

## DESCRIPTION

## Activation Unit for Munitions-Free Decoy Target

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Decoys and/or smoke grenades based on, for example, red phosphorus (RP) or nitrocellulose (NC) are used in military applications, such as smoke grenades, infrared (IR) effect aircraft decoys, etc. The RP/NC develops the smoke and IR action by burning after suitable ignition. The ignition of RP units (active matter) takes place by means of an ignition or break charge, which ensures that the bodies can ignite optimally for the particular purpose, and so can burn.

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The use of such a decoy target in civil air traffic is not possible owing to the munitions component, since explosive substances are not accepted in this context and international safety agreements have to be upheld.

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On this basis, a new ignition concept has been developed, which enables the ignition of RP/NC flares without explosives and/or pyrophoric substances.

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This new ignition concept is described in more detail in DE 10 2006 004 912 A1. From this, a system for protecting large airborne platforms in particular, such as aircraft, against IR-guided or radar-guided threats is known. Here, the activation or ignition of the active body is preferably carried out without contact. The launching of the active body is then performed pneumatically or mechanically. The active bodies themselves are munitions-free packages, which are ignited by hot air or a laser.

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The unpublished DE 10 2009 020 558.6 describes an activation unit, which activates (ignites) the active substances/flare material by supplying thermal energy, wherein the use of explosives is avoided. This has an

ignition tube, from which the active substances are ejected, a high-temperature activation element, which consists essentially of n heaters, which are disposed geometrically separately from each other and radially  
5 around the perimeter of an ignition tube. The material selection of the individual heating elements allows temperatures  $> 600^{\circ}\text{C}$ , wherein the heating elements are designed so that they allow very dynamic heating owing to low mass. To minimize heat loss and for further  
10 optimization of the thermal activation unit, ceramic inlays are provided. With this thermal optimization and an appropriate control technique, a very short response time of the heating elements is achieved, i.e. the heating time from the activation point until reaching  
15 the rated temperature is extremely short (small or low).

The unpublished DE 10 2009 030 868.7 deals with an ignition or activation unit for igniting red phosphorus  
20 flares by laser. The RP flares are subjected to laser radiation with a sufficiently high power density applied to their surfaces. By absorption of the laser radiation, the temperature of the RP flares increases, which results in the ignition of a self-sustaining  
25 combustion. For an ideal ignition (activation) of the flares, the laser energy is directed to the maximum possible proportion of the surface. For this, the laser beam is expanded by suitable optics, allowing extensive distribution.

30 Based on these forms of activation, the object of the invention is to provide an activation unit that activates such active bodies for the creation of decoys.

35 This object is achieved by the features of patent claim 1. Advantageous embodiments are disclosed in the dependent claims.

The invention is based on the idea of creating an active body activation unit based on an electric arc. Here the ignition of the active substance or the flare  
5 takes place by means of an electric arc. The electric arc is immediately applicable and low-maintenance. The activation of the active substance takes place on an electrical basis and instantaneously.

10 In order to achieve the ignition temperature of the active body/active substance or its containment (e.g. of an RP and/or NC among others), a suitably high voltage is applied to one or preferably more than one  
15 electron pair, so that an electric arc is created for each electrode pair. This is focused so that it passes over the curved area of the active body or even through the active body. An arrangement of several elements for vertical ignition is also possible.

20 The ignition elements and electrodes are conventional devices, e.g. point electrodes, flat electrodes etc. The arrangement and the quantity of electrodes have a significant influence on the quality of the ignition.

25 For ignition, the active body/the active substance is passed by the electrode by means of a conveyor mechanism. The high voltage strikes through the body, creating an electric arc, which leads to the ignition of the active substance and hence to the activation of  
30 the active material.

This form of activation allows the use of decoys without explosives in the civil environment, not only in civil air traffic, but also for civil marine targets  
35 and civil land vehicles. The structural and safety requirements on decoys and dispensers without explosive substances are simple, i.e. much lower. The ignition unit or device allows a number of ignitions, whereas

the classic flare is only intended for single use. The electrodes themselves are insensitive to environmental influences.

- 5 The invention will be explained in more detail using an example embodiment with drawings.

The drawings show:

- 10 Fig. 1 an active body of individual flares,  
Fig. 2 an electric arc activation unit in plan view,  
Fig. 3 the unit of Fig. 2 in a lateral illustration,  
15 Fig. 4 an arrangement on a hexagonally cylindrical active body,  
Fig. 5, 6 an illustration with a plurality of electrode  
20 pairs.

Fig. 1 shows an active body 1, consisting of individual flares 2, 3 of flammable substances. The individual flares 2, 3 are ignited by an electric arc activation  
25 unit 10 (e.g. Fig. 2). For this purpose, in this embodiment, two pairs of electrodes 11, 12 are positioned relative to the active body 1 so that an electric arc 19, 20 is produced between the respective pairs of electrodes 11, 12. To generate the electric  
30 arc 19, 20, a high voltage is applied to the electrode pairs 11, 12 via a control device 13, 14 and connecting lines 15-18. Fig. 2 shows the activation unit 10 viewed along the cylinder axis of the active body 1.

35 For ignition the active body 1 is moved past the electrode pairs 11, 12. The electric arc ignites the flares and thus the active body or its active substance. Because the active body 1 is moved further

relative to the electrode pairs, ignition takes place over a wide area (Fig. 3).

5 The components are installed in a reusable structure/device with an ejection tube (not shown), for example, between an ejection unit and a launching unit of a launcher system. There are no geometric constraints on the activation unit 10. Several electrode pairs are preferably incorporated in the  
10 housing at different distances from each other. Furthermore, the electrode pairs can be geometrically distributed over the circumference of the active body 1.

15 Fig. 4 shows an arrangement of at least one electrode pair 11 around a hexagonally cylindrical active body 1a.

A possible arrangement of at least two electrode pairs  
20 11, 12 with a rectangular cross section of the active body 1b, for example, (looking along the cylinder axis) is shown in Fig. 4.

Fig. 5 shows a 4-fold electrode pair arrangement of the  
25 electrode pairs 11, 12, 21, 22. These can be incorporated in a common plane or even in pairs over the length of the activation unit 10 and offset with respect to each other.

30 Fig. 6 shows a possible arrangement of a plurality of electrode pairs 11, 12 on an active body 1 with a rectangular cross section (looking along the cylinder axis).

## PATENT CLAIMS

1. An activation unit (10) for munitions-free active substances or an active body (1) with an ejection tube, characterized by electrode pairs (11, 12, 21, 22) attached around the ejection tube, at least one for producing an electric arc (19, 20), for which the electrode pairs (11, 12, 21, 22) are electrically connected by connecting lines (15-18) to at least one control device (13, 14).
2. The activation unit as claimed in claim 1, characterized in that, said electrode pairs (11, 12, 21, 22) are disposed symmetrically about said ejection tube.
3. The activation unit as claimed in claim 1 or 2, characterized in that, said electrode pairs (11, 12, 21, 22) are disposed in pairs at intervals over the length of said ejection tube.
4. The activation unit as claimed in one of the claims 1 to 3, characterized in that, said unit (10) is installed between an ejection unit and a launching unit of a launcher system.
5. The activation unit as claimed in one of the claims 1 to 3, characterized in that, the electric arc(s) (19, 20) is/are aligned so that it/they pass(es) over the curved area of said active body (1) or even through said active body (1).