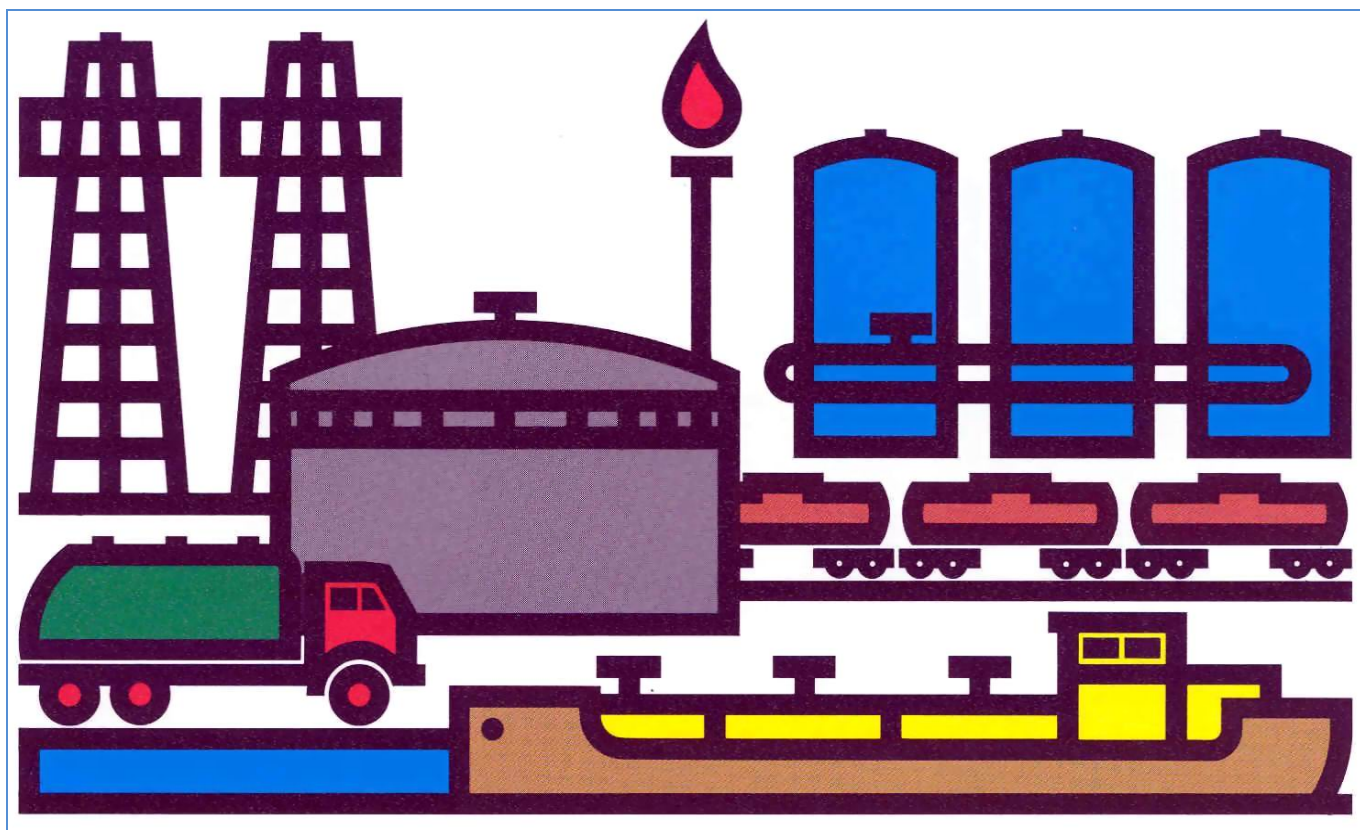


KITO® flame arresters and fittings for the storage and transportation of inflammable liquids, vapours and gases.

Designed to prevent fire penetration, explosions and detonations in tank installations of any kind.

Manufactured to meet the most stringent of environmental safety regulations and requirement.

KITO Armaturen GmbH



KITO® arresters and fittings conform in every respect to all – even the strictest - requirements applicable to explosion, endurance burning and detonation proof arresters.

KITO® arresters and fittings have been stringently tested and approved by notified bodies according to their purpose and specific field as stated in the European Standard EN 12874

KITO® explosion and endurance burning flame arrester devices

KITO® ventilation hoods (fig. 1 and fig. 3) are fittings which allow for a continuous exchange of gas with the atmosphere and protect the venting apertures on tanks, containers and pipes.

The ventilation hood allows for the unimpeded flow of air into the container and gases out to relieve dangerous internal pressure. The ingress of rain and dirt into the venting aperture is prevented by an acrylic glass cover incorporating a fine mesh filter screen. Also metallic covers are available.

The KITO® flame arrester element simultaneously provides constant and reliable protection against any flashback into the container.

Using a basic design we produce KITO® ventilation hoods (fig. 3). If the KITO® flame arrester is able to stop the flame for an undefined time this fulfils the stringent requirements for endurance burning safe arresters (fig. 1 and fig. 2). In the event of a fire the acrylic glass cover will burn without leaving any residue. The metallic cover will open. This enables the high temperature created by the burning product vapour/air mixture at the flame arrester element to escape to atmosphere.

In order to contain undesirable and uneconomic vapour losses, KITO® pressure relief valves (PRV) incorporating flame arresters identical to those on ventilation hoods are used. The PRVs incorporate the appropriate valve mechanism and can be adjusted as the application requires. Their design and construction ensures a rapid action.

KITO® relief valves are available for pressure relief, for vacuum relief (fig. 4) or as a combined pressure/vacuum relief valve (PVRV) (fig. 5). In many cases where gas flow is nearly equal, a combined KITO PVRV is recommended. However, where gas flow may strongly differ (e.g. on large tanks with differing pump flow rates for filling and discharging) installation of separate KITO® breather relief valves are more economical.

We are at your disposal to calculate the appropriate number and size of the breather valves according to the specific rules and regulations. To do so we need information about the tank dimensions and its design pressure, the capacity of connected pumps as well as the characteristics of the product.



fig 1 KITO® endurance burn ventilation hood at work

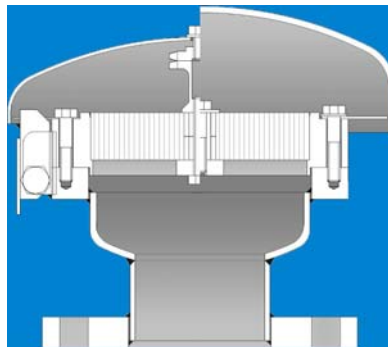


fig 2 KITO® endurance burn ventilation hood

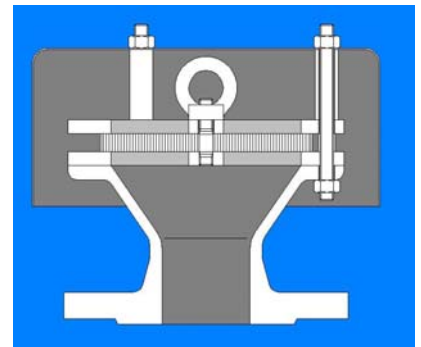


fig 3 KITO® ventilation hood

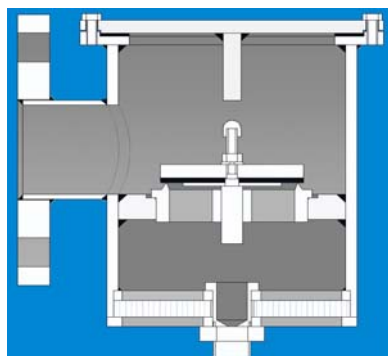


fig 4 KITO® vacuum breather relief valve

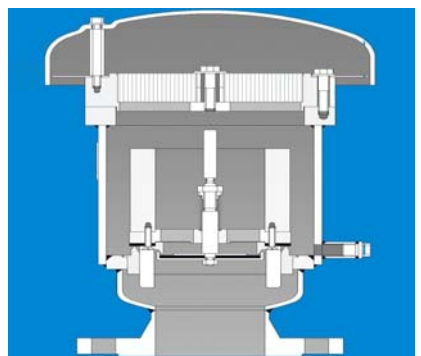


fig 5 combined KITO® overpressure/vacuum breather relief valve

Detonation proof KITO® flame arrester

If explosive vapour or gas mixtures are ignited in a pipe, a deflagration can develop into a (stable) detonation if the pipe work and run-up length are appropriate. The resultant force of such a detonation is tremendous; our detonation proof KITO® safety devices are built for this. The mounted flame arrester element will remain functioning and will hold back the flames that follow the shock wave (fig. 6).

Also if an unstable detonation must be taken into account (which is not necessary in Germany) we have a range of devices tested and certified for this specific hazard (fig. 7).

The selection of the right detonation arrester is based on the explosion group of the handled media. Our range of products included KITO® safety devices for all explosion groups (fig. 7 to fig. 10).

The use is limited to atmospheric conditions. Devices tested and certified for higher initial pressures are also available.

The installation and the flow direction can be chosen freely; most of the KITO® detonation arresters are also bidirectional, i.e. protection is proven against a detonation from both sides. The flame arrester element are optimised for lowest pressure drop while using a modular system of housings.

For commonly liquid filled pipes there is a special line of detonation arresters built as liquid seals (fig. 8).

Non return valves are mainly used in suction lines (fig. 9) with liquids.

Dry types of detonation arresters can also act as endurance burning flame arresters. For this purpose a pipe of a predetermined length, dependant on the nominal diameter of the pipe, has to be connected to the outlet flange of the arrester. This installation replaces the ventilation hood (fig. 2).

Where there are special conditions appertaining to the nature of the system, e.g. installation in torch lines or thermal incineration plants, the incorporation of one or more thermal sensors on the flame arrester element is mandatory for identifying an outbreak of fire. A appropriate switch circuit that triggers emergency measures against a potential endurance fire must be connected.

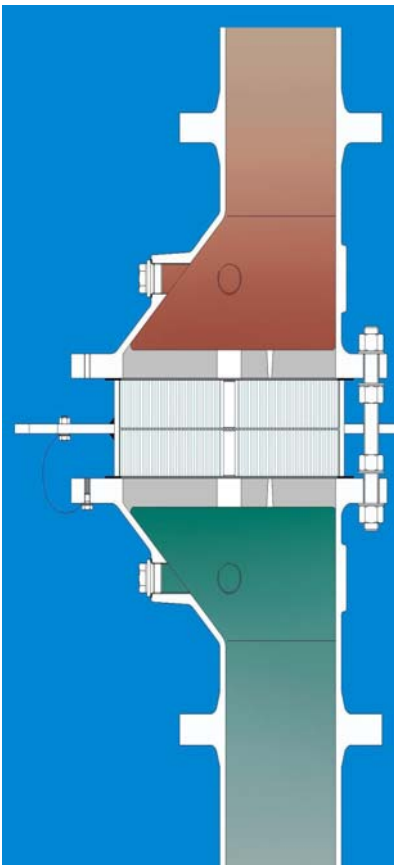


fig 6 KITO® detonation arrester at work

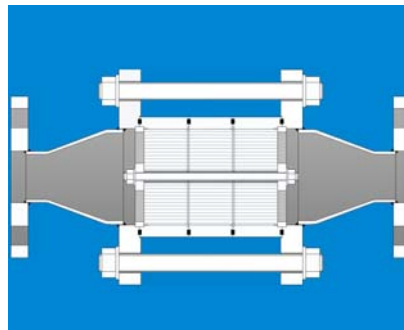


fig 7 KITO® detonation arrester for unstable detonations with hydrogen

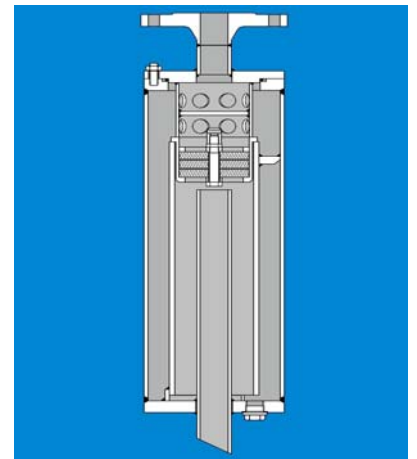


fig 8 KITO® liquid seal detonation arrester

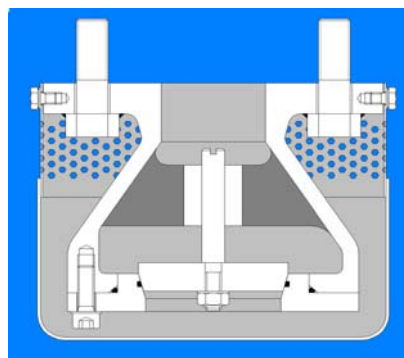


fig 9 KITO® non return valve, detonation proof

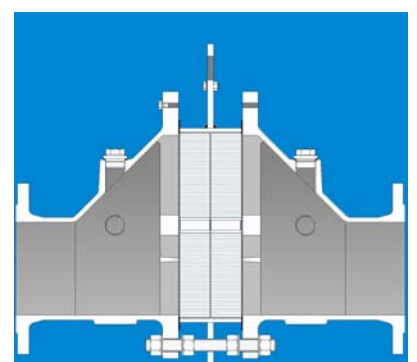


fig 10 KITO® detonation arrester, also for higher pressure

Deflagration proof KITO® armatures

If explosive gases ignite in a pipe then the reaction initially starts as deflagration (explosion) characterised by relatively low pressures and flame speeds.

KITO® deflagration arresters are installed to prevent a continuation of the reaction into other parts of the connected system. In contrast to detonation arresters, there are limitations on the length of pipe on which the deflagration arrester may be installed. These limitations are governed by the distance of the potential ignition source from the arrester.

Where there are special conditions appertaining to the nature of the system, e.g. installation in torch lines or thermal incineration plants, the incorporation of one or more thermal sensors on the flame arrester element is mandatory for identifying an outbreak of fire. An appropriate switch circuit that triggers emergency measures against a potential endurance fire must be connected.

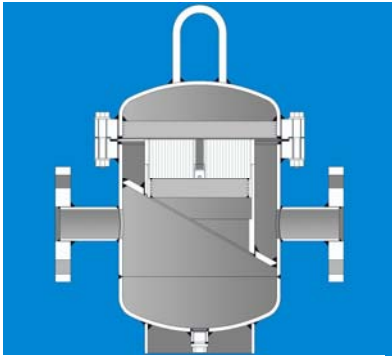


fig 11 KITO® deflagration arrester

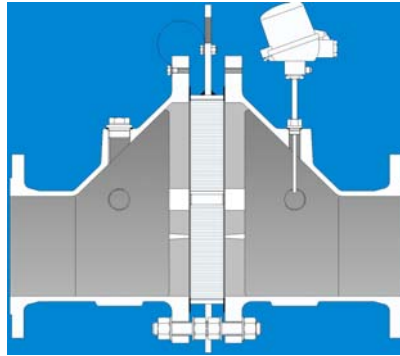


fig 12 KITO® deflagration arrester (eccentric body design)

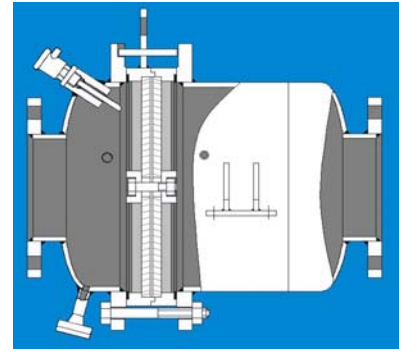


fig 13 KITO® deflagration arrester for larger pipes

Special areas of application for KITO® flame arresters

For railway tank wagons KITO® has specifically designed a low profile safety relief valve that has been type tested and approved by the authorities. It is available as a PRV, a PVRV, or combination with a gas compensation coupling (fig. 14).

Also devices without flame arrester element (fig. 15) as well as special construction for corrosive media are within the range of supply.

KITO® also manufacture special flame arrester devices for installation in tank containers and road tankers (fig. 16).

These devices comply with the actual requirements on tanks according to ADR and RID.

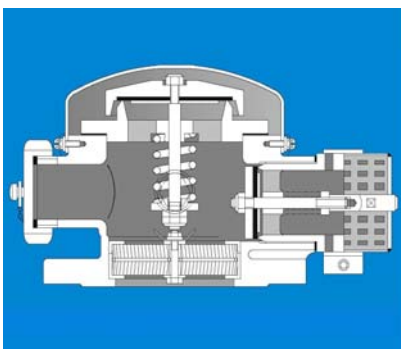


fig 14 KITO® railway tank wagon valve

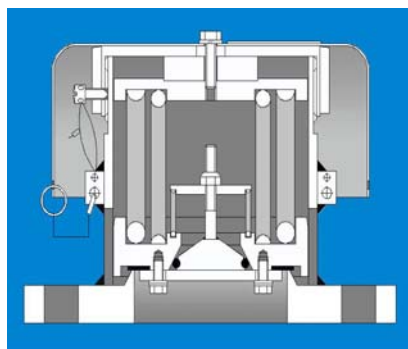


fig 15 KITO® railway tank wagon valve

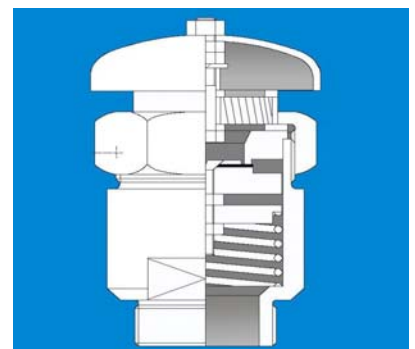


fig 16 KITO® vacuum valve on tank containers

Construction of the KITO flame arrester element

KITO® devices as explosion-, detonation- or endurance-burn proof flame arrester are standardized in the European Standard EN 12874. They all have passed the EC-type-examination tests and come with the CE mark. Therefore they are in accordance with the European Directive 94/9/EC (ATEX 100). The Guidelines to the European Directive 99/92/EG (ATEX 137) as well as German national technical rules are clearly demanding the use of flame arrester in different situations.

We have developed the KITO flame arrester element, based on the principle of the Davy screen and its derivation, the "gravel pot".

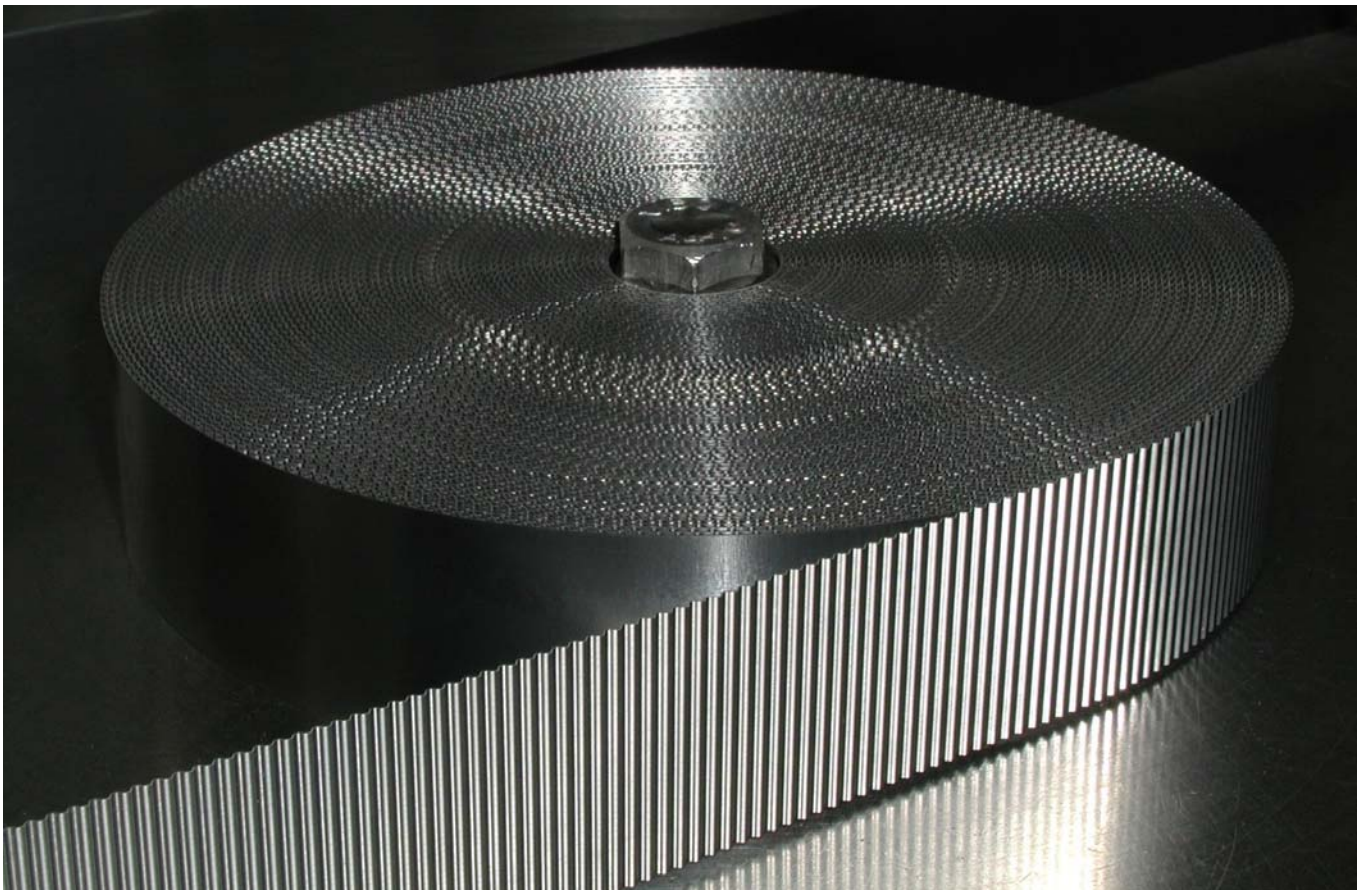
Although the Davy screen and gravel pot no longer conform to the latest requirements, the KITO flame arrester element meets the requirements of all regulations and specifications.

A KITO® flame arrester element consists of two stainless steel strips of 0.2 or 0.15 mm thickness; the width varies depending on the construction.

One flat and one corrugated strip are wound tightly together, forming a circular element with varying diameters dependent on the length of the wound strips.

The forms a gap between the smooth and the corrugated strip with a triangular section. The width of the gap is determined by the height of the corrugation. The gap width used in a specific flame arrester is in conjunction with the MESH of the mixture but is not equivalent with it.

Special widths for gas/air or vapour mixtures with abnormal flashback characteristics can be determined in cooperation with test institute like PTB; BAM or IBEU and manufactured by us. Also in this cases the device can be CE marked through a unit verification procedure.



Flame arrester element during manufacturing process

Other KITO® armatures

Supplementary to our flame arrester armatures we manufacture a variety of versions from inline valves to end-of-line valves with particularly low settings.

Special features and special versions such as e.g. heating with electricity, water or steam, inductive proximity switches etc. can be manufactured according to the client's specification.

Our armatures are of course also available in special materials e.g. plastics or highly corrosion resistant steel and special designs.

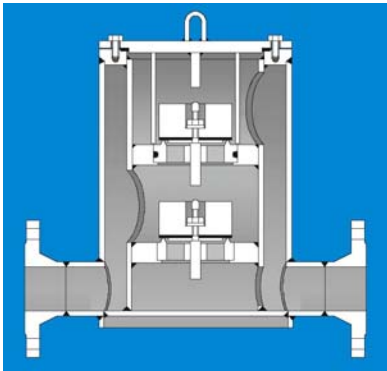


fig 17 KITO® PV-valve for inline use

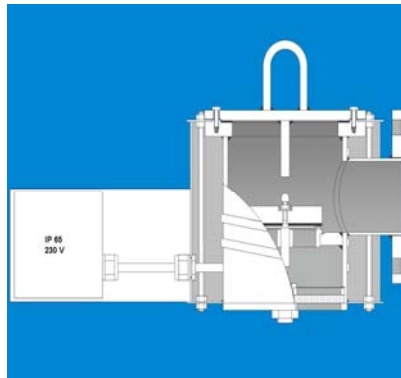


fig 18 KITO® vacuum breather relief valve with electrical trace heating

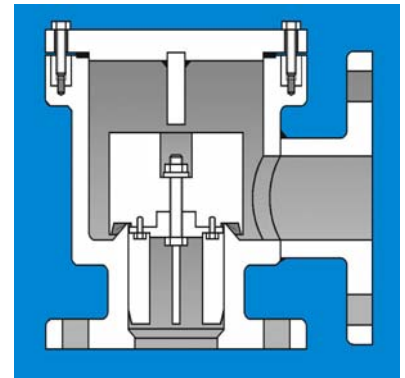


fig 19 KITO® PV-valve for inline use made of plastics

Maintenance of KITO® armatures

One of the special features of all KITO® flame arrester armatures is the minimal maintenance requirement. However, the type authorization requires regular checking of the armatures depending on the operating conditions. Being an approved manufacturer and registered maintenance company we will be pleased to give our advice about control checks as well as other maintenance and adjustment work and how to do this safely.

We also offer training for your staff in means of how to maintain our armatures, in our house or on your site, whichever is more comfortable for you.

You can order spare parts for our KITO® armatures at short notice by stating the type and factory number. This and other information is to be taken from the nameplate which identifies each fitting.

Older armatures without CE marking are not allowed to be replaced completely with spare parts. If necessary please ask for our advice in these cases.

Presented by :