

Valves in potentially explosive/contaminated areas

Discharge and metering

The chemical and pharmaceutical industries often process highly active substances with properties that necessitate safe containment and effective explosion protection. As a result, the requirements imposed on process technology have not just become more diverse but also more complex.



Fig 1: Explosion-decoupling cycle lock doses powder into the feed pipe

In certain concentrations, **dust and air mixtures** can explode in the presence of an effective ignition source. The risk needs to be analysed comprehensively and this harbours all kinds of stumbling blocks. For process-related reasons, primary explosion protection measures generally reach their limitations quickly and so the explosion risk cannot always be completely eliminated.

Nowadays, the effectiveness of ignition sources can be largely reduced. However, constructive (tertiary) explosion protection has to reduce the dangerous effects of an explosion to a harmless level, and is therefore all the more important. In addition, the machines and process chains need to satisfy future hygiene requirements. Both these factors represent a considerable challenge for manufacturers of plant components.

Prevention is better

EBRO ARMATUREN in Hagen, Westphalia/Germany, has been manufacturing valves, actuators and automation technology for more than 40 years. In recent years the company has also made a name for itself with new developments for sensitive processes in the chemical and food sectors and pharmaceutical industry. In particular, its TS-type cycle lock, FS impeller valve, ViDos butterfly valve with vibration disc and INFLAS inflatable liner offer safe solutions even for critical applications.

The TS-type cycle lock (Fig. 1) was developed for the discharge and metering of bulk solids and powdered media. It can be used in a very wide range of applications, as almost all EBRO valves can be used as shut-off valves. When discharging a bulk solid under pressure differences between the

individual production stages it acts as a gas-tight discharge device.

If media need to be transferred into pressure conveying pipe systems, considerable air leakage occurs when using conventional metering devices. The overflowing air entrains media particles and causes severe wear to the components coming into contact with the product. Particularly in the case of measures for explosion decoupling, e.g. inert gas conveying, the cycle lock reduces the gas loss significantly. The medium can be rendered inert in the lock itself. As a passive explosion decoupling device the lock is approved for dust class 3 and meets the requirements of ATEX in Zones 0/20.

The geometry of the filler pipe is adapted according to the specific properties of the products to be transferred. There are various options available for monitoring temperature, fill level, oxygen content, etc. Communication is either via conventional signalling technology or in a fieldbus.

Integration into superordinate control systems is already guaranteed in the standard version.

EBRO cycle locks do not need to be opened outwards for cleaning. CIP-capable valves allow completely effective containment.

Rotary FS type impeller valves (Fig. 2) are used to control the flow of bulk solids to ensure uniform material discharge, e.g. from silos, bunkers, weighing hoppers, etc. Thanks to frequency-controlled rotation speed, the impeller valve also serves as a dosing unit that works volumetrically and also effectively prevents the overfilling of downstream process sections. This means that, for example, screw conveyors or vibrating feeders can be loaded evenly without clogging. In the case of fast-flowing products every pair of blades interrupts the product flow at short, regular consecutive intervals and therefore effectively prevents the overfilling of the product. The materials passing through are not scraped or pressed along the front or sides of the housing walls, and granules, for example, are not pulverised. EBRO impeller valves are therefore extremely gentle on the product and energy efficient.

The fitting dimensions comply with the face-to-face diameter of butterfly valves with correspondingly low overall height and very low weight. This means that EBRO impeller valves can even be installed in existing systems

without needing a lot of adjustments. Pipe cross-sections remain cylindrical and there is no need to change to square flanges.

Standard butterfly valves are also traditionally used in simple coarse flow/fine flow dosing processes and the valve is put in an intermediate position to limit the product flow. EBRO's ViDos valve uses this technology and is based on established valve designs with elastomer or PTFE liners. A linear vibrator is mounted to the lower shaft. The vibration is activated in the fine flow setting. The resulting vibration keeps the medium in motion, reduces compression and almost completely eliminates the risk of bridging. Media that tend to stick are loosened and detached with minimal energy input, and cleaning and maintenance intervals are reduced. A pneumatic positioner allows various coarse/fine flow positions to be set, so that the medium can still be dosed accurately even in the case of small opening angles. If necessary the valve disc can be opened just a little for topping-up purposes; the vibration starts the product flowing again. This means that even very small quantities can be added subsequently.

Facts for decision-makers

EBRO valves are designed and built to meet ATEX requirements and are subjected to the corresponding type testing and certification processes.



Fig. 2: Dosing into a screw feeder with the speed-controlled impeller valve prevents blockages

They are type-tested and labelled according to ATEX guideline 2014/34/EC. If required, all soft-seal valve types can be used as pressure-shock resistant, flame-arresting valves to EN 14460.

Insulating or conductive elastomer liners to IEC 60079-32-2 are available. These include, for example, a wide range of NBR, EPDM, FKM and SBR composites that are approved for gas or dust zones depending on application. Additional requirements like FDA and EC 1935 can also be met. Visually detectable blue liners ensure maximum safety in contamination-sensitive applications. Conductive coatings are available at customer request or if technically necessary.

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