

Position switches for applications in very high and very low temperatures

Position monitoring in Extreme environments

The loading systems made by Emco Wheaton are used all over the world for handling large quantities of petrol, natural gas, liquefied gas or chemicals. To monitor the position of the loading arms, the company from Kirchhain near Marburg uses Ex position switches from the steute Extreme range, which remain reliable even in subzero temperatures.

The transportation of fuels, gases and chemicals requires special loading systems which can handle large quantities of these materials both reliably and flexibly – for example from the production plant to rail tanks, from rail tanks to the depot, or



Ex 97/Ex 99 position switches and Ex RC M20 KST magnetic switches are well suited to temperatures down to -60 °C

"ship-to-shore" in ports.

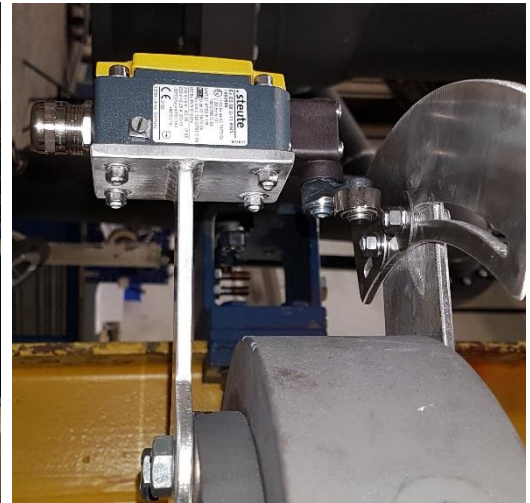
One specialist for the project planning and manufacture of such loading systems is Emco Wheaton GmbH. Two business divisions of this company, which belongs to the Gardner-Denver Group, are located in Kirchhain near Marburg. One manufactures large loading systems for ships, which have a similar design to cranes. The other develops and builds systems for use on land with mobile loading arms which e.g. reach into rail tanks and pump in or suck out a liquid or gas via mobile pipes with nominal sizes 2" to 8".

High vertical range of manufacture

Here Emco Wheaton provides and produces the complete infrastructure around the loading units, applying the vertical range of manufacture principle – which is no longer all that common. This is because the real skill in this field of machine and plant engineering is in the detail. Klaus Koch, Supervisor Engineering



Emco Wheaton in Kirchhain designs and manufactures loading systems for fuels, gases and chemicals which are used all over the world



The position of the loading arm is monitored using steute Extreme position switches

at Emco Wheaton, provides an example: "The loading arms usually have four swivel joints, giving them the mobility to swing into the manhole. Then the joints in the pipes must fulfil extremely strict sealing requirements. The manufacture of these components is one of our core competences". Emco Wheaton typically opts for individual project planning in close cooperation with the customer. This starts with the selection of materials – which can vary, depending on what is to be loaded – as well as the dimension of the loading arms and how they should be balanced. Here hydraulic, pneumatic and electrical drives are all available, as well as manual systems e.g. with sprung cylinders or counterweights.

Position monitoring

The temperature, both of the medium handled and of the ambient air, also plays a role when designing the loading arms and systems, as does the pressure range. And nearly every project also has to comply with the requirements for (gas) Ex protection.

This has a huge impact on the choice of position switch used to monitor the loading arms. Either a switch monitors the initial and final positions, or a mechanical switching cam covering a predefined area can be used. Thorsten Pfalzgraf, Project Engineer at Emco Wheaton: "Position monitoring of the loading arms is an intrinsically safe function, which is why the machine guidelines apply and we need switches with a positive break NC contact."

Extreme temperatures

In addition to explosion protection and machine safety, other special requirements and ambient conditions often have to be taken into account – for example particularly high or low temperatures. If, for example, bitumen or another hot medium is to be loaded, the loading arms must be heated or heat-insulated. And the switches must also be heat-resistant.

In such cases, Emco Wheaton uses Ex 98 position switches from the steute Extreme range. They are certified to Atex standards for gas Ex zone 1 applications, as well as to



From left to right: Thorsten Pfalzgraf, Klaus Koch (both Emco Wheaton), Rainer Lumme, Dennis Wilkening (both steute)

comparable international Ex standards (UL/CSA, Gost, Nepsi ...), and can also be used for intrinsically safe applications. They are suitable for temperatures of up to +70 °C.

More and more frequently, the Emco Wheaton engineers are called upon to design loading systems for extremely low temperatures. This is partly due to the fact that exploration areas for crude oil and natural gas are increasingly being accessed in colder regions of the globe. The steute Extreme range has a series of position switches for just such applications. The brand new Ex 99 series can be used in temperatures down to -60 °C and also in corrosive environments. These switches are actuated by brass roller levers.

Large-scale plant for loading liquefied gas

A new project aptly demonstrates both the competence of Emco Wheaton and the way

in which intrinsically safe Ex position switches can be used.

A loading system for liquefied petroleum gas (LPG) recently completed in Kirchhain is equipped with 108 individual loading units and 216 loading arms. This enables it to load and unload whole trains with long successions of rail tanks at a loading terminal in Central Asia – very fast and without having to shunt the train. The LPG must be kept at a pressure level of 170 to 180 bar if it is to remain liquid and thus transportable, and the same pressure therefore has to be maintained during the entire loading process. Klaus Koch: "This is a standard requirement for LPG handling, for which we have developed appropriate features regarding both the swivel joints of the loading arms and the sealing of the coupling between pipe and rail tank."

Every movement is monitored

On each of the 108 loading units, three Ex 99 position switches are installed. Two of them emit intrinsically safe signals in combination with a switching cam when one or the other end position of the loading arm is reached. A third switch communicates to the central control unit the position of a sliding ladder which grants staff access to the top of the rail tank. This guarantees highly reliable monitoring of intrinsically safe movements on each individual loading unit of the terminal – in explosive atmospheres and subzero temperatures.

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Images: steute Technologies GmbH & Co. KG / Emco Wheaton