

Niemann included the installation of Turck inductive proximity switches in the machine column in order to query the height of the hydraulic ram

QUICK READ

Wilhelm Niemann Maschinenfabrik is a company that manufactures mixers and mills for the paint, varnish and chemical industry. Customers use them almost exclusively in explosion hazardous areas. The manufacturer based in Melle installs space saving isolating switching amplifiers and temperature measuring amplifiers from Turck's IMX12 interface series in the control cabinet. These send the signals of the operator buttons to the field and transfer intrinsically safe digital and analog input signals. Niemann has also relied for many years on the IM36 potentiometer amplifiers for positioning the height of toothed discs. Turck inductive initiators with a Namur output have been even longer in use, and were able to impress Niemann due to their large switching distances.

Ex To Stay

Wilhelm Niemann Maschinenfabrik guarantees the reliable operation of their machines with safe and efficient Ex protection solutions from Turck, consisting of accurate sensors and fast compact interface devices

“What's on the outside must also be on the inside” – this is a maxim on which Wilhelm Niemann Maschinenfabrik places particular importance. From the special screw to the pneumatic cylinder, the company based in Lower Saxony produces a number of components for its industrial and laboratory devices itself. Customers, mostly consisting of manufacturers of paint, varnish, adhesives or silicone, come from all over the world. “We stick to the maxim: made in Germany, made by Niemann”, says Hendrik Werges, workshop and project manager for electrical engineering.

The range of the different machines from Niemann is not apparent to outsiders at first glance, especially since only three basic types are produced in Melle-Neuenkirchen. The dissolver is suitable for mixing processes but also for dispersing – through which a rotating toothed disc splits solid materials into a liquid, mills it and mixes it. The result could then be a wall paint. The basket mill offers an even finer milling of predispersed material. The suction of a pump disc pulls the product through a basket filled with ceramic pearls with an action that is used by manufacturers of car paint.

Tailor made machines

The requirements placed on the devices increase with the viscosity of the products. “There are high viscous products, in which the dissolver disc would only make a hole in the substance,” explains process engineer Michael Diddens. In order to move the content of the container at the same time, Niemann's third machine series, the “Butterfly” Kreis dissolver, also features a centrally positioned butterfly tool to which scrapers are fitted on the outside. The slow circular movement of this machine, for example, ensures the mixing of the material for the production of sealing materials, and passes it to the dispersion area of the eccentric dissolver toothed disc.

Depending on the requirements of the product, customers choose one of these basic types, but place far more requirements in practice on the quality of the machines. The technical office of the family-run company must create its project drawings according to the local requirements of the customer on site. For example, whether a 5,000 liter container is required due to restricted room height or whether a heating system should be added to the cooling circuit on the mixing tank for the production of a special product. Niemann also supplies its dissolvers in a standard design or in a top-mounted design for mounting in steel platforms or ceilings.



From Melle out into the big wide world: Niemann equips its machines, like this Kreis dissolver with sensors and interface technology from Turck

Safety in restricted space

One thing is common to all machines here – their use in explosion hazardous areas. This must also be taken into account in the control cabinet outside of Zone 1. Niemann generally follows at this point two systems, which are firstly dependent on whether a complex controller is required. Touch panels at the machines require PLC support without exception. This also applies to the operation of the dissolver butterfly in around 90 percent of cases. Encapsulated Profinet or Profibus cables can be run here from the PLC in the control cabinet to an operating element.

However, some companies cannot draw on the expertise of PLC programmers, and bus technology may possibly not even be necessary elsewhere. The second variant without PLC technology requires hard wiring. This sends signals from the operator button to the field via IMX12 isolating switching amplifiers from Turck. Devices from the IMX12 interface series are also used if users wish to pass certain digital or analog values from the Ex area. The data from proximity sensors or temperature values are thus run as intrinsically safe signals to the control cabinet.

The new isolating switching amplifiers purchased had to have a slim design and a power supply rail. Turck's IMX12 devices were chosen here thanks to their narrow width of only 12.5 millimeters, but also due to their power supply via a power bridge. The individual housings are thus fed in the control cabinet via the DIN rail, thus saving the panel builders the need for any

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Hendrik Werges | Wilhelm Niemann Maschinenfabrik



IMX12 and IM36 amplifiers guarantee safe signal transmission in the Ex environment



laborious bridging. A separate power supply device is also unnecessary on the IMX12, as a single plug connector is sufficient for the coupled series.

Three environments, three initiators

Niemann had been using Turck sensor technology for a long time before the interface technology devices. The interface modules now also convert some signals supplied by the initiators from the field. "Turck's sensors with this design simply have the advantage of a one to two millimeter switching distance larger than its competitors," says Hendrik Werges. These differences in range enable many things to be simplified. For example, the technicians at Niemann install M18 inductive proximity switches in the columns of its machines in order to query heights. A hydraulic ram for lifting a machine moves in the column. This is required, however, not to overshoot certain ranges so that the toothed disc only runs in the tank or stays on the cover. Sensors that monitor the central ram are installed at suitable points in order to limit the stroke and as a safety-relevant circuit. The mounting of these sensors is made more difficult by an approximately four millimeter thick reinforcement ring at the bottom end of the ram, which must not be blocked by the initiator. The sensor must detect the cylinder and ring in spite of the distance. This demonstrates the benefit of Turck's NI10-G18 proximity switches with a NAMUR output,

which are suitable for Ex zones 0 and 20 and are used by Niemann in a large number of products.

Anyone wanting to look for the smallest Turck components in a Niemann machine must look really closely. With a housing length of 31 millimeters and a height of six millimeters, the BIM-UNT-AY1X magnetic field sensor is hidden in the cover hinge of a tank fill opening. This detects here whether the cover is open or closed. The miniature sensor has a highly all-round visible LED and is clamped securely in the groove with a special screw.

A specially designed inductive sensor must withstand wear in the drive. This scans a switch lug in the very demanding atmosphere. Background: Top-mounted dissolvers with volumes up to 15,000 liters require a scraper that must not be located underneath the ball valves during the filling process in order to prevent the formation of deposits. The designers have therefore defined a park position for the container scraper and fitted a detection plate on the top chain drive which is monitored by the sensor.

IM36 passes speed test

The position of the toothed disc inside the container is determined by a cable sensor. This supplies resistance values via the contact of the measuring cable, which have to be supplied as analog values. A potentiometer amplifier converts this quickly to an intrinsically safe



The power bridge system simplifies the power supply of the IMX12 devices by feeding the voltage via the DIN rail connection

During the production process a double suction disc in the container rotates at the set height



Compact BIM-UNT magnetic field sensors are concealed in the fill openings

4-20 mA value so that connected systems can regulate the height steadily.

The process sometimes still caused problems five years ago, recalls Werges from experience: "Customers specify in the recipe certain heights at which the toothed disc must move. If the conversion takes too long, the machine misses these points by a few centimeters and then continuously oscillates." A transducer with a cycle time of less than 700 milliseconds was required as a solution. Niemann therefore turned at that time to Turck interface technology. To be precise, the IM36 amplifier, which completes a conversion within 30 milliseconds and thus enables the toothed disc to be positioned within the hysteresis range.

As a specialist for high-speed analog conversion, the IM36 has now been fitted in the control cabinets of Niemann machinery for a long time and has recently gained close neighborly acquaintance with the slimline IMX12 amplifiers. The machine builder in Lower Saxony

is currently testing another solution using Turck sensor technology, in which initiators are required to replace the previous solution for limiting the speed of older drives. "We are talking here about spare parts business," explains Hendrik Werges. The current machines are controlled by frequency inverters and the operator can regulate the speed of the machine via a potentiometer in the control panel. This type of haptic control continues to be popular with customers.

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