SYSTEM FOR **SAFETY**

EN

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 13840 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.

FUNCTION BLOCK PROGRAMMING

The safety controller is programmed based of the a Function Block Diagram (FBD) via Safety Editor in IEC61131-3. 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.

DRIVE COMMISSIONING - SAFE MOTION

Integrated Safe Drive functions are also commissioned with COMBIVIS studio safety. This is where the safety functionality and limits can be configured. The IDE also features a checksum to make sure the drive recieves the correct download.
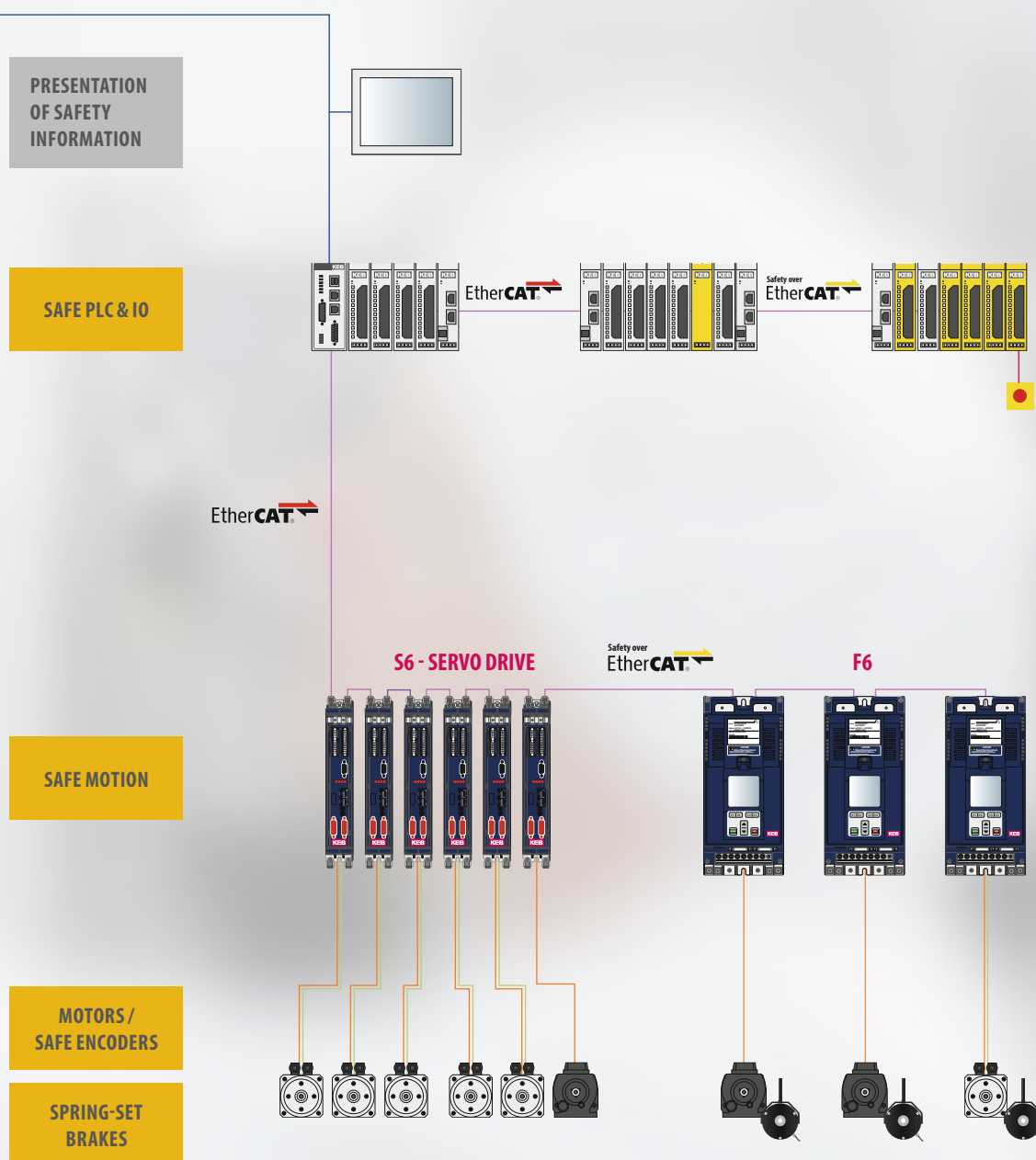
HARDWARE

Safe Automation

We understand system solution as a continuous architecture from the automation to the 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 FSoE communication creates a flexible interface in the drive level where modular safety solutions provide various safety functions.

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

PRESENTATION OF SAFETY INFORMATION

SAFE PLC & IO

EtherCAT

SAFE MOTION

S6 - SERVO DRIVE

Safety over EtherCAT

F6

MOTORS / SAFE ENCODERS

SPRING-SET BRAKES

SAFETY **PLC & I/O**

INSIDE THE AUTOMATION SYSTEM

Safety over
EtherCAT.

ADVANTAGES OF FUNCTIONAL SAFETY VIA FSoE

|	
Certified	approved by TÜV
Open	Managed by EtherCAT Technology Group (ETG)
Proven	FSoE established in 2010
Flexible	Machine PLC and Safety share common bus
Scalable	Up to 65,535 addressable slaves per master
Drive safety	Triggering Safety Functions in Drive over FSoE bus (e.g. STO, SLS, SLP, SOS, SS1, etc.)

Safe I/O

Safety PLC

EtherCAT.
Safety over
EtherCAT.

DECENTRALIZED SAFETY CONCEPT
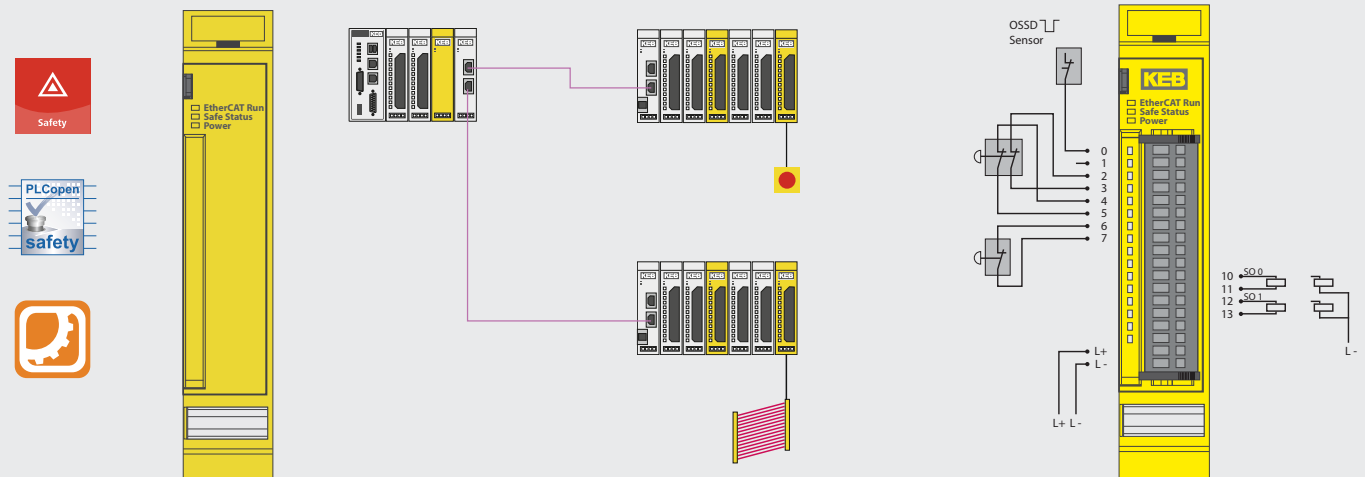
HIGHLIGHTS

Safety PLC
- Safety over EtherCAT (FSoE) Master
- TÜV approved
- IEC 61508 SIL3 and EN/ISO 13849-1 CAT. 4/PL e
- Black channel approach - main and safe control on the same bus
- Safety PLC can be used in decentralized topology

Safe I/O
- Safety over EtherCAT (FSoE) Slave
- TÜV approved
- IEC 61508 SIL3 and EN ISO 13849-1 CAT. 3/PL e
- Four safe inputs (with dedicated testpulse outputs)
- Two safe outputs (max = 2 Amps)
- Safe I/Os can be used in decentralized topology

DRIVES

FUNCTIONAL SAFETY (FS) DRIVES

KEB's 6th generation KEB drive products feature SIL3 Safe-Torque-Off (STO) as standard. This speaks to KEB's commitment to safety solutions moving forward and the standardization ultimately lowers the cost burden to customers.

Safety Module 1 in addition to STO, Module 1 adds Safe-Brake-Control (SBC) which provides a safe 24V supply for brake operation. Higher current useable by external Relay.

Safety Module 3 features safe motion functionality according to IEC 61800-5-2. Advanced motion-based safety functionality is possible in the drive. This improves reaction time in e-stop scenarios and lowers costs by reducing separate protective devices.
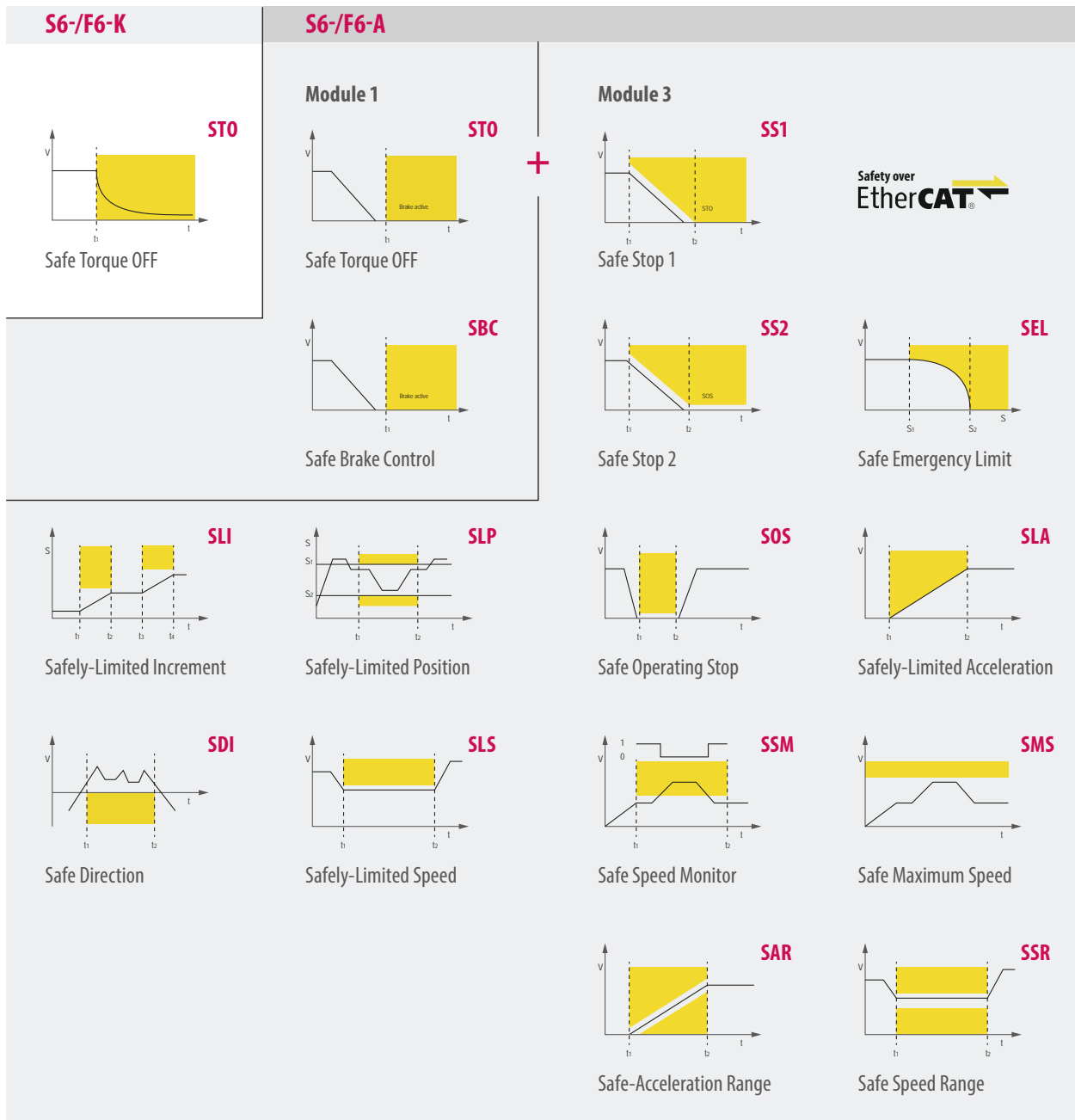
Additionally, Module 3 offers Safety over EtherCAT (FSoE) functionality where STO and all other KEB-supported safety functions can be controlled via the bus. This amounts to a huge savings in wiring. Additionally, safety levels (e.g. limits) can be changed. Safe actual speed and position can be transferred via the safe process data.

Safety I/O

EtherCAT **Safety over EtherCAT**

Real-time bus communication

Encoder input for safety encoders (X3A)

SBC - Safe Brake Control (24V, 2A)

HIGHLIGHTS

- Scalable safety concept
- Up to PL e (ISO13849-1) and SIL3 (IEC61508 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
- Dual channel ripple interface for cascading safety chain
- Up to 8 different configurations stored

BASED **SAFETY**

S6-/F6-K

ST0

Safe Torque OFF

S6-/F6-A

Module 1

ST0

Brake active

Safe Torque OFF

SBC

Brake active

Safe Brake Control

+

Module 3

SS1

STO

Safe Stop 1

SS2

SOS

Safe Stop 2

Safety over EtherCAT

SEL

Safe Emergency Limit

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

KEB 6th generation drives, like the S6 or F6, feature scalable safety functionality. Only pay for the safety functionality that you need. With Safety Module 3, two different safety functionalities can be implemented in addition to the ripple safety function (safety chain).

## 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

SERVO MOTORS   TA SERIES

Compact design 200 & 400V classes

**Safe Feedback options
Absolute multi-turn available
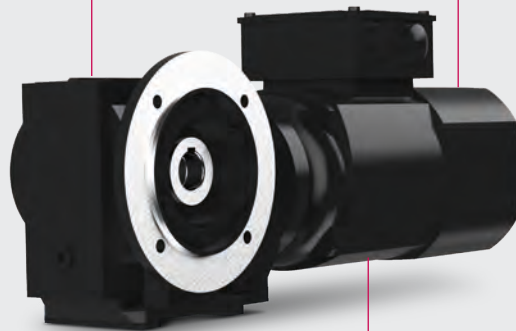(safe in single turn range)**
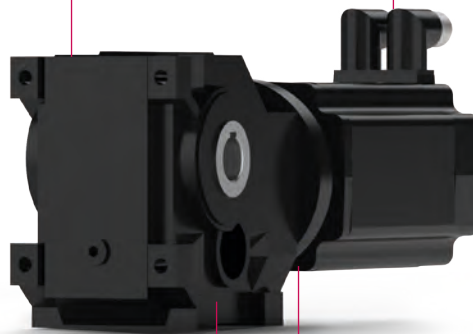
KEB spring-set brakes

Optional Integral or Planetary gearing

Narrow body allows dynamic operation

GEAR MOTORS

4 Styles of Efficient Gearing

SIL2 encoder options

KEB spring-set brakes

IE3 motors - up to 45kW

HIGHLIGHTS

Servo motors   DL3 & TA series
- Powerful, compact design, up to 82Nm nominal torque
- Option with KEB spring-set brake
- Quick connect power and feedback connectors
- Safe encoder options including absolute formats like Hiperface and BiSS

Gear motors
- Induction or servo motor (up to 45kW)
- Spring-set brake option with microswitch
- SIL2 encoder options

KEB

Automation **with Drive**

www.keb.de