



Pictures:

Safety modules of the Safety-M modular family. Basic and expansion modules ensure safe speed and positioning.

Safety non-stop

Safe motion and positioning

When a machine is in operation, the highest priority in its immediate environment is: Safety first. Kübler explains how this can be achieved with SIL2/PLd and SIL3/PLe-certified encoders and safety modules used to process the data they provide.

Machines include a large number of speed or position-controlled drives. Some of these movements are characterized by a considerable risk potential, against which the user must be protected. Until today delimitations by means of light barriers or safety enclosures and movement limitations by means of limit switches that switch off the concerned drives have been the simplest measures.

A de-energized drive that is standing still represents a safe state. But it may nevertheless be necessary for an operator to enter the danger zone of the machine while it is in operation, for example for troubleshooting purposes. This then naturally requires the extension of the safety function to the movements of the machine in the form of a safe reduced speed, a safe working area or torque limitation. These functions provide substantial benefit gains to the user of the plant.

All encoders are not equal Simple encoder redundancy is often not sufficient

to achieve high SIL or PL ratings. This is often due to the complex software of the encoder. Higher-level safety functions require specific measures and structures in the components belonging to the chain. Many inverters are equipped with a safety section to realize this functional safety. It is also desirable to arrange the motor encoder as a safe encoder to allow realizing a lean machine.

To that purpose, Kübler offers a comprehensive portfolio of certified incremental and absolute Sendix SIL encoders that can be easily integrated in the motor. This encoder family allows staged concepts in compliance with SIL2/PLd or SIL3/PLe, depending on the encoder type used. The use of one single encoder requires a 100 % reliable mechanical connection. For the solid shaft version, Kübler offers special mechanical components that ensure safe connection. This includes the safe bellows couplings that can compensate assembly tolerances. In the Sendix series, Kübler offers the Safety-Lock Design. This means higher



Safety-M Compact: Safe speed monitoring allows for a wide range of drive functions – thanks to the free choice of incremental encoders.



robustness of the ball bearings and of the mechanical structure of the encoder. The wide temperature range from minus 40 to plus 90°C and the protection level up to IP67 allow a wide range of applications. In addition, Kübler offers, for potentially explosive atmospheres such as painting lines, oil platforms or chemical industries, a wide portfolio of safe encoders with Atex and IECEx approval.

Integration concepts

In order to allow realizing an intelligent interaction of Sendix SIL encoders with the evaluation electronics used, Kübler offers adapted service packages. These consist in risk assessment, creation of a safety concept, plant commissioning and acceptance, up to the safety technology retrofit.

They help not only machine manufacturers, but also motor manufacturers, to analyze their drive from the safety technology point of view. Kübler attaches great importance to transparency and team work

to make sure that the result and the gain in know-how remain with the company.

Thanks to the Sendix SIL encoder and the adapted service packages, a solution for a safe drive system can be designed and implemented. Nothing could hinder the integration in existing machine concepts, as the encoders cooperate with all usual safe frequency converters

Machines for which the customer defines himself the drive system always require the development of new safety concepts. In addition to costing time and money, this also means that the machine manufacturer needs various software, handling and know-how for every machine type. For this purpose, Kübler offers a new generation of safety modules that can be used independently of the drive system. The good integration plays a particularly important role, especially for older machines, which have to undergo important modifications to meet the requirements of Machinery Directive 2006/42/EC. The easy retrofitting of the safety technology is a decisive point here. The integrated signal splitter for the encoder signals saves expensive and complex external wiring. Moreover, the easy forwarding to a control system or frequency converter is ensured.

The device firmware integrates comprehensive speed and position-related safety functions for drive monitoring according to EN 61800-5-2 (e.g. SS1, SS2, SOS, SLS, SDI, SSM). The extensive diagnostic function integrated in the firmware allows achieving, with a certified Sendix SIL encoder, the highest safety level SIL3/PLe. Moreover, the encoder interface supports combinations with other encoders such as for example SinCos, TTL / RS422 and HTL / push-pull, as well as proximity switches. 4/2 safe inputs and 8/4 safe shut-off channels are available. The analog output ranges from 4 ... 20 milliamperes and provides a fast internal speed signal conversion. Kübler offers a removable OLED touch screen with plain text display as an accessory. It allows performing local diagnostics and parameterizing without PC software. The status LED on the front side indicates the operating status of the device.

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Kübler offers the Sendix-SIL encoders up to SIL3/PLe in incremental and in absolute version. Mechanical connection is achieved with safety-oriented bellows couplings and torque stops.