

RADIO CONTROLLED HYDRAULIC PILLAR

Alexandru HRISTEA¹, Bogdan TUDOR¹, Ștefan-Mihai ȘEFU¹

¹ INOE 2000- IHP, hristea.ihp@fluidas.ro

Abstract: *In today's modern world, the problem of protecting the associated spaces of some constructions of public interest is becoming more and more frequent. Mobile terminals protect the streets with limited access, sidewalks, parks or spaces around apartment blocks, or hotels.*

The device described above is in principle a cylindrical pillar mounted on the road, which must be able to be lowered and raised as needed.

Keywords: *Hydraulic pillar, remote control, public safety*

1. Introduction

In recent years, the necessity to protect public spaces such as squares, parks, streets with limited or prohibited access, paid parking, parking of certain institutions or private areas, etc. has emerged. Due to the considerable proliferation of cars, the authorities have taken measures to systematize the access spaces. The locking solution with movable pillars offers the advantage of a more elegant appearance and can provide a higher resistance to unauthorized penetration by an auto vehicle. It also allows the unrivaled passage of cyclists and pedestrians.

The areas where this device is used are the following:

- the automatic gates protect the halls and the courts of the institutions or private domains
- the automatic barriers allow access, usually, in the paid parking spaces for public use
- mobile terminals protect the streets with limited access, sidewalks, parks or spaces around apartment blocks or hotels.

Such a retractable pole has as an element of resistance, a movable cylinder, which slides vertically into a fixed one, reinforced in the roadway. The two cylinders are constructed of strong steel pipe, and can withstand an attempt to force the access. In some cases, even the use of a barrier and a mobile terminal is used in parallel, having the main role in preventing the forced access (Fig. 1).

To protect a larger area, several movable poles can be fitted (fig. 2). These poles are operated electro hydraulically, from an electrical panel or via a remote-control device. The vehicles unauthorized to access are blocked with the most discreet solution possible.

They can be lowered to the level of the road, to allow the access of the authorized vehicles, with the help of a remote control, in the possession of the driver, which can be operated on the road, near it. Also, from the remote control the pole can be raised in place, after passing the vehicle. These products are accepted by the road authority, as they are also visible at night, being marked with reflective elements, or with LED lights. These poles are operated electro hydraulically, from an electrical panel or via a remote control.

2. Construction of the hydraulic pillars

The following figures illustrate two situations of using the remote-control posts.



Fig. 1. Pillars to prevent the forced access to the barrier



Fig. 2. Covering a larger opening with more retractable posts

They can be lowered to the road level, to allow access of the authorized vehicles, with the help of a remote control, which can be operated inside the vehicle or near it. Also, from the remote control the pole can be raised in place, after the vehicle has pass. These products are accepted by the road authority, as they are also visible at night, being marked with reflective elements, or with LED lights.

Because they are mounted in concrete roadway, they become secure and robust, and cannot be pulled or broken by vehicles or by malicious persons. With installed power below 350 W, it has low power consumption, mobile poles are economical and easy to maintain.

From a constructive point of view, the pillar assembly is composed of three distinct parts:

- fixed outer shirt, which is inserted into a concrete pit, buried in the road surface;
- movable cylindrical pole, which is inserted into the fixed outer shirt;



Fig. 3. Commercial Hydraulic pillar made by Fardini

2.1 Hydraulic diagram

An example of a hydraulic drive diagram is as follows:

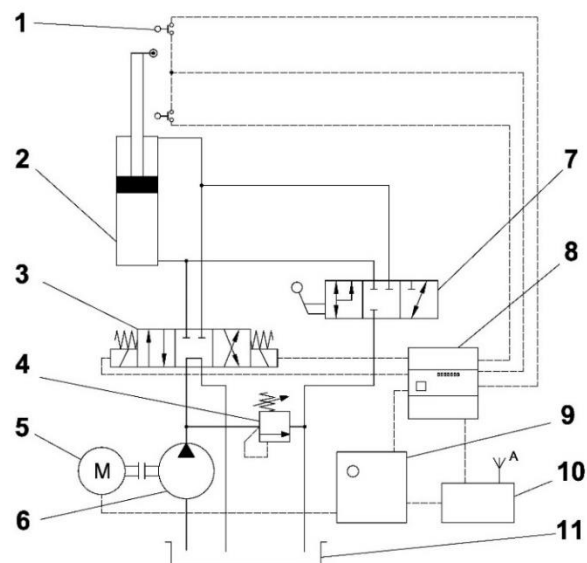
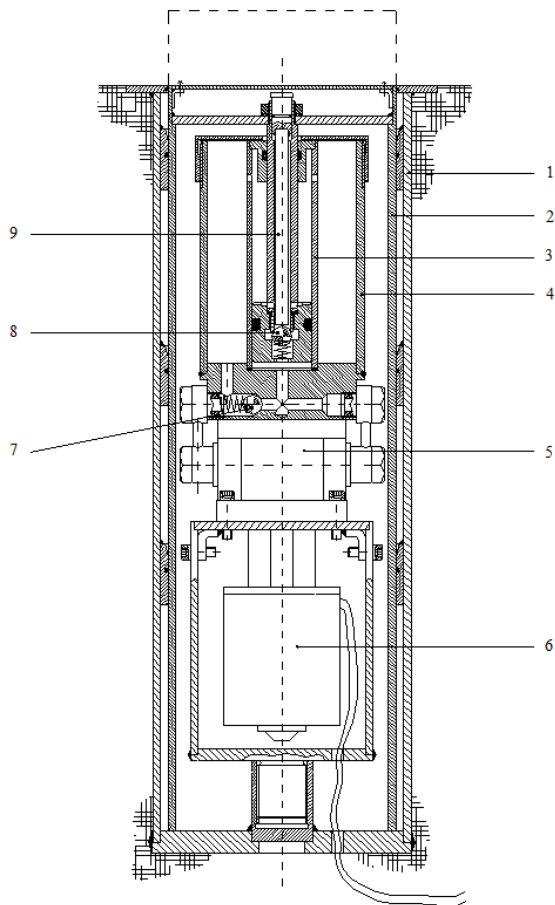


Fig. 4. Hydraulic scheme

1-Position limiter, 2-Hydraulic cylinder, 3- 4/3 hydraulic directional valve, 4-Pressure limiting valve, 5-Electric motor, 6-Gear pump, 7-Fault withdrawal valve, 8-PLC, 9-Electric box, 10-Radio remote control receiver, 11-Oil tank

2.2. The construction of the hydraulic pillar

The electro-hydraulic drive for pillar is a compact mechanism, with the following components, as in the example from fig. 5.



The numbers have the following meanings:
 1- fixed cylindrical jacket, which is buried in the roadway surface,
 2- movable cylindrical pipe with lid, which rises on a height of 500 mm
 3- hydraulic cylinder
 4- sealed container
 5- reversible, gear pump
 6- electric motor
 7- protection valve
 8- relief valve
 9- unlocking rod

Fig. 5. Constructive sketch of the electro hydraulic pillar

3. Functional performance

Its technical characteristics are:

Electric motor	Hydraulic Electro-pump	Hydraulic power	Performances
<ul style="list-style-type: none"> • Power: 0,25 kW • Supply voltage: 230 V • Frequency: 50 Hz • Current absorbed: 1,8 A • RPM: 2800 r.p.m. • Intermittent service: S3 	<ul style="list-style-type: none"> • Hydraulic pump: P10 • Pomp flow: 4,45 l/min • Nominal pressure: 20 bar • Maximal Pressure: 40 bar • Work temperature: - 20 ÷ 80 °C • Oil type: A 15 Agip • Weight: 10 kg • Standard protection: IP54 	<ul style="list-style-type: none"> • Piston diameter: 30 mm • Rode diameter: 16 mm • Stroke time: 4 sec • Pretensioner: 15 daN • Piston stroke: 500 mm 	<ul style="list-style-type: none"> • Service operation: 6s raise - 30s stationary - 6s - lower - 30s stationary • Complete weight: 86 kg • Protection class: IP57

Mobile locking systems can be equipped with the following safety accessories:

- Pair of Photocells for safety
- Flashing lamp
- Detector for police or ambulance sirens for automatic lowering of the pole.

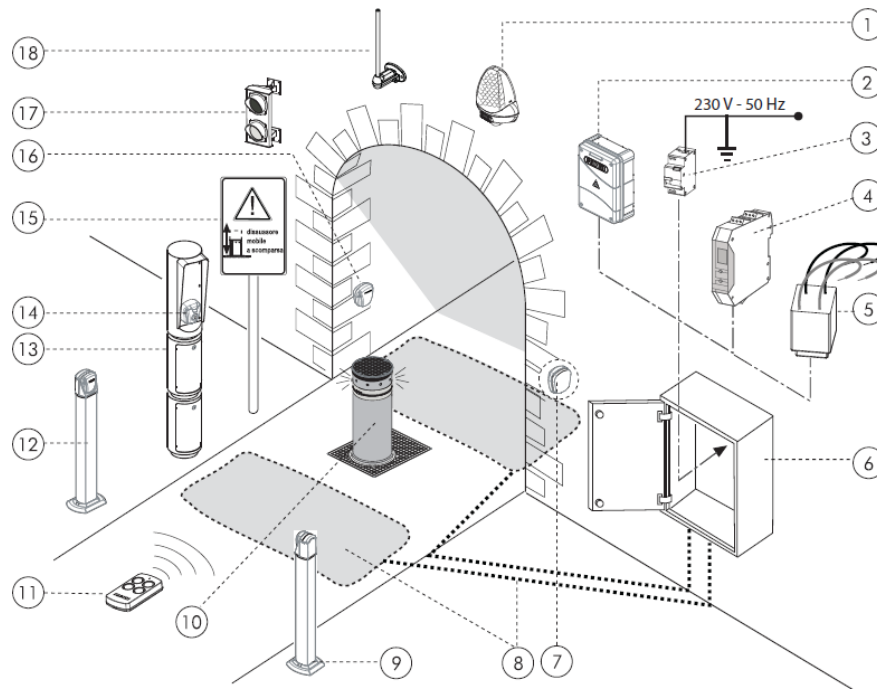


Fig. 6. Optional Accessories that can be equipped [7]

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|---|---|
| 1 –LED flashing lamp | 10 – Pole with hydraulic drive |
| 2 – Electronic controller with radio receiver | 11 – Remote controlled |
| 3 – Electrical safety relay | 12 – Pillar with photocell receiver |
| 4 – Two channels for detecting mass metal | 13 – Pillar with control |
| 5 – voltage stabilizer | 14 – Key switch |
| 6 –Anti vandalism metal box | 15 – Warning indicator for post existence |
| 7 – Photocell receiver | 16 – Photo barrier emitter |
| 8 – Pre-assembled loop with power cord | 17 – Traffic light |
| 9 – Pole with light barrier transmitter | 18 – Antenna for remote control receiver |

The pillar is equipped with a remote control system. The remote control unit contains three buttons, namely:

- a button for rising the pole
- a stop button
- a button to lowering the pole

With a very small table and dimensions, it can be kept i pocket.

4. Conclusions

Most concerned about the pillars mobile remote-controlled areas are public administrations of the municipalities and the hotel industry.

The public administrations and the governmental institutions show an increased interest for the use of these protection systems, for the efficiency of the traffic in the areas of interest, for avoiding the blockages generated by the presence of the unauthorized vehicles or for securing some roads.

A growing demand for temporary access restriction systems are observed and privately-owned businesses. Thus, major shopping malls, supermarkets tend to acquire such systems. These systems are a modern and effective way of ensuring the flow of supply of these units, while traffic congestion that characterizes cities generally perimeters near the premises in particular.

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