SAFETY

INTEGRATED SAFETY SYSTEM SOLUTION

EN

KEB

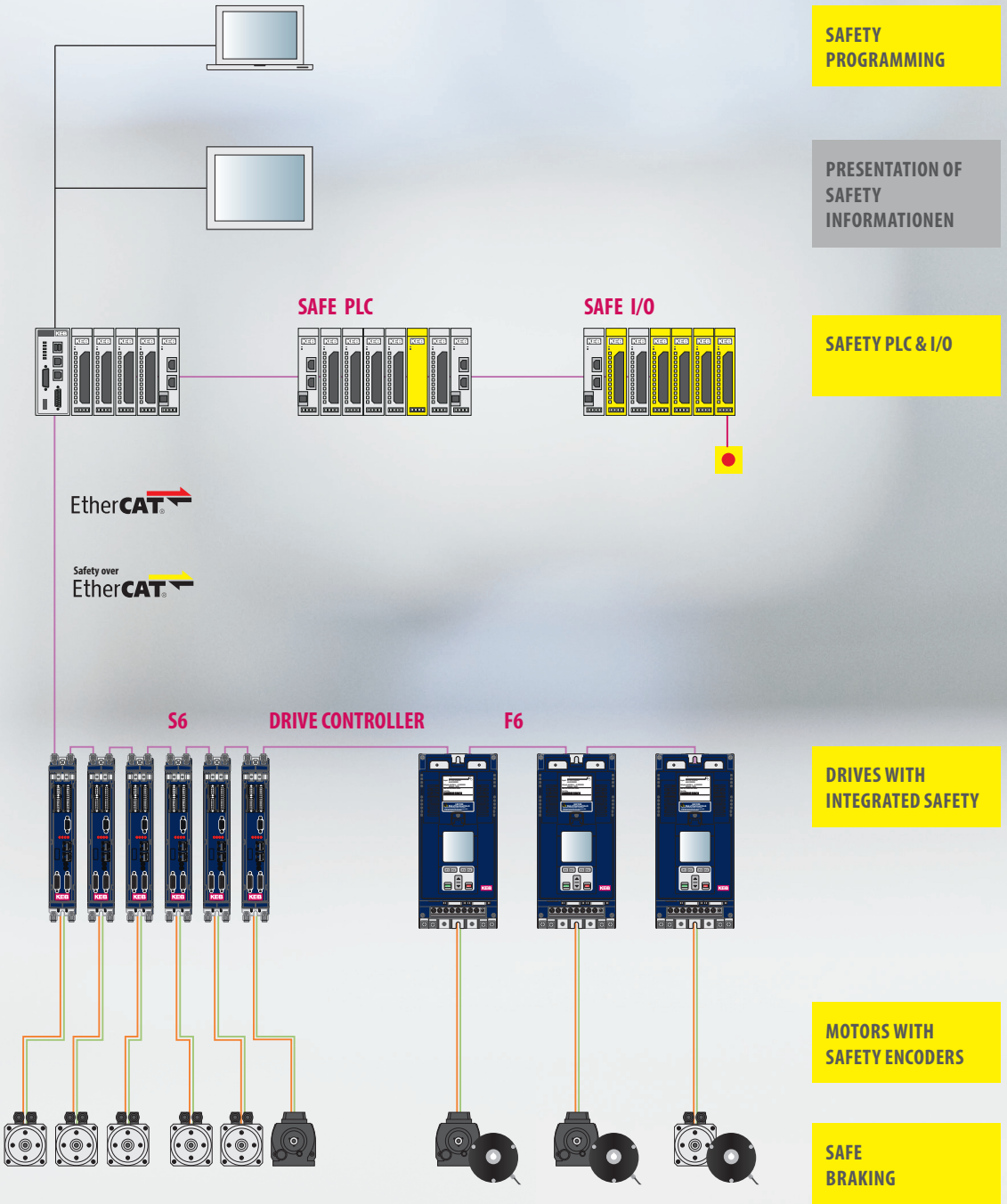
CONTENT PAGE

INTEGRATED SAFETY SYSTEM

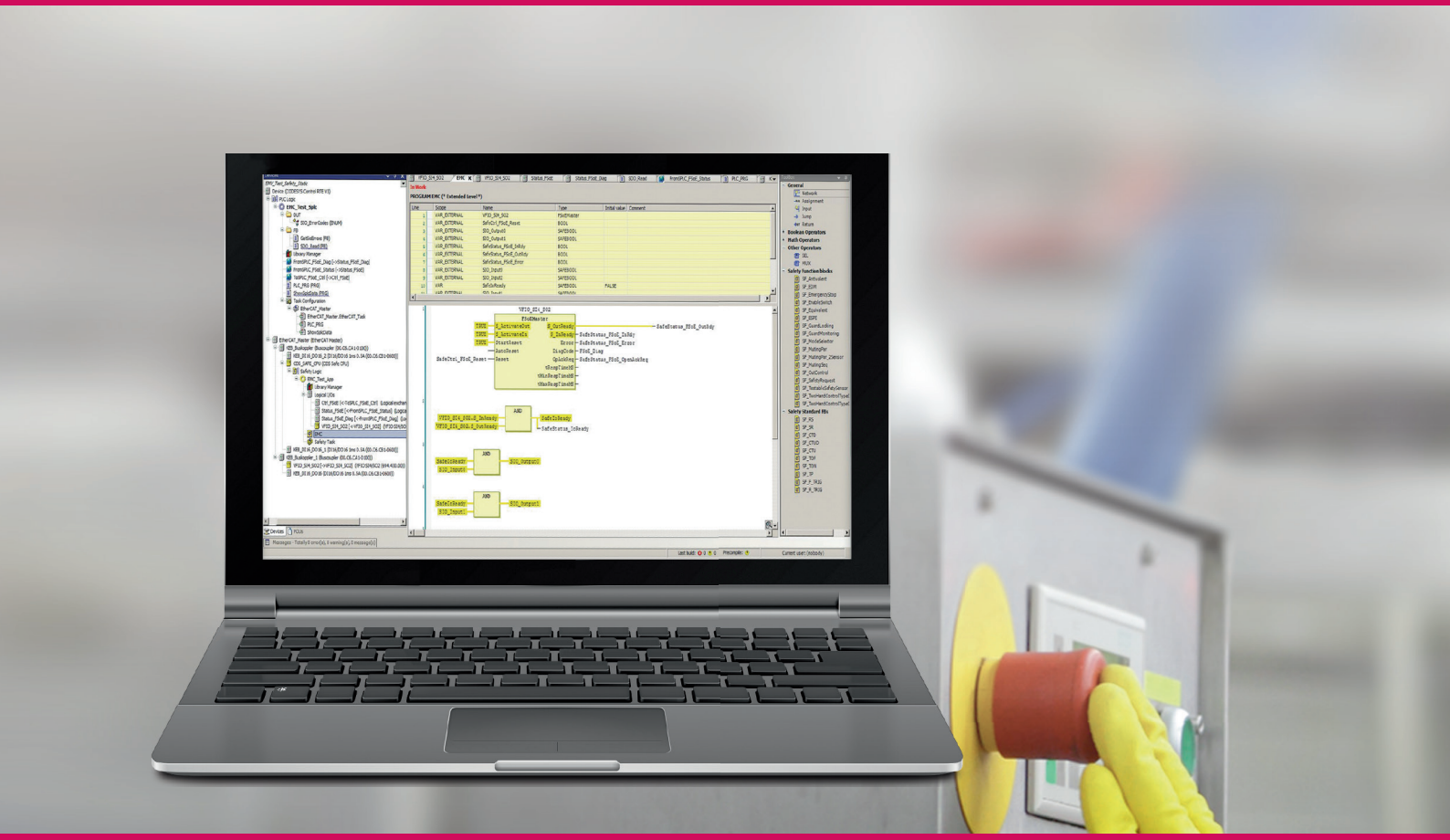
KEB's system solutions span from control through automation to mechanical interface. Parallel to the certified software tool KEB offers a complete portfolio of powerful hardware for the machine and plant automation.

Integrated into the EtherCAT-based control and remote I/O system, the Safety PLC and the Safety I/O module take over all safety relevant tasks of the control level.
The safety-oriented Safety over EtherCAT communication (FSoE) creates a flexible interface in the drive level where modular safety solutions provide various safety functions.

Synchronous/asynchronous motors and gear motors described as FS = "Safety Ready" are fitted with encoder feedbacks for safety tasks.



SOFTWARE



SINGLE POINT OF **ENGINEERING**

DEVELOPMENT ENVIRONMENT (IDE)

With COMBIVIS studio 6 safety machine designers can meet compliance with IEC 61508 SIL3 and ISO/EN 13849 PL e for their safety PLC application. COMBIVIS studio 6 safety uses a TÜV certified CODESYS plug-in which is fully integrated in COMBIVIS studio 6 development environment. This means the machine and safety program can be developed in one unified software platform. The safety controller programs as a sub-node of the main machine controller and the application, tasks, global variable lists, POEs and logic I/Os are also integrated.

SAFE PROJECT MANAGEMENT

COMBIVIS studio 6 safety also offers additional functionality for managing the project. This includes change tracking, safe signal flow, safe versioning (pinning), and the separation of safe mode and debug mode.

PROGRAMMING OF SAFETY APPLICATIONS

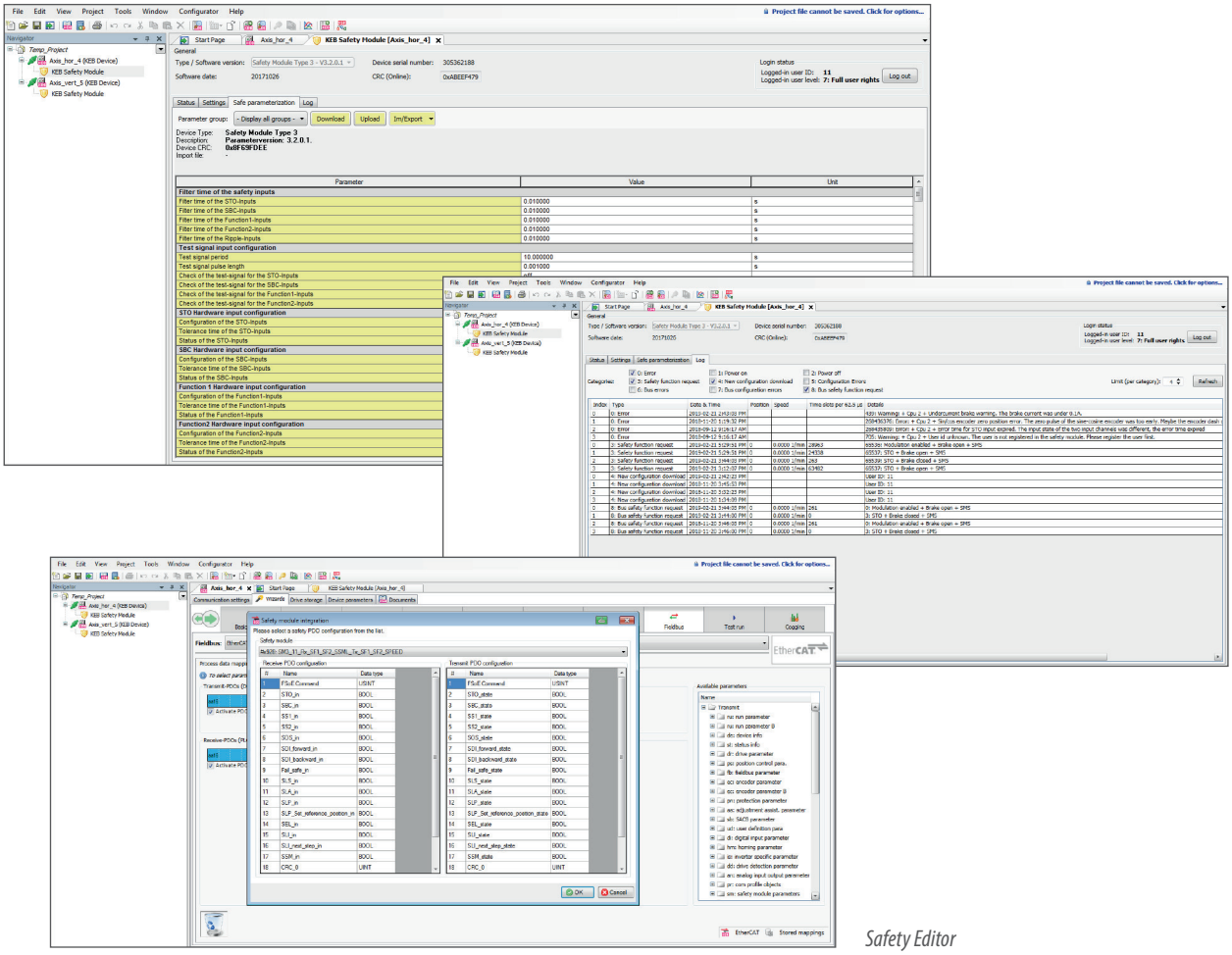
The safety controller is programmed based of a Function Block Diagram (FBD) via Safety Editor in IEC 61131-3. The FBD Safety Editor contains certified safe modules according to PLCopen Safety. The safety modules facilitate the programming of common machine elements like for example e-stop circuits, light curtains, and two-handed control.

This reduces the time required for the development, verification and acceptance of the safety application for the user.

CONFIGURATION OF INTEGRATED SAFETY ON THE DRIVES

The configuration of the KEB Safety Drives is done with the certified Safety Editor, which is integrated in the KEB parameterization environment COMBIVIS 6. This is where the safety functionality and limits can be configured. These safety-related settings can be saved and downloaded to other drives via COMBIVIS or via the controller.
Current parameters and the error history can be used for system diagnosis. The export function makes it easy to create the required documentation.

COMBIVIS 6 is available free of charge for every user.



Safety Editor

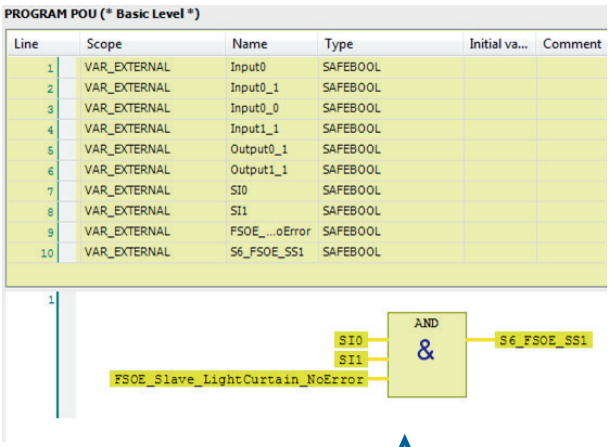
HIGHLIGHTS

- User administration
- Creation and adaptation of the configuration
- Diagnosis
- Data backup
- Documentation of the settings
- Change history
- Creating the MDP file for Safety over EtherCAT

HARDWARE

SAFETY PLC & I/O

The freely programmable Safety PLC and the Safety I/O modules form an innovative safety solution. Communication takes place via the existing EtherCAT bus with the certified Safety over EtherCAT (FSoE) safety protocol. Any FSoE slaves can be addressed via the Safety PLC (FSoE master).



Freely programmable via function block diagram

TÜVRheinland®
Precisely Right.

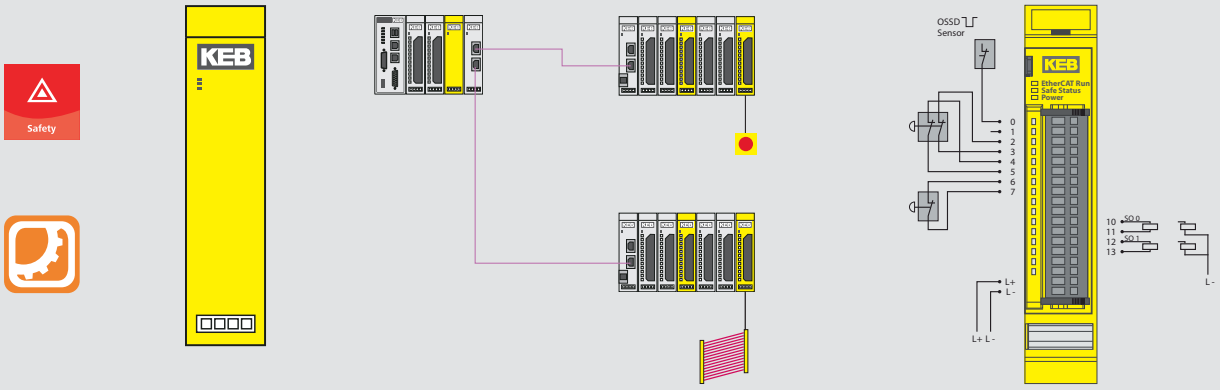
Safety PLC

Safety I/O

EtherCAT

Safety over EtherCAT

DECENTRALIZED SAFETY CONCEPT



HIGHLIGHTS

Safety PLC

- Safety over EtherCAT Master
- Free programmable Safety PLC
- IEC 61508 SIL3 and EN ISO 13849-1 CAT.4/PL e
- Cross communication between PLC and Safety PLC on common bus

Safety I/O

- Safety over EtherCAT Slave
- Safe I/O module with safe inputs and outputs
- IEC 61508 SIL3 and EN ISO 13849-1 CAT.3/PL e
- Four safe inputs (with dedicated test pulse outputs)
- Two safe outputs (max = 2 Amps)

FUNCTIONAL SAFETY (FS) DRIVES

The sixth generation of KEB drives offers scalable safety functions directly in the drive controller. The device variants are Compact, Application and Pro for the COMBIVERT F6 and S6 enabling selectable functions according to the requirements.

COMPACT

In the Compact device variant, Safe-Torque-Off (STO) is integrated as the basic function.

APPLICATION

The Application device variant is available for speed and position-dependent safety functions with encoders. Flexible adaptation of the safety functions and limit values is possible via digital I/Os and/or Safety over EtherCAT (FSoE).

PRO

The Pro device variant offers possibilities for implementation in the area of encoderless safety. For example, safe solutions can be implemented in applications where encoder mounting is not possible. This also results in a reduction in costs. Here, too, the safety functions and limit values can be flexibly adapted via digital I/Os and/or Safety over EtherCAT (FSoE).

Drive controllers COMBIVERT F6 and S6 provide integrated safety functions

EtherCAT®

Safety over EtherCAT®

HIGHLIGHTS

- Scalable safety concept up to PL e (ISO 13849-1) and SIL3 (IEC 61508 and IEC 62061)
- Advanced safe motion functions according to IEC 61800-5-2
- Safety over EtherCAT (FSoE) Slave Option
- OSSD outputs (detection of wire breakage, shorts, etc.)
- Safe parameterization through COMBIVIS 6
- Safe speed measurement without encoder
- Dual channel ripple interface for cascading safety chain
- Up to 8 different configurations stored

SAFETY FUNCTIONS IN THE DRIVE

BASIS FOR SAFETY

COMPACT

In the Compact version, the COMBIVERT F6 and S6 drive controllers are equipped with Safe-Torque-Off (STO).

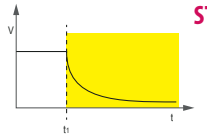
SAFETY FUNCTIONS WITH SPEED AND POSITION MONITORING

APPLICATION

The device variant Application is available in two versions. In addition to STO, Module 1 adds safe brake control (SBC) which provides a safe 24 V supply for the brakes.
Module 3 offers safe motion functionality according to IEC 61800-5-2 through speed and position detection using encoders.
The error reaction time is shortened and costs are reduced by reducing the number of separate protective devices. Module 3 also offers the option of controlling all available safety functions and limit values via Safety over EtherCAT (FSoE).

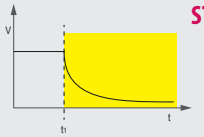
COMPACT | **APPLICATION**

on board

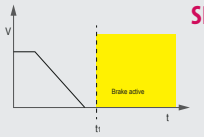


STO – Safe Torque OFF

Module 1



STO – Safe Torque OFF



SBC – Safe Brake Control

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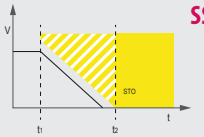
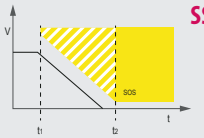
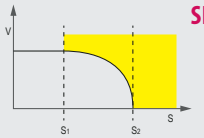
Module 3



SS1 – Safe Stop 1

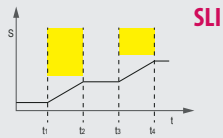


SS2 – Safe Stop 2

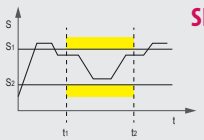


SEL – Safe Emergency Limit

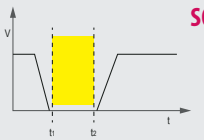
Safety over EtherCAT®



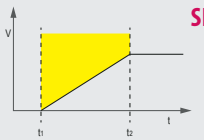
SLI – Safely-Limited Increment



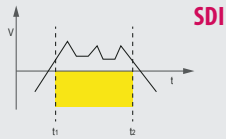
SLP – Safely-Limited Position



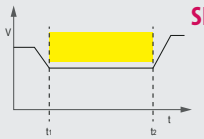
SOS – Safe Operating Stop



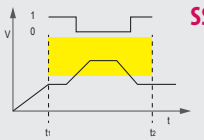
SLA – Safely-Limited Acceleration



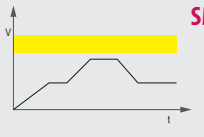
SDI – Safe Direction



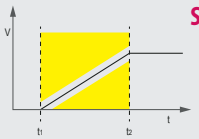
SLS – Safely-Limited Speed



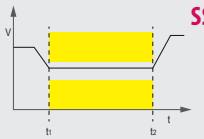
SSM – Safe Speed Monitor



SMS – Safe Maximum Speed



SAR – Safe Acceleration Range



SSR – Safe Speed Range

SENSORLESS SAFETY FUNCTIONS

PRO

The Pro device variant of the COMBIVERT F6 and S6 drive controllers offers advanced safety functions without having to use a safety encoder. The device determines the safe velocity parameters from the pulse width modulation (PWM) of the motor supply.

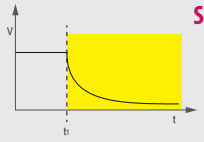
In addition to STO, Module 5 is equipped with a safe brake control (SBC), which provides a safe 24 V supply for braking operation as well as a monitoring of the switching status of the brake via microswitch evaluation.

Module 5 also offers the option of controlling all available safety functions via Safety over EtherCAT (FSoE).

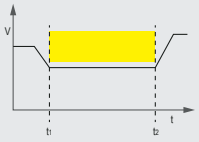
PRO

Module 5

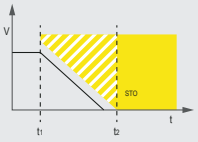
Safety over EtherCAT



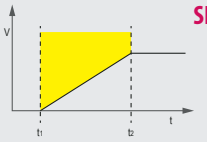
Safe Torque OFF



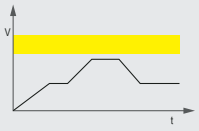
Safely-Limited Speed



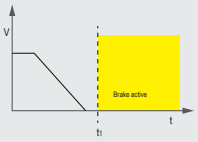
Safe Stop 1



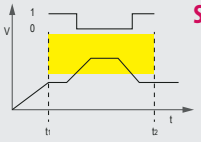
Safely-Limited Acceleration



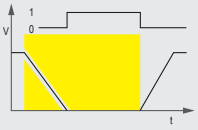
Safe Maximum Speed



Safe Brake Control



Safe Speed Monitor

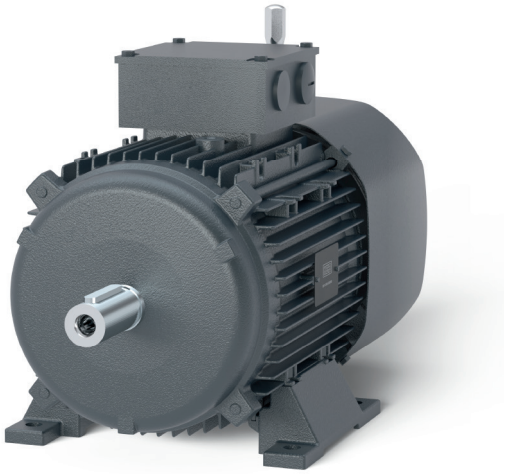


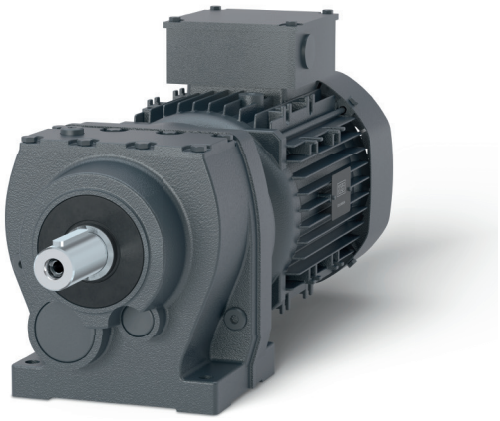
Safe Door-Lock Control

WHY USE DRIVE-BASED SAFETY (SAFE MOTION)?

- Less wiring - remove contactors and other traditional safety components
- Fast reaction - direct handling inside the drive
- Easy to operate - up to 8 different safety setups per function
- Cost savings compared to traditional safety solution

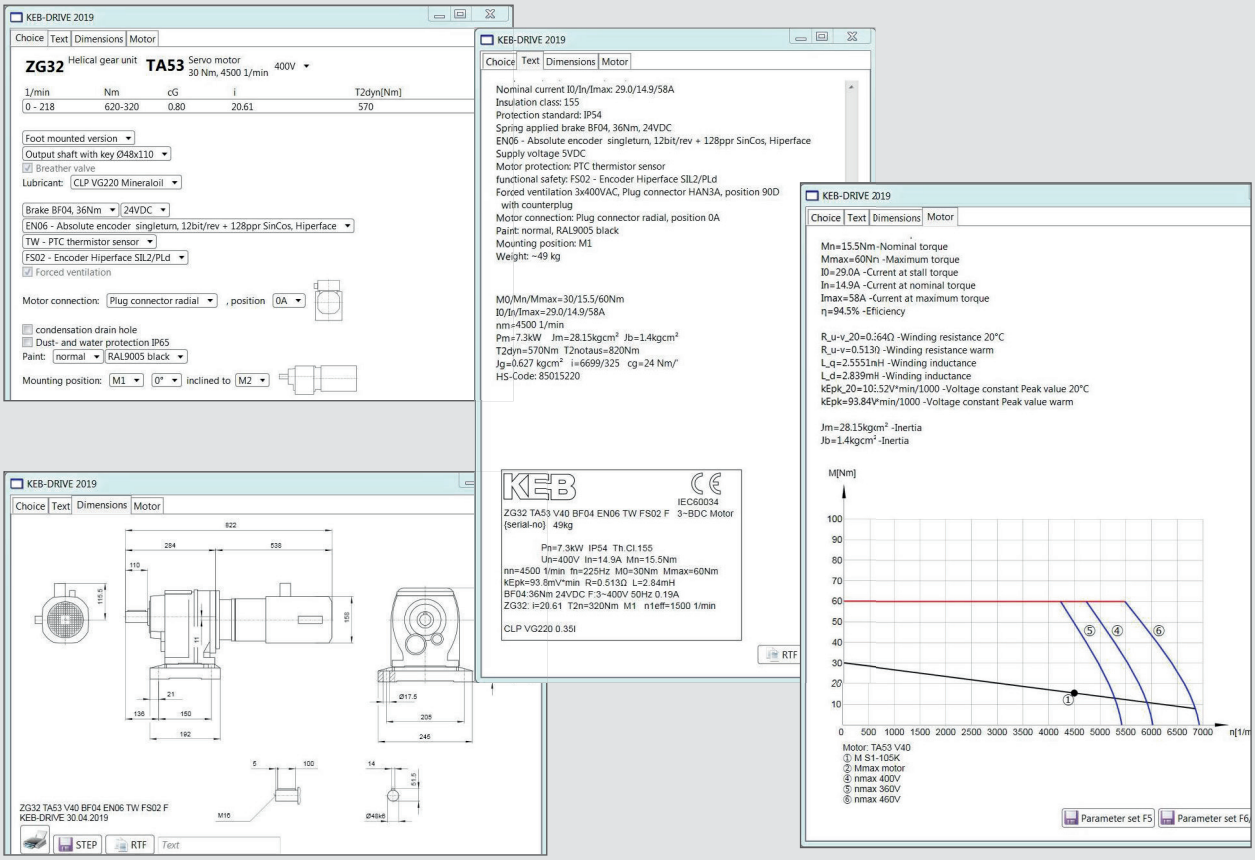
THREE-PHASE ASYNCHRONOUS MOTORS





KEB DRIVE

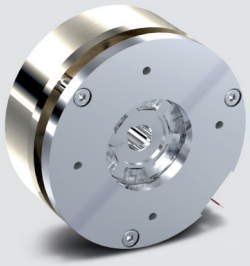
The fast configuration for motors and gears is done with the software KEB DRIVE.



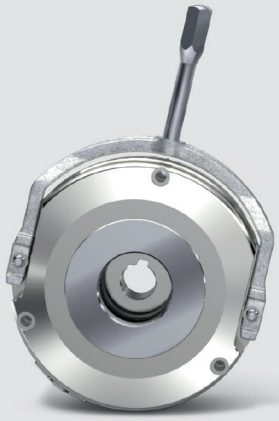
SERVOMOTORS

SPRING-APPLIED BRAKES

- Holding brakes from 0.3 Nm ... 1,500 Nm
- Options such as protection class IP 65
- Double brake design possible for theatres, elevators and lifts
- Optional microswitch to increase the diagnostic coverage level



COMBISTOP for servomotors



COMBISTOP for three-phase motors

HIGHLIGHTS

Servomotors DL3 & TA series

- Powerful, compact design, up to 82Nm nominal torque
- Option with KEB spring-applied brake
- Quick connect power and feedback connectors
- Safe encoder option: Hiperface, Resolver

Gear motors

- Induction or servo motor (up to 45kW)
- Spring-applied brake option with micro switch
- SIL2 and SIL3 encoder

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THE COMPLETE WORLDWIDE KEB PARTNER NETWORK

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