CONTROL TECHNIQUES

SAFETY

PROTECTED FROM ALL ANGLES

INTEGRATED SAFETY

DRIVE OBSESSED

SAFER MACHINES WITH

WHAT IS FUNCTIONAL SAFETY?

Functional Safety entails the detection of a potentially dangerous condition resulting in the activation of a protective or corrective device or mechanism to prevent hazardous events arising or providing mitigation to reduce the consequence of the hazardous event.

Machinery Directive 2006/42/EC

EN ISO 12100

Risk Assessment
- Identify hazards
- Assess safety requirements

→

Safe Machine Design
- Make design inherently safe
- Eliminate hazards

→

Design Safety Measures
- Design safety system to reduce residual risk

IEC 62061
Safety Integrated Level (SIL)
> SIL1 - Lowest Level
> SIL3 - Highest Level

ISO 13849-1
Performance Level (PL)
> PL a - Lowest Level
> PL e - Highest Level

In the design of a machine, a risk assessment must be performed and then updated regularly.

As far as possible, the machine should be designed to be inherently safe, so that hazards are eliminated from the basic design.

However, in most cases some risks remain at an unacceptable level and must be actively reduced using suitable control measures.

Drives with integrated safety

Safety Sensor → **Safety Monitor** → **Drive System**

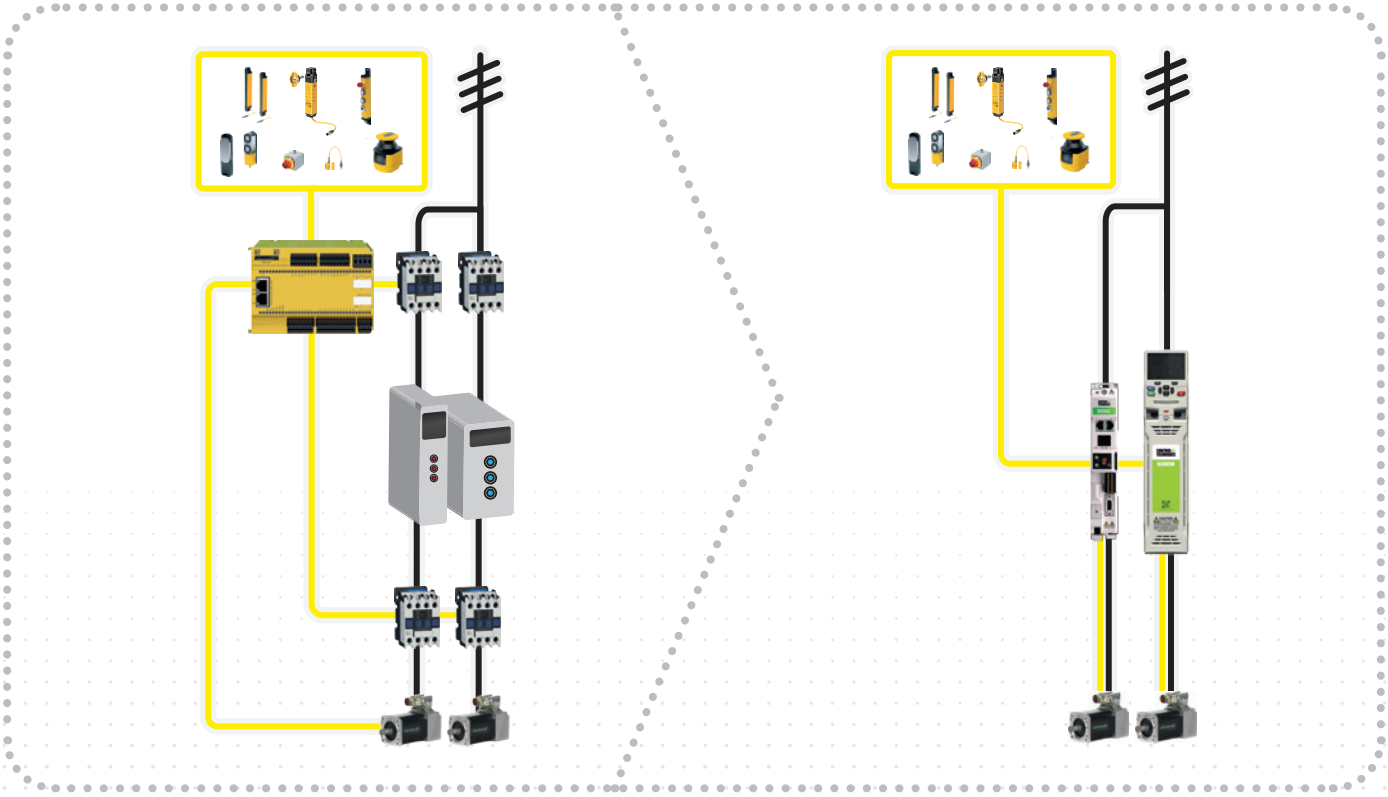
INTEGRATED SAFETY

WHY INTEGRATED SAFETY?

The integration of motion safety functions in the drive supports a decentralised approach to the machine's functional safety that brings many benefits:

- Reduced complexity and therefore design time
- Reduced wiring and consequential costs
- Ease of commissioning
- Speed of actuation, thanks to close-coupling of safety function and drive

Conventional approach **Integrated safety**



INTEGRATED SAFETY
THE NEW PARADIGM OF SYSTEM DESIGN

Modern industrial processes face a three-fold challenge: the constant demand for increased machine throughput, matched by a parallel need to reduce complexity and points of failure, all the while ensuring the health and safety of human operators and allowing them interaction with the running process.

Modernising system design, replacing traditional electro-mechanical safety components with the capabilities of the latest generation of variable speed drives, is the new standard across industries to increase efficiency and availability.

Unidrive and Digitax offer integrated dual Safe Torque Off (STO) inputs, certified to SIL3 / PLe, providing an elegant and more reliable solution over traditional motor contactors.

The MiS210 and MiS250 safety options extend the built-in STO with the ability to safely monitor and/or restrict the scope of motion. Supporting both wired and safety fieldbus connections, they offer maximum flexibility in the safety system architecture.

TÜVRheinland®
CERTIFIED

Simple, cost-effective & functional

The conventional approach to functional safety relies on an external safety controller, electromechanical components to disconnect the drive from the motor and often additional sensors to monitor speed or position.

Integrated safety can **dramatically reduce the cost and design time**.

Onboard STO safely switches off torque to the motor negating the need for external contactors.

The addition of an MiS210 or MiS250 Safety option enables complex safe motion monitoring directly on the drive using the existing motor encoder.

While many applications can be completely solved with a drive-based distributed architecture, when an external safety PLC is required, drive integration is easily achieved using network safety protocols.

Performance without compromises

When protecting people and equipment from hazards, timeliness is of the essence.

Integrated safety offers **faster reaction times**, thanks to the close-coupling of safety function and drive.

Support of the SafeEnDat protocol enables the use of functional safety certified encoders, with the ability to reach SIL 3 / PLe with a single motor-mounted encoder.

All of our integrated safety functions are externally certified to control category SIL 3 or PLe (Performance Level e).

Flexible safety solution

With an integrated safety solution from Control Techniques you always enjoy **maximum flexibility**, be it in the functional design or the choice of components and protocols to integrate.

The MiS210 and MiS250 options support several encoder protocols on up to 4 different channels wired to the drive or directly to the module. Onboard Motion Safety Functions support multiple instances and safe logic blocks are also available to allow implementation of complex safety chains.

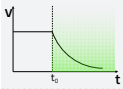
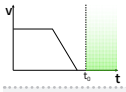
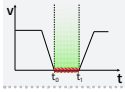
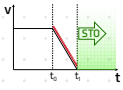
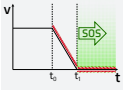
Control and monitoring of the functions, as well as transfer of safe position and speed values are available over the main safety fieldbuses: CIP Safety over EtherNet/IP and FSoE over EtherCAT.

REDUCE DOWNTIME WITH MOTION SAFETY

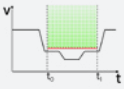
When human intervention is required to carry out inspection and repair or simply during production, it is essential to protect personnel from interaction with dangerous moving parts.

A comprehensive selection of Motion Safety Functions offers the flexibility to provide maximum protection whilst minimising the impact on machine availability.

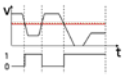
Brake and stop

	STO	**Safe Torque Off** prevents the drive from generating toque in the motor. The drive's DC link stays energized, allowing for a fast restart
	SBC	**Safe Brake Control** can be used in conjunction with STO for the safe control of an electromechanical brake
	SOS	**Safe Operating Stop** keeps the energized motor in a safely monitored standstill condition
	SS1	**Safe Stop 1** allows a controlled stop of the motor before removing power via the Safe Torque Off
	SS2	**Safe Stop 2** allows a controlled stop of the motor followed by a Safe Operating Stop condition

Speed and acceleration monitoring

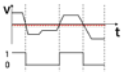


SLS **Safely Limited Speed** safely monitors the motor speed to keep it within a specified limit



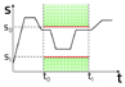
SSM **Safe Speed Monitor** provides a safe signal to indicate the motor is operating below a specified speed limit

SLA **Safely Limited Acceleration** safely monitors the motor acceleration to keep it within a specified limit



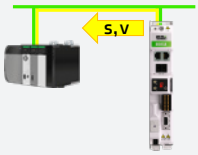
SDI **Safe Direction** safely monitors the motion direction

Position monitoring



SLP **Safely Limited Position** monitors the absolute position of the motor to prevent it from moving outside of the specified range

Network safety



Safe Value Transfer safe position and speed value transfer over safety fieldbus for further processing by safety controller

Additional functions

STHC3 – Safe Two-Handed Control safely monitors the contemporary application of two push-buttons

SES **Safe Emergency Stop** safe monitoring of an emergency stop button

NETWORK SAFETY

NETWORK SAFETY

MORE SAFETY WITH LESS WIRING

Activate and monitor all motion safety functions over the fieldbus for minimum wiring and maximum flexibility.

The black channel principle allows safety data to travel alongside standard, non-safety-relevant information on the same Ethernet medium.

This means that even complex safety configurations can be implemented with minimal wiring and without changes to the existing network topology.

MiS210 and MiS250 safety options support all the main industry standards for easy integration in any automation architecture.

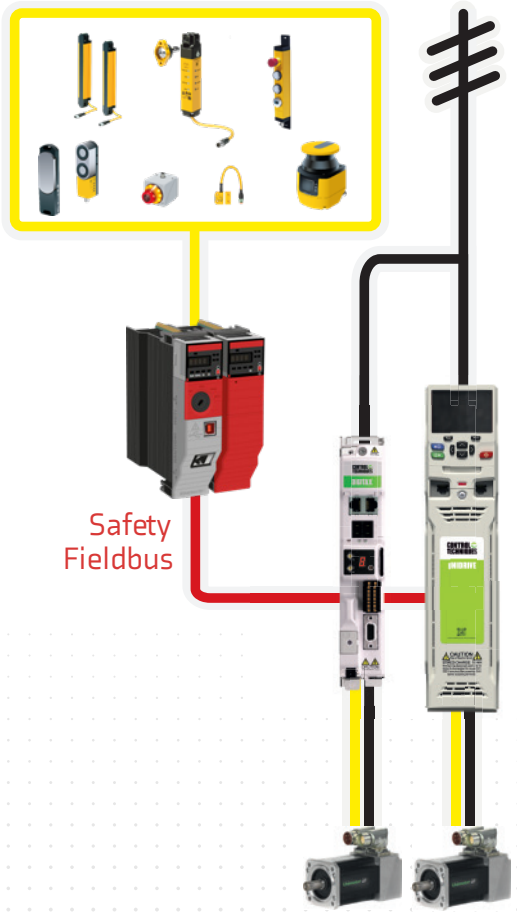
- CIP-Safety on EtherNet/IP
- Safety over EtherCAT (FSoE)

Safety over EtherCAT

CIP Safety™

For extra flexibility, safe position and speed values can be transferred to an external controller for further processing.

Support for the Safe EnDat protocol means that the maximum safety integrity level can be achieved without the need for extra wiring and additional feedback devices.



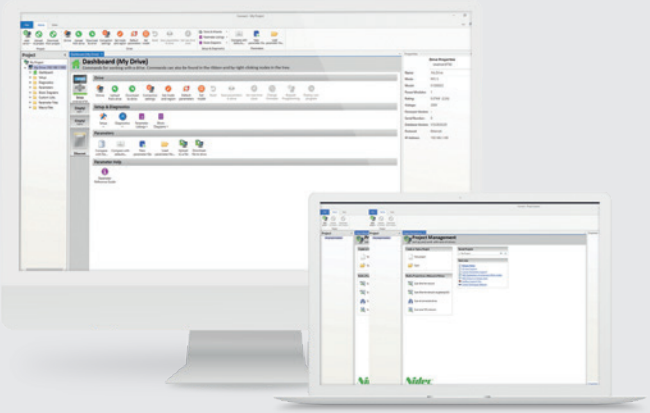
CONFIGURING SAFETY

WE MAKE IT QUICK AND EASY

Our free Connect PC tool is your hub for commissioning, optimising and monitoring drive and system performance. Its development draws from our extensive user research, using human-centred design principles to give a superior user experience.

Integrated safety is easily configured within Connect via the drives built-in communication port.

- Dedicated dashboard to quick access all safety-related tasks
- Simply add the functions you need and follow the guided screens for easy parametrisation - no code writing is needed
- Safety application test mode with enhanced diagnostic
- Automatic Sign-Off report generation to streamline the validation process



Diagnostics? There's an app for that

FREE DOWNLOAD

Diagnostic Tool

The Diagnostic Tool App is a fast and simple tool, which allows users to quickly solve any error codes that the drive may show.

Get it from Microsoft
Download on the App Store
GET IT ON Google Play

Download from:
controltechniques.com/mobile-applications

*For Microsoft users, this mobile app operates with Windows 10 only.

FREE DOWNLOAD

Drive set-up

Quickly find everything you need for quick and easy installation of your drives.
Visit: www.drive-setup.com

Access a series of training videos, available on YouTube, visit:
www.youtube.com/controltechniques

SPECIFICATION

All Unidrive and Digitax drives offer onboard STO as standard.

The MiS210 and MiS250 safety option modules extend the built-in STO with the ability to safely monitor and/or restrict the scope of motion.

Safety Option Module

Unidrive M

Digitax HD

		MiS210	MiS250
		Order No. 82400000021100	Order No. 82700000021500
Safe I/O	STO integration	"blade" connector	wired
	Safe Input Pairs	4	4
	Safe Outputs	2	1(+1 used for STO)
	Pulse Outputs	2	2
Encoders	Local Encoders	2	2
	Encoder PSU	1	1
	Encoder external PSU Monitoring	1	1
Network Safety	Safety over EtherCAT (FSoE)	with SI-EtherCAT	on M753
	CIP Safety	on M700/M702	on M750
Motion Safety Functions (instances)	Safe Stop 1	1	1
	Safe Stop 2	1	1
	Safe Operating Stop	4	4
	Safe Brake Control	1	1
	Safely Limited Speed	4	4
	Safe Speed Monitor	4	4
	Safely Limited Acceleration	4	4
	Safe Direction	2	2
	Safely Limited Position	4	4
	Safe Datum	1	1
	Safe Value Transfer	Position, Speed	Position, Speed
	Safe Two-Handed Control	1	1
	Safe Emergency Stop	1	1

WWW.CONTROLTECHNIQUES.COM

DRIVE OBSESSED

CONTROL TECHNIQUES

Control Techniques has been designing and manufacturing the best variable speed drives in the world since 1973.

Our customers reward our commitment to building drives that outperform the market. They trust us to deliver on time every time with our trademark outstanding service.

More than 45 years later, we're still in pursuit of the best motor control, reliability and energy efficiency you can build into a drive. That's what we promise to deliver, today and always.

1.5K+
Employees

70
Countries

#1 FOR ADVANCED MOTOR AND DRIVE TECHNOLOGY

Nidec

Nidec Corporation is a global manufacturer of electric motors and drives.

Nidec was set up in 1973. The company made small precision AC motors and had four employees. Today, it's a global corporation that develops, builds and installs cutting-edge drives, motors and control systems in over 70 countries with a workforce of more than 110,000.

You'll find its innovations in thousands of industrial plants, IoT products, home appliances, cars, robotics, mobile phones, haptic devices, medical apparatus and IT equipment all over the world.

112K	$14.2B	44+	337+
Employees	Group Turnover	Countries	Companies

CONTROL TECHNIQUES

CONTROL TECHNIQUES.
NO ONE KNOWS DRIVES LIKE WE DO.

Our drive obsessive representatives will drive you in the right direction and give you first class support whenever you need it.

For more information, or to find your local drive centre, visit:

www.controltechniques.com
www.driveobsessed.com

Connect with us

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All for dreams