

## Shut-off valve as a discharging valve when extracting glycerin from the waste products compound

### Brief profile of Emil Kammerer GmbH

For more than 60 years, Kammerer slide gate valves have been providing reliable shut-off solutions nationally and internationally, whereby reliable technology is combined with top quality. The current product range is the result of decades of experience, an in-depth technical understanding, and an openness towards innovative developments and cooperation with customers. Innovative developments for numerous shut-off solutions are implemented continuously here to meet customer needs. A close exchange between different departments makes it possible to take an in-depth look at the existing possibilities and select the best possible solution for the respective customer facility. This process is completed with the fast implementation of the developed idea. On request, our offer also includes expert service personnel and a correspondingly well-equipped stock of spare parts.

Our product range primarily covers valves with nominal diameters of DN 25 (1") up to DN 600 (24"). All of our shut-off valves are completely sealed outwardly. Rated operating pressures range from  $10^{-4}$  up to 25 bar, and the operating temperature range is from  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) up to  $+300^{\circ}\text{C}$  ( $572^{\circ}\text{F}$ ). Usually, various types of stainless steel and the material silumin are used for the housings. The sealing materials are selected according to the technical and chemical requirements.

Shut-off solutions for requirements that go beyond the criteria mentioned above are gladly discussed in a personal discussion in order to find the best possible solution at short notice.

### Brief profile of ecoMotion GmbH

ecoMotion GmbH is a subsidiary of SARIA-Bio-Industries AG & Co. KG, which, in turn, belongs to the family-run Rethmann Group. ecoMotion GmbH specialises in the production of biodiesel from animal fats and plant-derived oils, particularly rape seed oil. This production method cares for natural resources and reduces CO<sub>2</sub> emissions. Esterification primarily takes place in the biodiesel plant, i.e. the glycerin contained in the rape seed oil is replaced with methanol using a chemical reaction. Biodiesel, also called fatty acid methyl ester, and glycerin are ultimately produced. This glycerin flows into various applications as a preliminary product. At the site in Sternberg, the raw glycerin with a purity of 80% is further processed in a special plant to produce pharmaceutical glycerin with a purity of at least 99.5%. Each year 15,000 tonnes of pharmaceutical glycerine are produced.

## **Example application - in cooperation**

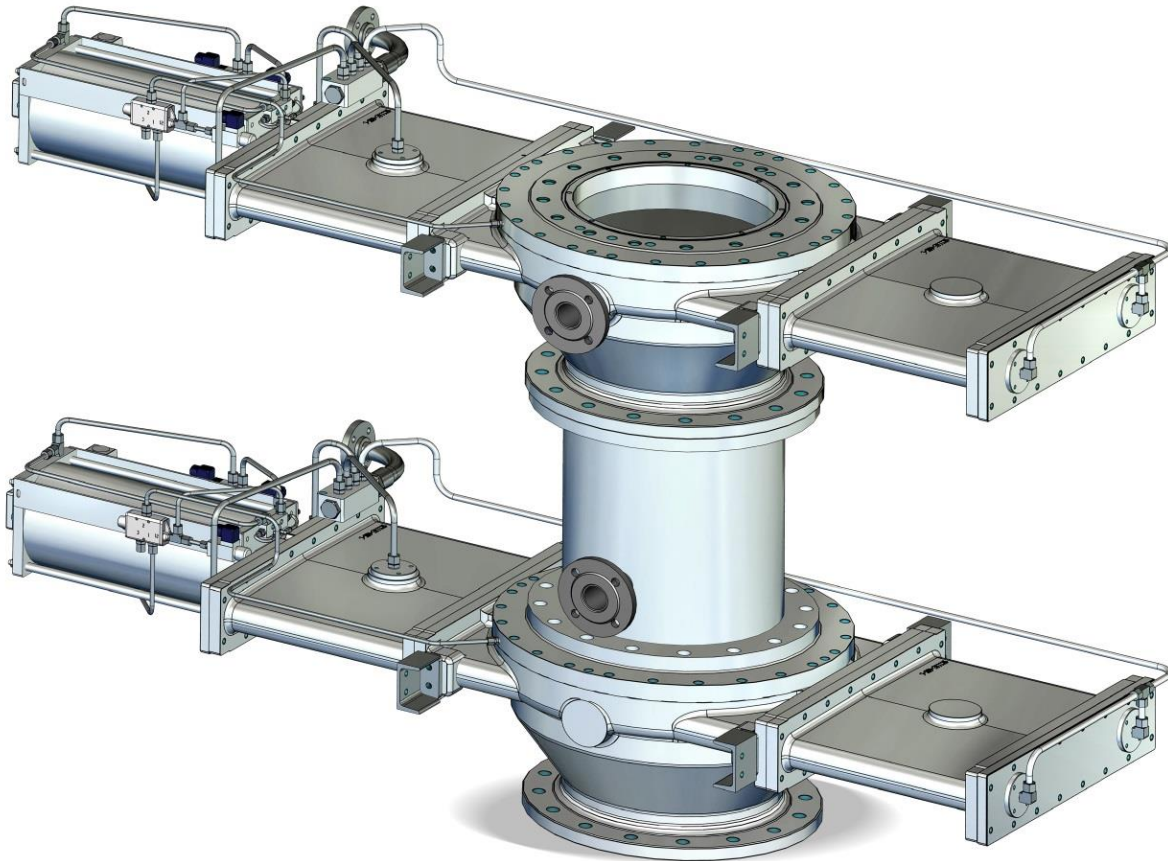
In cooperation with ecoMotion GmbH, Emil Kammerer GmbH provides the following example of an area of application. The company produces biodiesel primarily from rape seed oil as well as other plant oils while also extracting glycerin from the waste products in order to reuse and resell it.

### **Basic knowledge on biodiesel manufacture from plant oils with the by-product glycerine**

Biodiesel is fundamentally produced from raw plant oils. Glycerine is a by-product. This can be sold on in a freshly extracted form or prepared in various purity grades. This is a trivalent alcohol, also called 1,2,3-propanetriol. Today, glycerins are also used in a very wide range of areas. For instance, they are used in the manufacture of plastics and dyes, pharmaceuticals, foodstuffs and cosmetics, among other things. They mainly serve as softeners or to preserve the material's own moisture. In Europe, rape seed oil is primarily chosen as the starting substance, while this is soya and palm oil in the USA. The other important regions in which glycerin is produced include South-East Asia.

### **Tasks to be fulfilled by Kammerer discharging valves: Operational challenges in MONG discharging**

During the acquisition of glycerin from biodiesel manufacture, a waste product is produced that primarily contains salt as well as a small amount of glycerin. The glycerin-free portion of the waste product is called MONG (matter organic non-glycerol). The discharging of MONG generally represents a very special challenge for shut-off solutions in two regards. Firstly, the shut-off valve must maintain the vacuum in the system in a completely reliable way, i.e. create a perfect seal. Secondly, the slide gate valve must enable MONG to be discharged with as close to no residue left as possible – without itself being damaged by the properties of the product being discharged. The characteristics of MONG are thus crucial, as it is not always easily free-flowing, but instead sometimes adheres, can be highly abrasive and chemically aggressive as well. It displays an aggregate state from moist and paste-like to solid. As the product is abrasive and fast-drying, this can lead to anything from slight blockages through to the complete damaging of the shut-off equipment. The latter brings the risk of the shutdown of the plant and thus a complete cease in production. The consistency of MONG can fundamentally be influenced by its glycerin content. This, in turn, is fundamentally a cost-based decision on the part of the plant operator: after all, every amount of glycerin that is discharged in the waste product so that this flows easily cannot be reused or resold.



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### **Developed Kammerer solution: automated discharging valve**

For the first time in 1988, Emil Kammerer GmbH designed a semi-valve that enabled MONG to be discharged in a relatively automated manner. In the following 26 years to the present day, the valve system was further developed in cooperation with the respective clients so that the various customer-specific operating parameters could be taken into account without a loss of quality or function. The discharging valve is thus optimally adapted to the operating conditions of the respective plant so customers can achieve the best possible results from a technical, chemical and commercial viewpoint. The modifiable shut-off solution has since proven itself very successfully in practice in various customer plants in Germany and abroad.

The Kammerer discharging valve is typically installed under a thin film evaporator or dryer that absolutely possesses a vacuum in the range of 3 to 10 mbar. Through evaporation and various distillation stages, the majority of the glycerin is extracted. A residue of MONG, combined with remaining glycerin, is deposited at the bottom. The valve directly underneath consists of two completely sealing Kammerer shut-off valves that are connected to each other via a valve container and locked against each other. The product reaches the upper slide gate valve and is

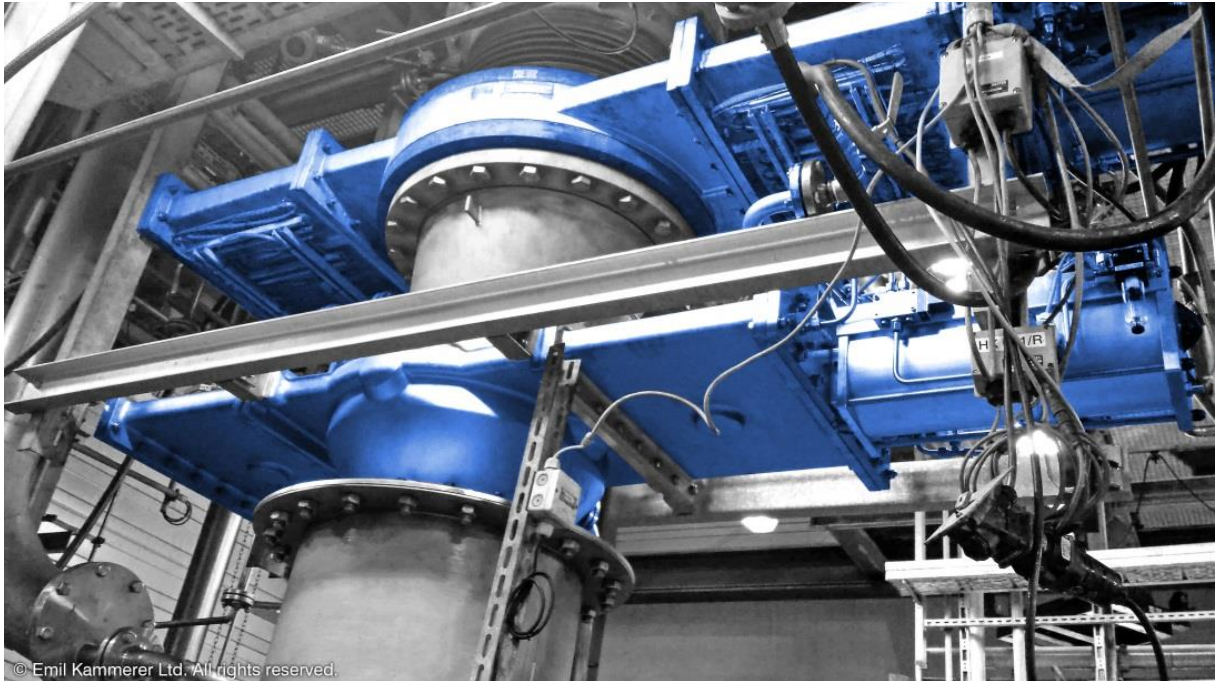
saved up here. This upper slide gate valve is then opened so that the remaining products can pass through a valve container to the lower slide gate valve; the upper slide gate valve is closed. The space between both shut-off valves is placed under an atmosphere. Only then can the MONG be discharged. The waste or salt residues usually have a glycerin content of around 3-10%.

In practice, the slide gate valve models FK and FDK with integrated rinsing devices from Kammerer have proven themselves in this specialist area. The first one or two letters refer to the sealing system, while the last letter indicates the model of the shut-off valve. The K housing prevents possible depositing of the product and, as a result, the build-up of product due to its downward funnel-shaped, tapered construction. The F and FD sealing systems are particularly favoured for gas-tight shut-off requirements: There is an active pressing of the respective impermeable material here and, afterwards, also an active pushing back of the seal in the FD version. This mechanism ensures that the seals are as gentle as possible while also being completely reliable.



### **Result – threefold customer satisfaction**

First of all, the Kammerer discharging valves guarantee the stated customer a reliably continuous discharge every 4 to 5 minutes. Secondly, the glycerin can be extracted in a significantly higher quantity for reuse as the waste product can be discharged in a drier form, thus containing less glycerin. Thirdly, a significant increase in the service life of up to 12 months has been achieved in all plants. The investment in a Kammerer discharging valve system usually pays for itself within one to two years.



## Options

We would finally like to refer in this context to a further typical field of application: Kammerer shut-off valves for the discontinuous discharge of waste. Customers who work with vacuum chambers have used the Kammerer shut-off valve in the simple version. The residual products using pass through the shut-off valve into a container. Once this container is filled to a certain level, the vacuum chamber is evacuated, enabling the container to be replaced with an empty one.

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