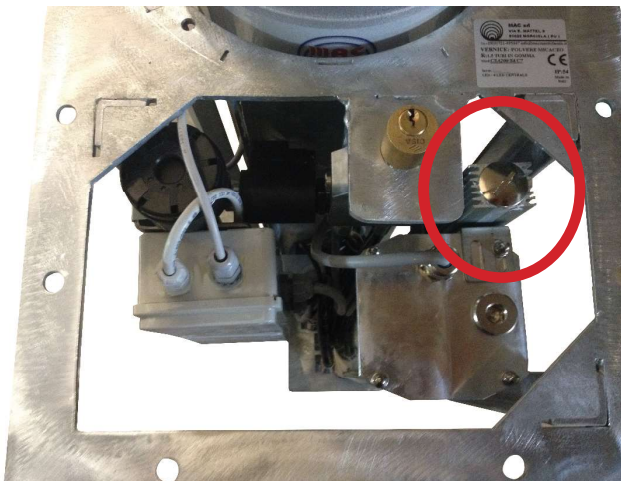
It is made with an anodized aluminum heat sink in which is inserted a PTC thermistor which can be fed with variable tension from 110V to 250V getting a superficial temperature around 70°C (tests done during working cycles in a humid place).

The resistance must be installed in the formwork, when the average external temperature (or during the winter period) is near to 0°C.

It is advisable to install the resistance in vertical position in order to obtain the better performances..

This resistance must be connected to an electric network 230Vac.

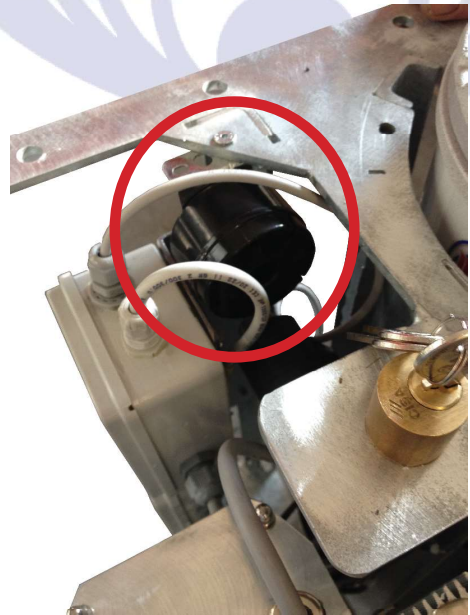
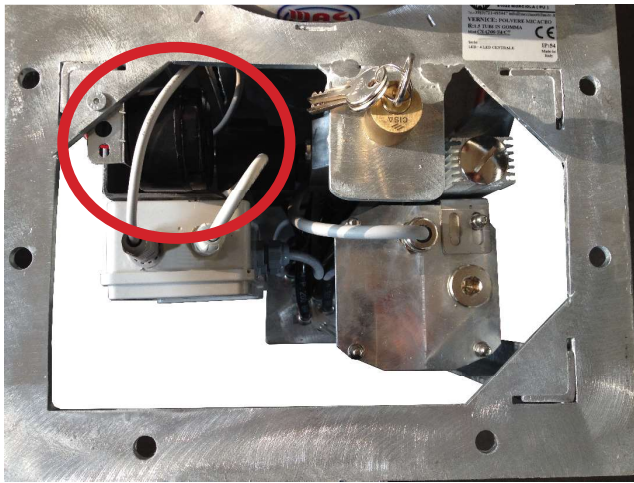
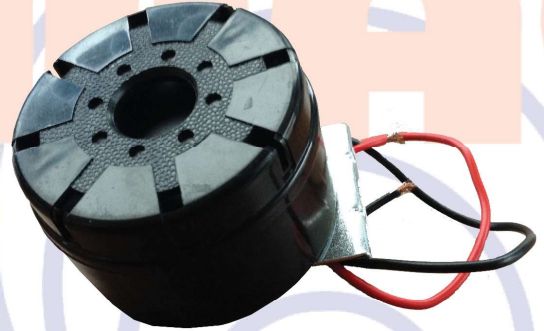
DESCRIPTION	Un.	DATA
Protection	IP	IP 66
Power supply	Vac	110/250
Power	W	MAX 250
Absorption	A	0.8



## ACOUSTIC BUZZER

The buzzer (has to be placed within the bollard), is an intermittent acoustic device ("beep"... "beep"). It is activated few seconds before the handling of the bollard until its end (to signal danger).

DESCRIPTION	Un.	DATA
Power supply	Vac	230-50Hz
Power absorbed	mA	300
Operative frequency	Khz	2.8 ± 0.5
SPL at 1 mt. (V=220Vac)	dBa	100
Working temperature	°C	-20 / +60
Protection degree	IP	67



## WARRANTY

- The products of Mac s.r.l. have 24 (twenty-four) months of warranty from the billing date against manufacturing and/or components defects.
- The warranty can be extended only if the customer subscribes the required biannual checks imposed by the legislative regulations.



- The warranty expires:
  - From the moment in which the customer doesn't respect the ordinary maintenance contract imposed by the legislative regulations in force, by CEE 2006/42/CE and by the manufacturer's indications;
  - In case of the customer and/or the product manager doesn't subscribe a planned biannual maintenance (every 6 months) with a specialized company for the first 24 months starting from the billing date;
  - In case of tampering or fixing carried out by unauthorized personnel;
  - In case of non-original spare parts are used;
  - In case of improper use of the product;
  - In case of sudden occurrence of natural events;
  - In case of the customer refuses to return the defective product or component to repair service so as to verify possible defects;
  - In case of removing the product identification labels. Request their replacement if they are deteriorated.
- Complaints or controversies must be documented by multimedia contents and sent to the manufacturer or to local repair service within 8 (eight) days from the date of receipt of the product or component. These complaints or controversies don't give the right to interrupt the payments. Any return must be previously agreed and authorized by the manufacturer and carried out in free port.

## MAINTENANCE OBLIGATIONS

- The machinery directive 2006/42/CE and successive force to a "correct installation and maintenance" of the device.
- The single text 81/2008 art. 64 com.1.c force that "the plants and the devices must be submitted to a regular technical maintenance. The detected defects must be removed as soon as possible because they may compromise the safety and the health.
- Regardless of whether the product is installed in a public or private area, that place will be considered "work area" and that involves the respect and the obligation of the reference regulations.
- For a correct and long-lasting use of the product, MAC s.r.l. recommends to subscribes a planned biennial maintenance (every 6 months) with a specialized installer company. After every intervention of maintenance that company must release to the customer a documentation with the test results performed.



- In case of the customer decides to not activate the product for a long period, it is advisable to make it inoperative by interrupting power source.
- In case of the product is activated after a long period of inactivity, it is advisable to contact a specialized company for a prior check of all components. That company must also certify the correct operation of the product.

## GENERAL WARNINGS

- This manual contains the necessary information for a correct mechanic, hydraulic and electrical maintenance.
- Important, in order to avoid malfunctions that may cause directly or indirectly grave accidents and/or damages to people or objects, it is advisable to observe and respect the instructions and the indications of this manual.
- The maintenance must be only carried out by specialized companies' experts in the field.
- The maintainer must be fully formed and informed about all the characteristics and requirements of the product.
- The maintainer must respect all the safety regulations in force in the area of intervention.
- The information described in this manual are necessary for a correct ordinary and extraordinary maintenance of the product.
- In case of unusual problems or it is necessary to have further explanation during the maintenance, please contact MAC s.r.l. company.



## WARNINGS FOR THE MAINTENANCE TECHNICIAN

- The maintenance technician must be fully formed and informed about all the characteristics and requirements of the product.
- Dangers may be generated in case of the maintenance is carried out in a superficial or inattentive way. This may cause damages to people or things.
- The maintenance technician must use original components and carry out all the necessary checks in order to verify the correct functioning of the product both in ordinary maintenance and in extraordinary maintenance.
- The maintenance technician must check:
  - To avoid physical contact with components in movement;
  - That during the product maintenance the work area must be forbidden to unauthorized personnel;
  - That the animals are kept away from the area interested in the maintenance operations;
  - That the maintenance operations are carried out with enough lighting. Lighting devices must be used in case of maintenances localized in areas not sufficiently lighting. The maintainer must avoid cone of shadows that impede or reduce the visibility of the operation point or surrounding areas.;
  - Not to smoke;
  - Not to weld and move close flames during the replacement operations and the fill of the fluid;
  - Not to make welding in presence of fluids;
  - Not to carry out any operation when the product is activated;
  - Never to overtake the maximum pressure indicated;
  - Not to modify the electrical and hydraulic connections;
  - That at the end of the maintenance and before their putting in action, all the devices and safety components are correctly installed.
  - To use the D.P.I. (Individual Protection Devices) necessary both for the maintenance operation and for work environment.
  - To use suitable utensils and/or tools. They don't have to be worn and/or defectives.
  - Not to use suitable utensils and/or tools improperly.

## D.P.I FOR THE OPERATOR

Pictogram				
Description	FOOTWEAR	GLOVES OF PROTECTION	CLOTHING SUITABLE	GLASSES / GLASSES WELDING

**The operator must always use suitables D.P.I. respect to the work environment.**

## WAREHOUSING

The product can be stored for around six (6) months before its putting in action following the indications below:

- All the joints provided for the pipe connections must remain sealed.
- No component must be removed from the plant.
- The warehouse must take place in a dry and not dusty space, with a temperature between -30°C and 80°C.
- After six (6) months of warehouse the lubricating and antioxidant proprieties of the fluid utilized for the check are no more guaranteed.



## WARNINGS FOR THE HYDRAULIC COMPONENTS MAINTENANCE

### HYDRAULIC CONNECTIONS REALIZED WITH RIGID PIPES

Use cold drawn steel tubes without welds, annealed copper tubes, high pressure hydraulic PVC pipes.

- For dimensions up to diameter 32 (DN32) use tubes following DIN2391.
- For dimensions starting from diameter 40 (DN40) and pressures up to 160 Bar, use tubes following DIN2448.

To calculate the diameter and thickness of the tubes considering the maximum pressure and capacity.

Comply with the values below:

- Fluid speed in the delivery pipes: 3-6 mt/s
- Fluid speed in the return pipes: 2-3 mt/s
- Fluid speed in the suction pipes: 0,5 mt/s

### HYDRAULIC CONNECTIONS REALIZED WITH FLEXIBLE PIPES

Strictly respect manufacture indications relate to the operating pressure, the compatibility with the fluid and the installation and maintenance regulations.

The joints must be chosen according to the operating pressure and the pipes diameter:

- For joints up to 1" ½ is recommended to use three cutting ring fitting, with curb to weld and seal with O-Ring DIN2353.
- The connections must be realized with flange if the joint is more than 1" ½ (SAE 3000 – SAE 6000).

## CHECKS FOR THE FIRST START OF THE PRODUCT

- Control that all the circuit components are installed and ready for the use.
- Control that the pipes are correctly connected by checking the tightening of the joints so as to avoid damages and fluid leaks.
- Before to proceed with the tank filling, check that it is internally clean. Regarding the cleaning, use vacuum for liquids and solids and non-filamented mops. Not to use degreaser or solvents for the internal cleaning.
- The tank filling with the operating fluid must be carried out only through the specific loading cap.
- Make sure that the fluid is the same prescribed and listed in the "recommended fluids" table.
- Filter the fluid before to put it in the tank, because even a new fluid may contain polluting particles.

## FIRST START OF THE PRODUCT

- Open the faucets on the pumps aspiration.
- Reset the settings of the pressure regulating valves by turning the regulating screws in counter-clockwise.
- Make sure that the circuit is free of air and the cycle sequences are correct.
- Make sure that there aren't leaks toward outwards and that all the pipes are correctly connected.
- Carry out the pressure and flow calibrations indicated in the diagram by blocking them.
- Pay specific attention to the noise during the functioning.
- In the first hours of operation, control the fluid level in the tank and check if there are leaks.
- After the first 100 hours of operation, check the cleaning and the temperatures.
- Check the maintenance sheets to decide how often replace the fluid (table n°2).

## ORDINARY AND EXTRAORDINARY PLANNED PROCEDURE

Check that:

- The operation area where to do the maintenance is well delimited by specific signage;
- In the maintenance delimited area, the access is forbidden to unauthorized people and animals;
- The maintainer is provided with D.P.I. devices;
- The product power source is interrupted.

 The technician must always pay full attention to the cables placed upstream of the general switch because they remain turned on.

**TABLE N°1 GENERAL ORDINARY MAINTENANCE CONTROLS**


Period		Description of operations for general controls
6 months	12 months	
Yes		Check the bollard does all the commands (both mechanics and radio controlled)
Yes		Check the hold-to-run control don't put people in danger
Yes		Check the electronic devices state and their working logics
Yes		Check the surface paint state and eventually, clean or retouch it
Yes		Check the bollard handling linearity
Yes		Check the bollard doesn't make abnormal sounds
Yes		Check the acoustic buzzer functionality (for blind persons) (where provided)
Yes		Check the functionality of the emergency vehicles sound recognizer European approved sirens (where provided)
Yes		Check the traffic light and flashing smart LED functionality
Yes		Check the magnetic coil/photoelectric cells
Yes		Check the electrical valve functionality (where provided)
Yes		Check the release functionality
Yes		Check the oil leaks (from roller, tubes, vents, control unit, release)
Yes		Check with simple tests the correct electrical or mechanic safeties (like sensible head) functionality (with specific tools)
Yes		Check the bolts and screws tightening for the fixing of components
Yes		Check the power electric line
Yes		Check the grounding system
Yes		Check the ground conductors, sewer, PE, main and secondary equipotential conductors
Yes		Check the polyurethane mould or polythene (in plastic) band entirety on the tube/platform
Yes		Check the mechanic/magnetic limit switch functionality
Yes		Check the non-condensation resistance functionality
Yes		Check the anti-wear polythene guidelines (green/black colour)
Yes		Regulation limit stop piston
Yes		Regulation pressure switch (where provided)
Yes		Keep clean the water sewer drainage placed on the bottom of the formwork
	Yes	Check the presence of water into the formwork (to prevent malfunctions, ask the constructor if the water level rest constantly high)
	Yes	Check the presence of condensation into the sensitive head (ask the constructor in case of big quantitative of water)
	Yes	Check the presence of Vaseline on the mechanic contacts of the sensitive head
	Yes	Remove any materials or salt accumulations settled into the formwork
	Yes	Oil swap every 1.000.000 operations or after a year (only with compatible oil)
	Yes	Check the oil level or the presence of water inside it
	Yes	Check the oil drawing state from the head of the cylinder
	Yes	Regulation of the maximum pressure valve of the pump



## TABLE N°2 ORDINARY MAINTENANCE FLUID CONTROLS

Period	Description of operations for general controls	
6 months		
Yes	Check the fluid level into the tank:	
	CAUSE	CONSEQUENCES
	If the level quickly goes down	Hydraulic oil leaks outwards
	If the level goes up	Possible entrance of water from the vent
Yes	Check the seal outwards:	
	Check visually the tubes, the joint and component supports; keep the plant clean to a quick leaks localization.	
Yes	Check the noise:	
	A noise increase indicates plant anomalies (check the oil. Possible traces of water)	
Yes	Check power consumption:	
	An electric absorption increase at the same payload/pressure indicates plant anomalies	
Yes	Check the fluid temperature:	
	The fluid never must exceed 90°C. The passing of this value is a cause of seal and mechanic parts deterioration	
Yes	Check the pressure calibrations:	
	Check the pressure delimitator valve operation value and reducers.	
Yes	Check the fluid contamination:	
	An emulsified, turbid or dark fluid indicates plant anomalies.	
Yes	Check flexible pipes:	
	Check on the tubes there aren't: cracks, abrasions, deformations, bubbles, sprain upholstery, swellings, sticky tube areas, leaks.	
	The anomaly described above impose the tube replacement.	

## RECOMMENDED FLUIDS

SUPPLIER	DESCRIPTION/BRAND	CERTIFICATES
	HLP SYNTH E 22	ECOLABEL
Nils 	ANTARES ES 22	ECOLABEL
	ATF DEXRON II D ISO VG32 HLPSYNTH E22 (olio biodegradabile)	

### WARNINGS:

- Provide with a filling and filtering autonomous group for the fluid filled up/replacement.
- The exhausted fluids and any impregnated rag must be disposed according to the regulations in force in the operation area;

## TABLE N°3 ORDINARY MAINTENANCE FORM

### NOTE FOR THE MAINTENANCE TECHNICIAN

- Carefully read the sheets and the maintenance registry reported below;
- Photocopy the sheets and fill them out after the maintenance is done;
- Keep the sheets with technician original signature;
- Keep a copy of the filled out sheet to have available a maintenance updated registry (copy for the maintainer).

### Description of the operation

(Mark the corresponding box to the intervention done. Describe any residual risks and/or the predictable improper use)

Installation  Start  Regulations  Maintenance  Fixing  Modifications  Upgrade  Other

Form Title	Description of the operation
Standard/emergency commands State for the bollard activation	
Electronic devices functioning state (response to commands, working logic, stop commands, emergency commands)	
Surface paint state	
Obstacles detection state with sensitive head MAX 3kg (not designed for things or people lifting)	
Emergency vehicles sound recognizer state (where provided)	
Traffic light lanterns or indicators state	
Magnetic coil / photocells state	
Electric valve state (where provided)	
Hydraulic system efficiency state (control unit, unlock, piston)	
Hydraulic oil state (oil level and quality: degraded, emulsified)	
Screws and bolts tightening state for components fixing	
Power source of electrical components state	
Electronic equipment state (breakdowns, presence of condensation, scalds, sticking points, super heating, short-circuits, electric circuit tracks state)	
Electric power line state / Mag/T/Diff 0,003A switch	
Grounding system state	
Ground conductors, sewer, PE, main and secondary equipotential conductors state	
Polyurethane strip (in polizene) state, tube guide	
Magnetic/mechanic limit switches	
Non-condensation resistance state	
Anti-wear polizene guidelines (green/black colour) state	
Flush piston regulation state	
Pressure switch calibration state (where provided)	
Formwork cleaning state	
The water sewer drainages placed on the bottom of the formwork state	
Formwork water level state	
Sensitive head condensation state	
Presence of grease on the mechanic contacts of the sensitive head	
General state, pressure, work, wear, cleaning.	

### NOTE:

Signature of the Technician:

Signature of the Client:



## MAINTENANCE REGISTRY

The current maintenance registry contains technical references and the installation, maintenance, fixing and modifies operation carried out. It must be available to possible inspections from authorized organisms.

### TECHNICAL DATA OF THE MOTORIZED TECHNICAL CLOSURE AND INSTALLATION

BUYER: (Reference Person) \_\_\_\_\_  
(Buyer informations) \_\_\_\_\_

CLIENT: (Reference Person) \_\_\_\_\_  
(Client informations) \_\_\_\_\_

BUILDING SITE: (Reference Person) \_\_\_\_\_  
(Building site informations): \_\_\_\_\_

Order: (Order N°) \_\_\_\_\_ (Date order) \_\_\_\_\_

Model and description: \_\_\_\_\_

Dimensions / Weight / strength / speed: \_\_\_\_\_

Serial number / Year of construction: \_\_\_\_\_

### LIST OF INSTALLED COMPONENTS

The technical features and the performances listed below are documented in the related installation manuals and/or on the same component label.

Drive unit: \_\_\_\_\_ Model, Type, Serial Number

Electrical panel: \_\_\_\_\_ Model, Type, Serial Number

Loop Detector/ Photocells: \_\_\_\_\_ Model, Type, Serial Number

INT-M/T/Dif 0,03A \_\_\_\_\_ Model, Type, Serial Number

Safety devices: \_\_\_\_\_ Model, Type, Serial Number

Safety devices: \_\_\_\_\_ Model, Type, Serial Number

Safety devices: \_\_\_\_\_ Model, Type, Serial Number

Safety devices: \_\_\_\_\_ Model, Type, Serial Number

Safety devices: \_\_\_\_\_ Model, Type, Serial Number

Control devices: \_\_\_\_\_ Model, Type, Serial Number

Control devices: \_\_\_\_\_ Model, Type, Serial Number

Dispositivi radio: \_\_\_\_\_ Model, Type, Serial Number

Warming devices: \_\_\_\_\_ Model, Type, Serial Number

Warming devices: \_\_\_\_\_ Model, Type, Serial Number

Other: \_\_\_\_\_ Model, Type, Serial Number

Other: \_\_\_\_\_ Model, Type, Serial Number

PRODUCT CODE	CONTROL UNIT CODE	PISTON CODE	RESISTANCE CODE	ELECTRIC VALVE CODE	SENSITIVE HEAD CODE

### RESIDUAL RISKS AND IMPROPER PREDICTABLE USE INDICATIONS

Inform the bollard user or the supervisor about the current risks and the improper use of the bollard through signage affixed on the product risk parts and/or through written indications.



# TABLE N°4 ORDINARY MAINTENANCE FORM

Client/Building site:	Model and description:				Bollard serial number:				LEGENDA The letters (R) or (N) must be reported in the box "finale results" depending on the results of the checks. In case of a control has negative result, the "negative results maintenance form" must be also filled out with the signatures of the client and the technician. Photocopy the maintenance forms, keep them in an archive and send them to the constructor when required.
	Date + ref.	Date + ref.	Date + ref.	Date + ref.	Date + ref.	Date + ref.	Date + ref.	Date + rif.	
Tests performed	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	
1 Hydraulic unit									
2 Hydraulic pipes / joints									
3 Hydraulic circuit pressure									
4 Potential difference									
5 Oil level control unit /lubrication systems									
6 Oil swap (same type/gradation as written on the label)									
7 Condenser									
8 Engine, motor reducer, pneumatic engine									
9 Electric brake / mechanic clutch									
10 Lubrication devices									
11 Counterweights and suspensions									
12 trapezoidal screw for the lifting									
13 Unlock / Maximum pressure valve									
14 LED lighting head / flashing light									
15 Traffic light and additional signal lights									
16 Sensitive head / additional pressure switches									
17 Electric valve									
18 Safety devices									
19 Magnetic coils and photocells									
20 Acoustic buzzers									
21 Emergency vehicles sound recognizer									
22 Emergency stops commands									
23 Selectors / control buttons									
24 Radio controls									
25 Planned time command									
26 Electronic programmer									
27 Receiving radio / antenna									
28 Transformer /automatic voltage regulator									
29 Anti-condensation electrical resistance / thermostats									
30 Temperature / water / level detectors									
31 Fixed and movable protections									
32 Mechanical stops									
33 Guidelanes / wheels / lanes / printed strips									
34 Ground conductor / equipotential / stakes									
35 Power line /electric cables / connection plugs									
36 Differential tests with a tool regulated at ..... mA									
37 Cable insulations with specific tool									
38 Switch / differential									
39 Paints and surface treatments									
NOTES:									
	Technician Sign Client Sign.	Technician Sign Client Sign.	Technician Sign Client Sign.	Technician Sign Client Sign.	Technician Sign Client Sign.	Technician Sign Client Sign.	Technician Sign Client Sign.	Technician Sign Client Sign.	Finale Result



# TABLE N°5 NEGATIVE RESULTS MAINTENANCE FORM

Client/Building site:	Modello e descrizione:	Bollard serial number:
Tests performed	Date + ref. .....	RESULT
1 Hydraulic unit		
2 Hydraulic pipes / joints		
3 Hydraulic circuit pressure		
4 Potential difference		
5 Oil level control unit /lubrication systems		
6 Oil swap (same type/gradation as written on the label)		
7 Condenser		
8 Engine, motor reducer, pneumatic engine		
9 Electric brake / mechanic clutch		
10 Lubrication devices		
11 Counterweights and suspensions		
12 Trapezoidal screw for the lifting		
13 Unlock / Maximum pressure valve		
14 LED lighting head / flashing light		
15 Traffic light and additional signal lights		
16 Sensitive head / additional pressure switches		
17 Electric valve		
18 Safety devices		
19 Magnetic coils and photocells		
20 Acoustic buzzers		
21 Emergency vehicles sound recognizer		
22 Emergency stops commands		
23 Selectors / control buttons		
24 Radio controls		
25 Planned time command		
26 Electronic programmer		
27 Receiving radio / antenna		
28 Transformer /automatic voltage regulator		
29 Anti-condensation electrical resistance / thermostats		
30 Temperature / water / level detectors		
31 Fixed and movable protections		
32 Mechanical stops		
33 Guidelines / wheels / lanes / printed strips		
34 Ground conductor / equipotential / stakes		
35 Power line /electric cables / connection plugs		
36 Differential tests with a tool regulated at ..... mA		
37 Cable insulations with specific tool		
38 Switch / differential		
39 Paints and surface treatments		
NOTES:		
	Finale Result	PLEASE NOTE:
	Technician Si	TAKE OFF AUTOMATION POTENTIAL DIFFERENCE
	Client Sign.	

**LEGEND**

LEGEND : (R) regularly functioning – (N) negative results – (X) non pertinent to the automation  
The letters (R) or (N) must be reported in the box "finale results" according to the checks carried out. Photocopy the maintenance forms, keep them in an archive and send them to the constructor when required.





## FAQ

N°	INCONVENIENCES	POSSIBLE CAUSES	HYPOTHESIS BREAKDOWN	SOLUTIONS
1	THE BOLLARD DOESN'T GO UP (presence of air in the circuit)	Low oil level in the tank	damaged seals	Replace the seals
				Add oil
		Manual unlock is open	Manual unlock is open	Close the manual unlock
		electric valves are open	electric valves are open or damaged	Check electric valve voltage coil
		electric safeties are open	electric safeties are open or damaged	Fix / replace electric safeties
		(photocells, sensitive head, magnetic coils, emergency button, clock)		
		Oil leaks	Break of the hydraulic circuit	Fix the circuit
		Incorrect sense of rotation	Incorrect limit switch connection	Re-wire up magnetic limit switch
		Reversed limit switches	Incorrect electric engine connection	Re-wire up the electric engine on the electronic programmer
		Missing power source	switch turned on	Re-activate the disconnecter button
		Faulty electronic programmer		Replace the electronic programmer
		Faulty fuses	High absorption peak	Replace the fuse with another suitable
		Low potential difference	Short-circuits on the line	Check and fix the breakdown
		Engine, electric valve inputs, output 24Vac, traffic light		
2	IRREGULAR BOLLARD ASCENT (pump in fault of flow)	Pump not completely immersed in the oil	Blocked aspiration or not immersed in the oil	Check the oil level
		Air bubbles in the circuit	Faulty aspiration	Check the oil cleaning
		dirty oil	Oil with many work hours	Replace the oil
			Oil with solid bodies in it	
		Manual unlock is open	See point 1	See point 1
		electric valves are open	Electrical valve broken	Replace the electrical valve
		Mechanic flaw		
		Low voltage	small cable section	Replace the cable
		Maneuver after opening the manual unlock	Air aspiration in the pump	The problem disappears with a second operation
3	SLOW BOLLARD ASCENT (insufficient pressure) (sticky oil at room temperature)	Incorrect maximum pressure		Correctly calibrate the valve consulting "regulation of the bollard rising force"
		Air presence in the circuit (the bollard doesn't go up)	See point 1	See point 1
		Pump failing in payload (Irregular bollard ascent)	Worn pump	
			See point 2	See point 2
		Too viscous oil	Very compact oil	Replace the oil type
		Too liquid oil	Too high temperature	Replace the oil
		Excessive leaks/ breaks in the circuit	Circuit leaks	Check the circuit
			Break of the O-Ring in the control unit runner	Replace the O-Ring where required
		Incorrect supply voltage	Faulty electric programmer	Sequential programming for the multiple ascent of the bollards in the electrical programmer
			Not tightened screws	tighten screws
			Low fuse voltage	Check power cable
			problem with the distributor	Check with the distributor
Insufficient condenser	broken condenser	Replace condenser or augment it		
	too little condenser			
Friction guide rails	too tighten guide rails	"regulations of bollard guide rails"		
4	CLOSE BOLLARD DOESN'T GO DOWN	Insufficient condenser	See point 3	See point 3
		Cylinder high pressure at the limit switch	Too tense pressure valves	Correctly calibrate the valve consulting "regulation of the bollard rising force"



5	CLOSE BOLLARD, THE TUBE GOES DOWN	Oil leaks	See point 1	See point 1
		Manual unlock is open	See point 3 (O-Ring unlock damaged)	See point 3
		electric valves are open	Cylinder seal	Replace cylinder seal
		Faulty valve seals	Break of the seal valve	Replace the O-Ring in the distributor
6	CLIMB GETS SLOWER (very viscous oil)	Low temperature	See point 3	See point 3
			Exhausted Oil	Replace the oil
				Install a resistance
		Very high pressure of the bollard ascent	Too tense pressure valves	Relax the maximum pressure valves
		Incorrect supply voltage	See point 3	See point 3
	Insufficient condenser			
7	NOISY PUMP	Presence of air in the circuit (the bollard doesn't go up)	See point 1	See point 1
		Too viscous oil	Worn oil	Replace the oil
		(irregular bollard ascent)	See point 2	See point 2
		Wear pump	Excessive inner backlash	Replace oil
		Dirty oil		Replace the pump
8	SEAL OIL LEAKS	abrasive substances in the oil	Crack on the seal	Replace the oil and the seal
			Worn seals	
		High oil temperature	Collapsed seal	Refrigerate the oil and replace the seals
9	EXCESSIVE CONTROL UNIT SUPER HEATING (oil too hot)	Intensive use of the control unit	Wear pump	Replace the pump
			More movements than expected	Respect the operating cycles
			Worn oil	Replace the oil
		Manual unlock is open	See point 1	See point 1
		electric valves are open		See point 1
		Irregular set of the limit switch sensors	Wrong reading of the limit switch	Set the limit switch in the right position (check the limit switch sensor and magnet functioning)
		Too high pressure	Very tight maximum pressure valves	Set the right pressure by consulting Adjustment of the bollard rising force
		Oil leaks with loss of pressure	See point 1	See point 1
		High external temperature	See point 3	See point 3
Wrongly regulated valves	Oil overheating	Respect the function temperature		
	Low regulated valves	Ask the constructor		
10	THE BOLLARD DOESN'T COMPLETELY GO UP (incorrect regulations)	Low oil level in the tank	See point 1	See point 1
		Irregular set of the limit switch sensors	See point 10	See point 10
		Insufficient condenser	See point 3	See point 3
		Too high pressure	See point 10	See point 10
		incorrect timing		Adjust time on the brain
11	HIGH WATER LEVEL OF THE FORMWORK	Obstructed sewer	Foliage / debris slow down the waste water	Do maintenance (clean the well)
		non-draining soil	The soil absorbs little water	Build a well or a sewer with pump to draw waste water
			Request an IP67 hydraulic control unit	
12	LIGHTING HEAD NOT WORKING	Faulty or wrong regulated limit switches	Wrong cable installation	Rewiring respecting the polarity of the cables
		Wrong connections	Faulty cables	Cables replacement
			Socket not connected	Connect the plug into the head socket
			See point 14	See point 14
		Faulty fuses	Check fuses	Replace fuses

13	LIGHTING HEAD WITH LOW BRIGHTNESS	Incorrect supply voltage	See point 3	See point 3
			secondary transformer broken	Replace the electronic programmer
		Incorrect installation of the ground cable	Voltage drop on the line	Add a new suitable transformer
				Incorrect bollard installation
				Check the voltage drop
				Do ordinary maintenance
		Worn led	Check led	Replace led
		incorrect installation of ground cable	damaged cables	replace the ground cable
	Contact oxidation	Faulty electrical or contacts insulation	Replace the LED lighting head	
14	FAULTY LIMIT SWITCH	Exceeded the number of cycles	breaking of internal contacts	Replace the limit switch
		Contact oxidation	No contact lubrication	Do ordinary maintenance Contact the constructor
15	SENSITIVE HEAD DOESN'T INVERT THE MOVEMENT	See point 15	See point 15	See point 15
		Not wired electric cables	Incorrect cables installation	Rewiring respecting the polarity of the cables
			Faulty cables	Cables replacement
			Plug not connected	Connect the plug into the head socket Check series connections
16	ELECTRIC VALVE NOT WORKING	Incorrect supply voltage	See point 3	See point 3
			Check fuses	
		incorrect thermal insulation	Incorrect bollard installation	Do ordinary maintenance
		Broken coil	short-circuit	Replace coil
			Insufficient IP grade	Respect the installation type and IP level
			Faulty fuse	Replace fuses
			Broken connector	Replace the connector
	High external temperature	See point 10	See point 10	
	Dirty oil	See point 2	See point 2	





