



Kollmorgen

INDUSTRIAL AUTOMATION OVERVIEW

S700

KOLLMORGEN[™]

Because Motion Matters.[™]

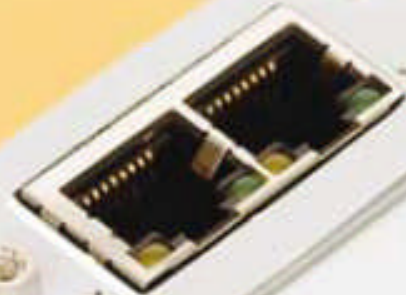
A DANAHER MOTION COMPANY



S700



X7A



X7B
X2

X1



X3A

X3B



WAHER

Your Benefits

KOLLMORGEN

Because Motion Matters.™

Advantage	Why	S300	S700
Increased throughput	High performances allow to get a reduced settling time and thus increase the number of cycles of your machine.. The “Safety” On Board allow you to speed up some operation in your machine.		
Reduced part #	Multifeedback, MultiFieldbus, MultiMotor and With a single part number in your stock you can cover the needs of any application. Reduce time to train your people.		
Smaller switchgear cabinets	High level features reduce the need of external devices. EMC filters, Safety, Regen resistors are integrated. Also the capability to parallel the DC bus avoid to use external components.....		
Esay to use	MMC memory card helps production as on field replacement. 8 click to have the motor running.		
Cost rduction	Ethernet/CanOPEN on board (S700) Reduces the needs of external devices. Flexible, suitable for any application Modern GUI		

- **Broad Voltage range, US and Europe**
 - S700: 208V – 480V, 1~/3~
 - S300: 115V - 230V, 1~/3~
230V - 480V, 3~
- **EMC filter built in**
 - No hidden cost
- **world wide approved**
 - CE, UL/cUL, GOST-R, RoHS, REACH



S700 power ratings

	Voltage 50-60 Hz	I _{cont} (rms)	I _{peak} (rms)	Rated Power (at 480V)	Regen int.	Regen ext.
S701	208...408 V	1.5 A	4.5 A	1,1 kW	50 W	300 W
S703	208...480 V	3 A	9 A	2,2 kW	50 W	1 kW
S706	208...480 V	6 A	18 A	4,5 kW	75 W	1 kW
S712	208...480 V	12 A	24 A	9 kW	100 W	1.5 kW
S7120P	208...480 V	12 A	30 A	9 kW	100 W	1.5 kW
S724	208...480 V	24 A	48 A	18 kW	200 W	2 kW
S7240P	208...480 V	24 A	72 A	18 kW	200 W	2 kW
S748	208...480 V	48 A	96 A	36 kW	-	6 kW
S772	208...480 V	72 A	140 A	52,5 kW	-	6 kW

- **Safe Torque Off onboard** EN13489-1 PLe IEC62061 SIL3
 - Switches off of IGBTs
 - Reduces cost for cutting power
 - Certified
 - Prevent from accidental movement
- **The DC-bus can be paralleled**
 - Also among drives of different sizes
- **Internal regen resistor**
 - External as a option
 - No Hidden cost
 - Often no need of external regen resistor



S700: Safe and Flexible

- **Safety Expansion**

- Meets EN 61800-5-2 e IEC 61508
- Offer STO, SS1, SS2, SOS, SLS, SSR, SDI
- (STO Old EN 954-1 Cat 3)
- New IEC62061 SIL3 or PL e EN13489-1 on board



- **MMC Memory card**

- Backup for Parameters & Firmware upgrade
- Comfortable in production
- Easy replacement

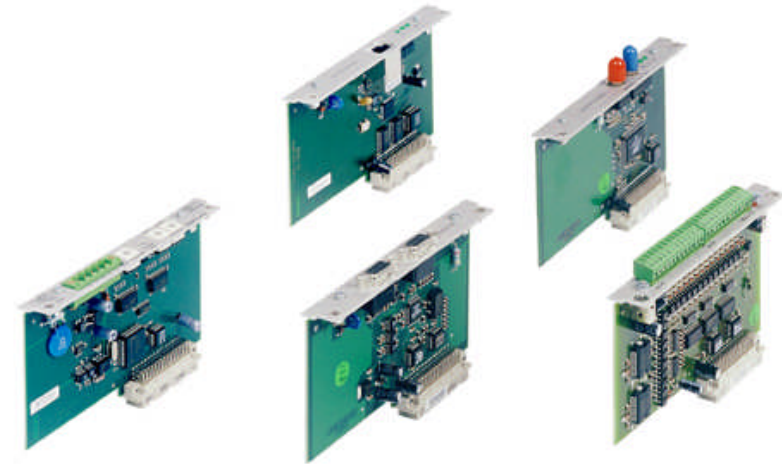
- **2 Expansion slots**

Inputs / Outputs S700

- 4 x Digital in - on board
- 2 x Digital In or Digital Out (switchable) - on board
- 2 x Analog In - on board (16/12 Bit)
- 2 x Analog Out - Option Card (under development)
- Encoder Emulation Out - Option Card
- 14 x Digital In - Option Card
- 8 x Digital Out - Option Card

S700 Fieldbus

- RS232 - on board
- CAN – on board
- PROFIBUS – Option Card
- Sercos – Option Card
- Ethercat – Option Card
- DeviceNet – Option Card
- SynqNet – Option Card
- Others (PLC600.....)



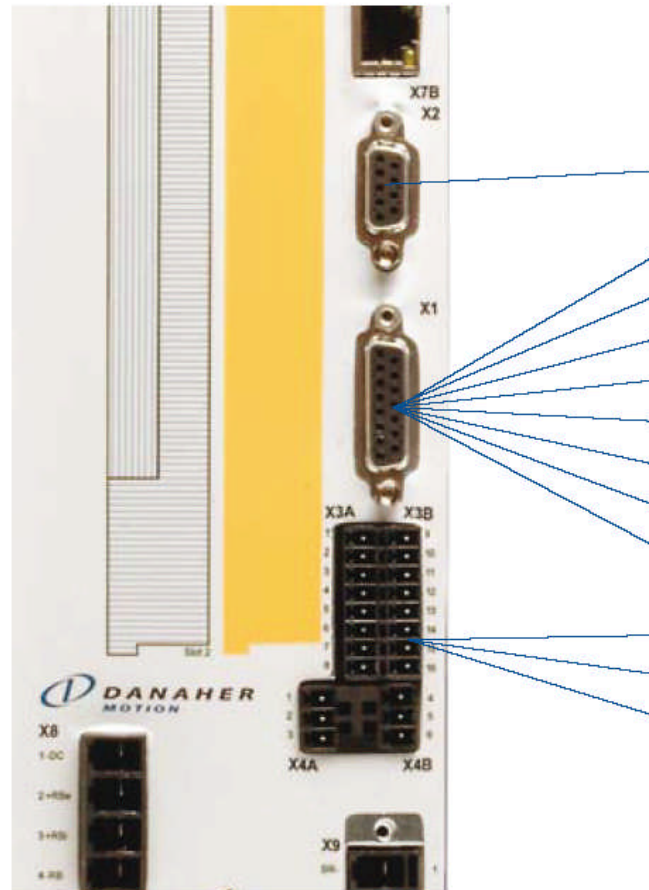
- EtherNet On Board
 - **EtherCAT**
 - **SynqNet**
 - **Ethernet TCP/IP**
 - **Sercos III**
 - **Powerlink**
 - **ProfiNET**
 - **EtherNet IP**
 -



S700 feedback possibilities

Different Feedback Types - No Hardware Option

- Resolver (20/14 Bit)
 - SinCos Encoder
 - with **W&S** or Hall sensor
 - **EnDat 2.1** (also linear)
 - **Hiperface**
 - **BISS**
 - **analog halls**
 - SSI Encoder
 - A quad B Encoder
 - with **W&S** or Hall Sensors
(Comcoder)
 - Hall only feedback
 - with **interpolation**
 - Digital Encoder
 - **Biss**
 - **EnDat 2.2**
- or
- Sensorless



- 2 to 36-pin resolvers
- SinCos encoder with BISS
- SinCos encoder with ENDAT 2.1
- SinCos encoder with HIPERFACE
- SinCos encoder without data track
- SinCos encoder + Hall-effect sensor
- Hall-effect sensor
- Incremental encoder (AquadB) 5 V
- Incremental encoder (AquadB) 5 V + Hall-effect sensor
- Incremental encoder (AquadB) 24 V
- Incremental encoder (AquadB) 24 V + Hall-effect sensor
- Pulse/direction 24 V

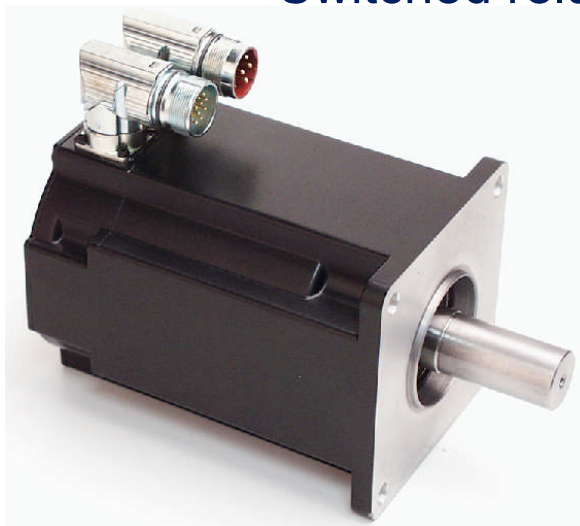
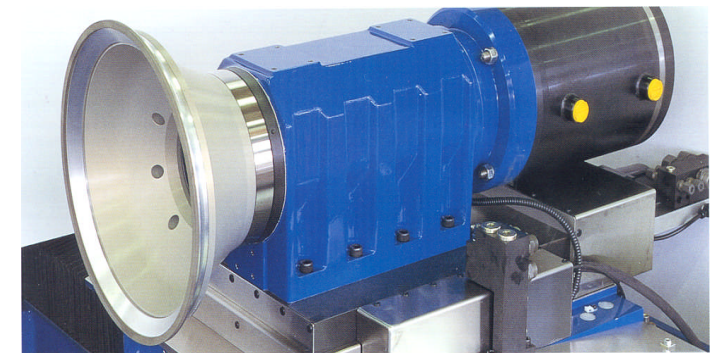
Optional

- SSI absolute encoder
- Pulse/direction 5 V

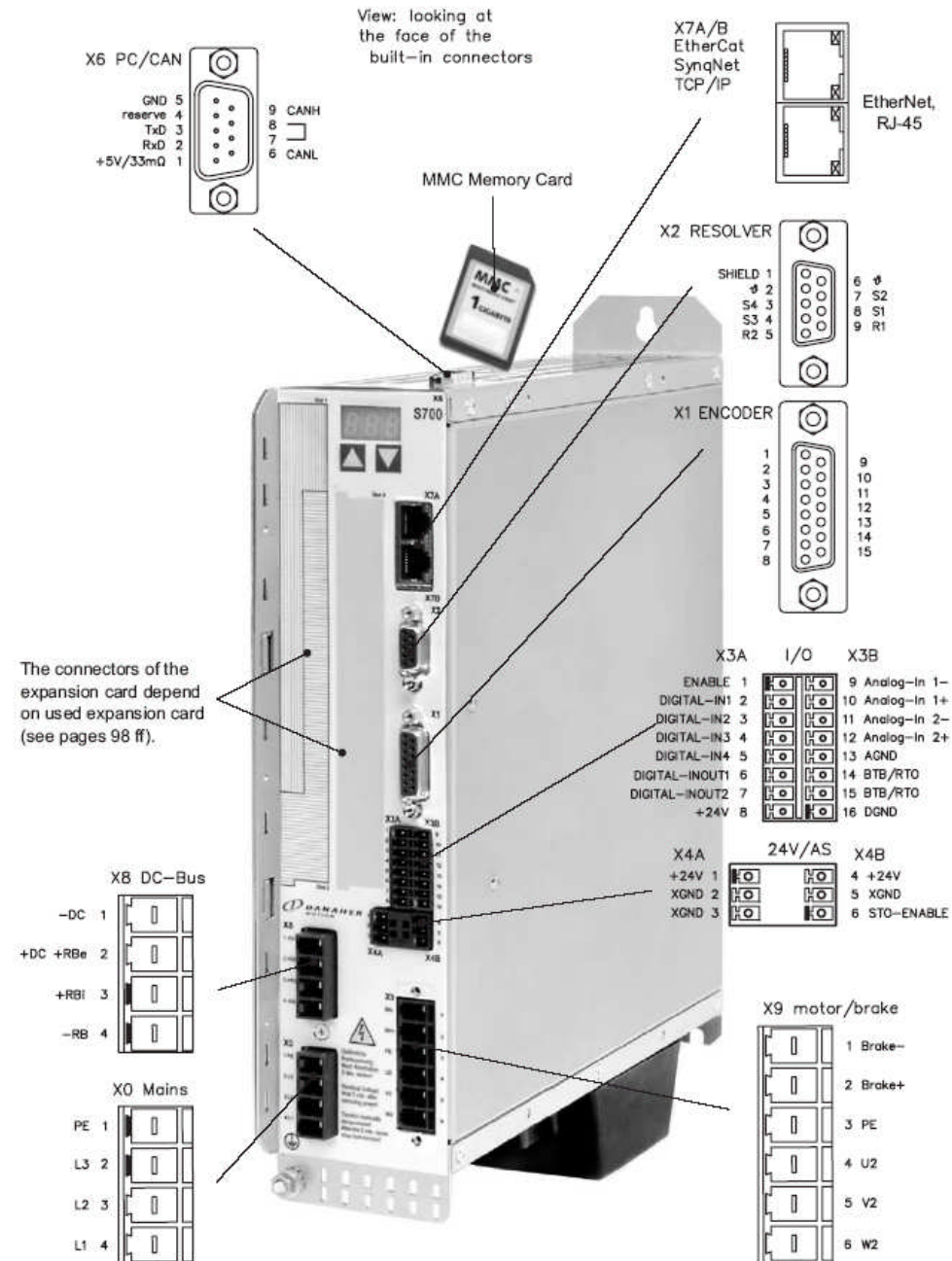
S700 Motors

6 Different motors technology with no option

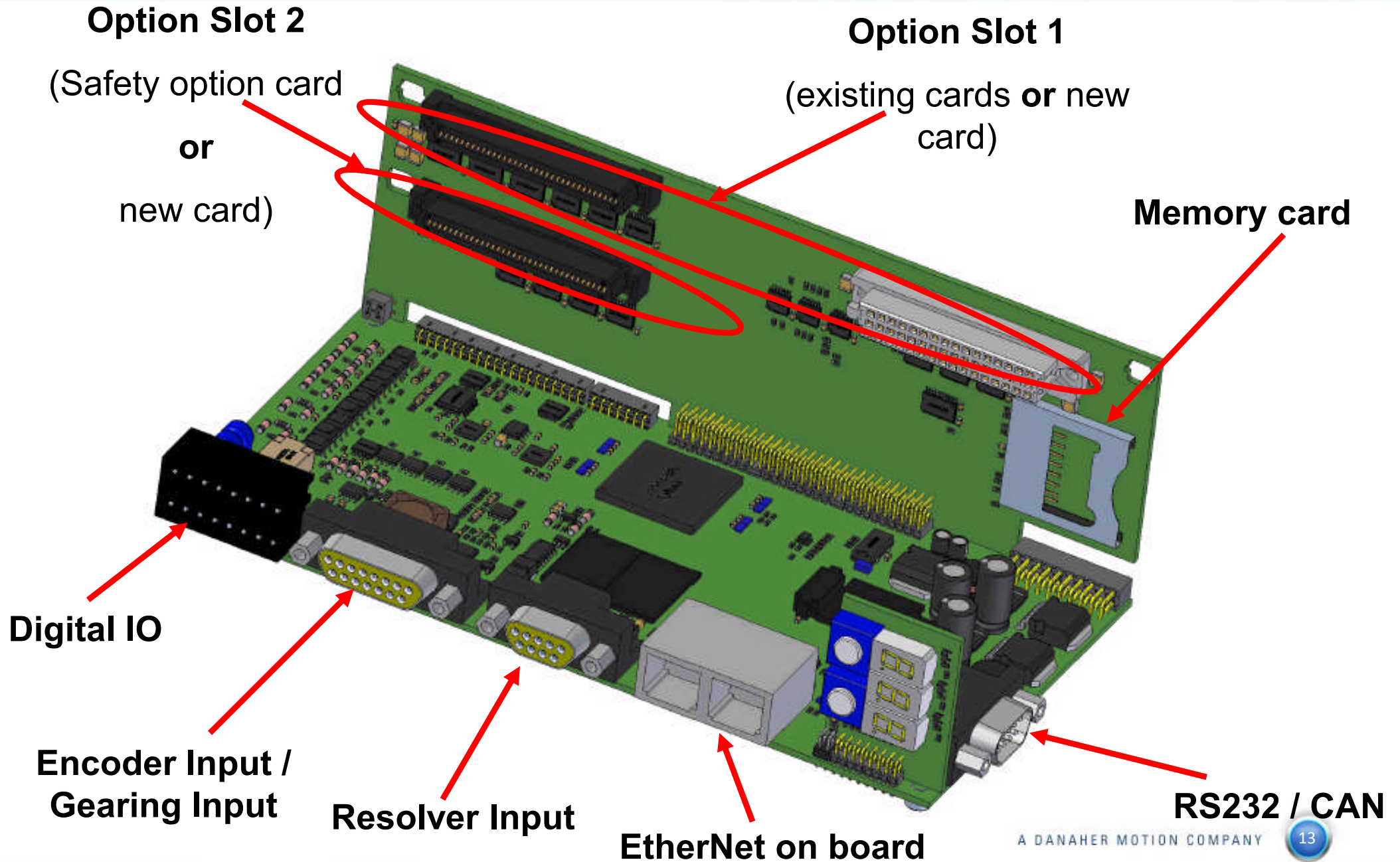
- Rotary PM Servo motors (DBL/DBK/AKM)
- Direct Drive Rotary (DDR)
- Direct Drive Linear (DDL)
- Induction motors
- DC Motors
- Switched reluctance motors



S700

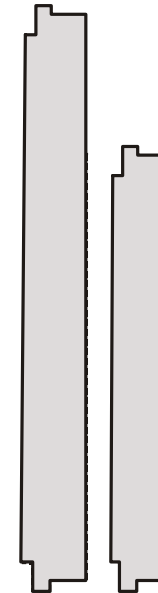
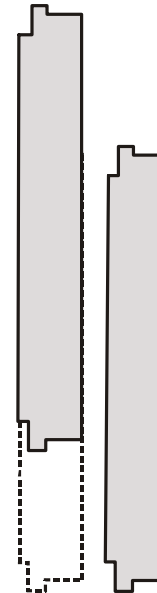
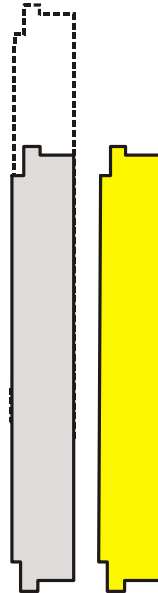
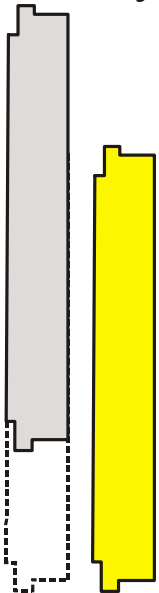


S700 control architecture



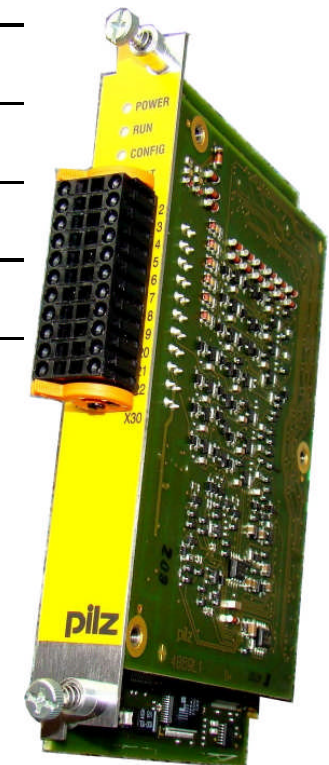
Expansion Cards combinations

- 1 – Former format + safety
- 2 – New format + Safety
- 3 – Former format + New format
- 4 – New maxi format + New format



Functionality Safety Card S2 for S700

Category	Name	Description
Stop Functions	STO	Safe Torque Off
	SS1	Safe Stop 1
	SS2	Safe Stop 2
Motion Monitoring	SOS	Safe Operating Stop
	SLS	Safely Limited Speed
	SSR	Safe Speed Range
	SDI	Safe Direction

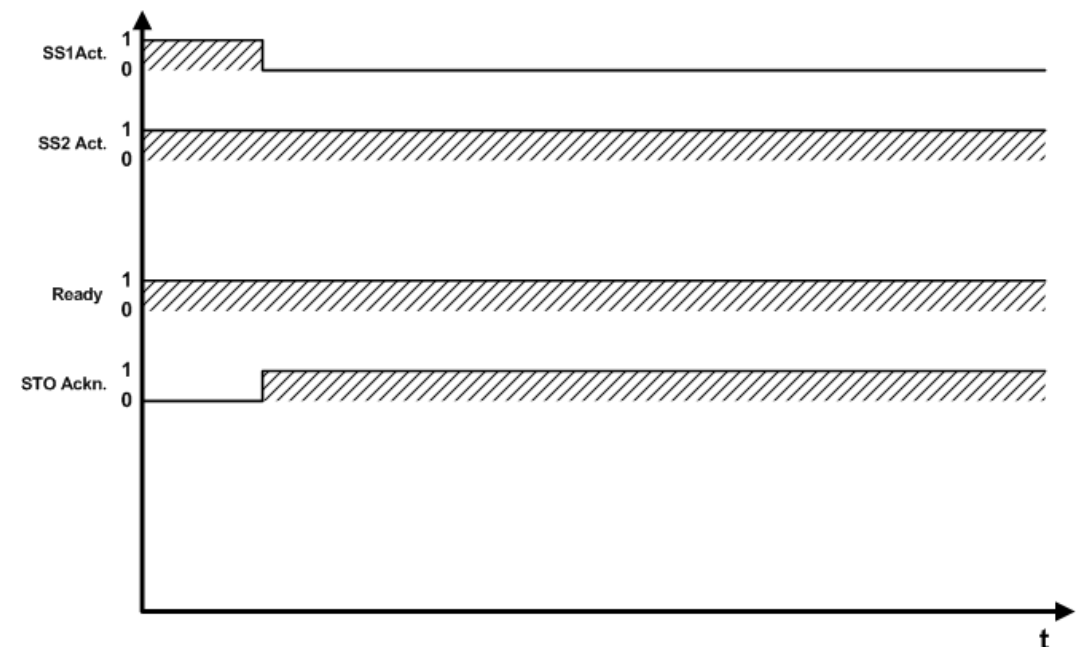
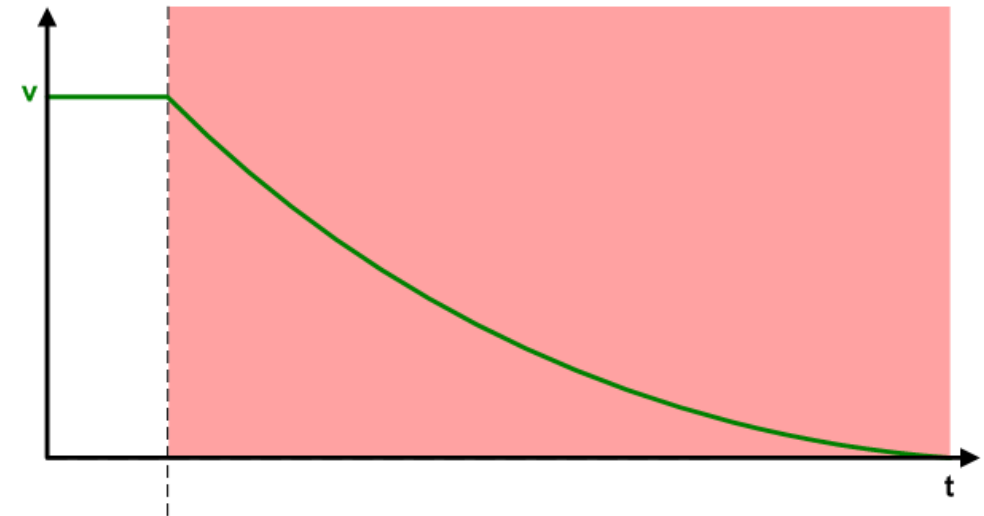


Highlights Safety Card

- **Very fast release time**
 - Safetycard ca. 2-3ms / Extern P.. solution 30ms
- **Works with all Standard Feedbacks.**
 - No higher costs for a special feedback
 - No expensive SinCos Feedback necessary
 - No second feedback necessary
 - Same feedback cable
- **Highest safety level**
 - Sil 3 possible
- **High level software**
 - Ease of use / High safety
 - Password protect
- **Easy and fast mounting**
- **Patented system for low speed control**

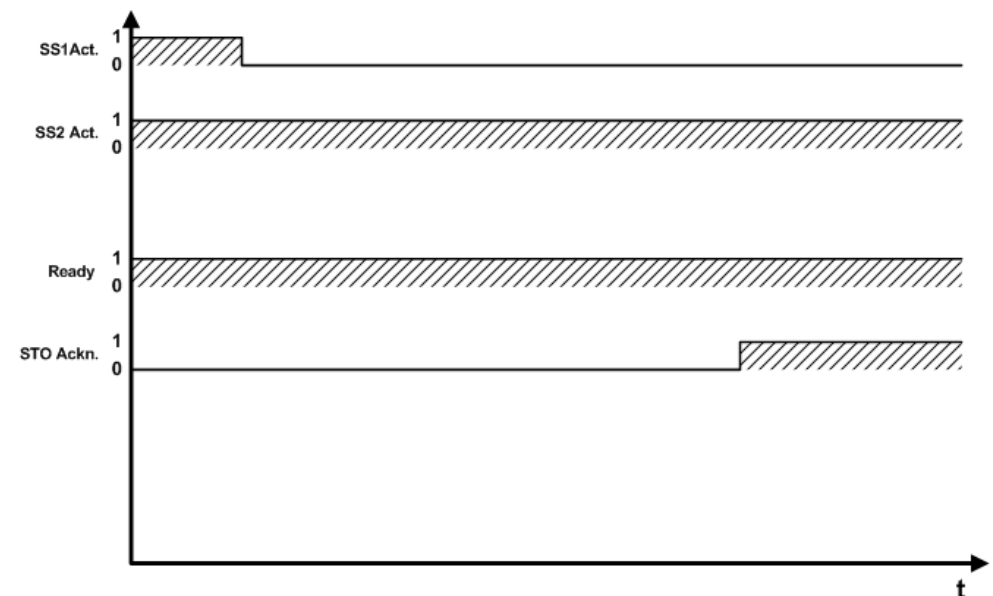
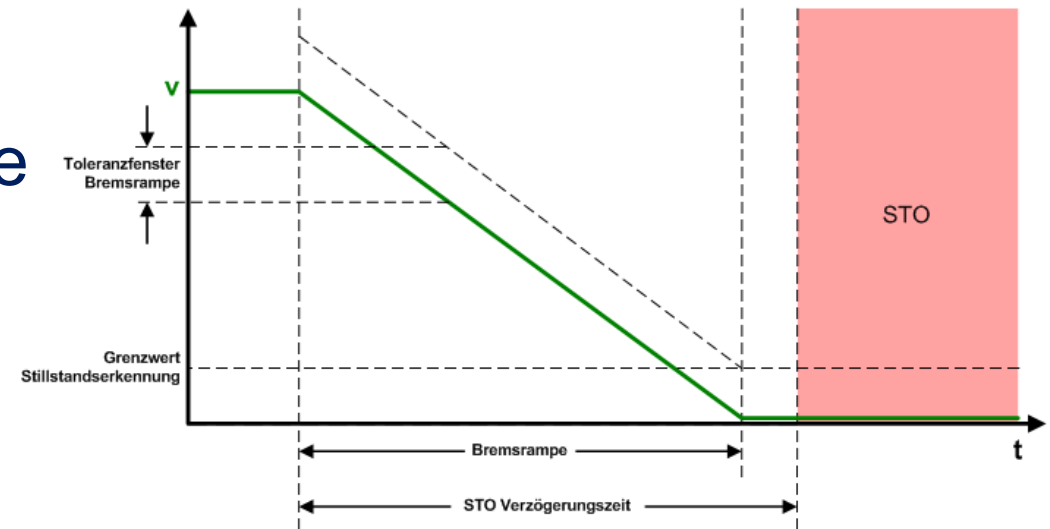
Safety Function STO - Safe Torque Off

- Base functionality of the Servo Amplifier
- Equivalent to a category 0 stop acc. to EN 60204-1 (uncontrolled stop)
- Undefined run-out of the motor
- Special case of SS1 with 0 sec delay time
- Error function in case of internal faults



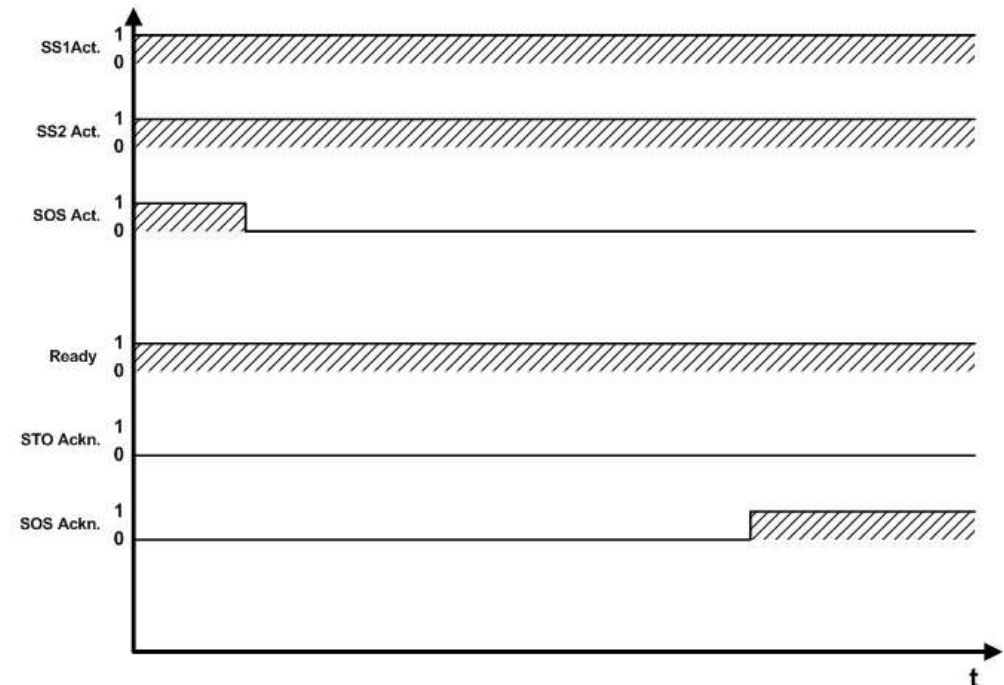
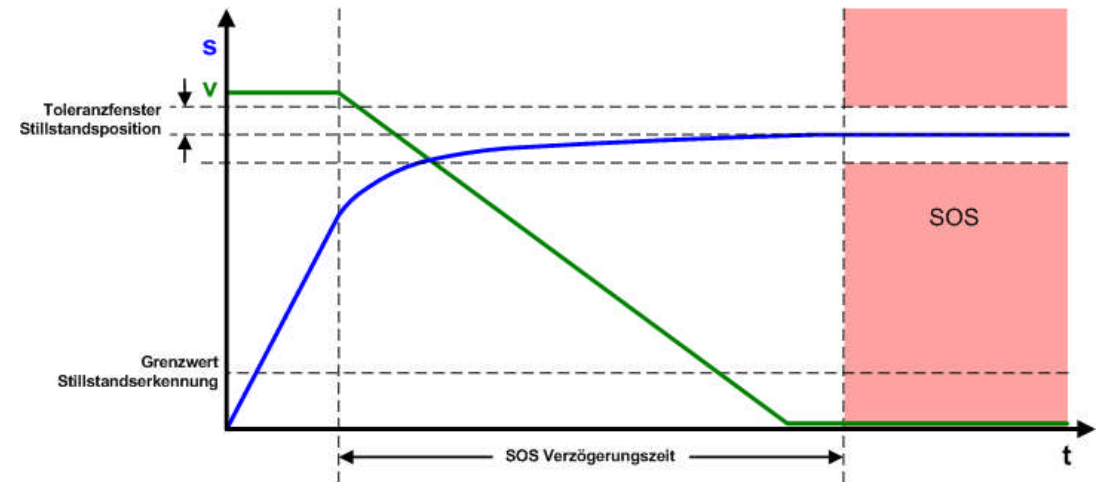
Safety Function SS1 – Safe Stop 1

- Equivalent to a category 1 stop acc. to EN 60204-1 (controlled stop and cut of the power supply)
- Standard function with supervised time delay
- Option „automatic standstill detection“
- Option „brake ramp supervision “
- Error if limit values are reached
- Motor delay controlled by drive or PLC



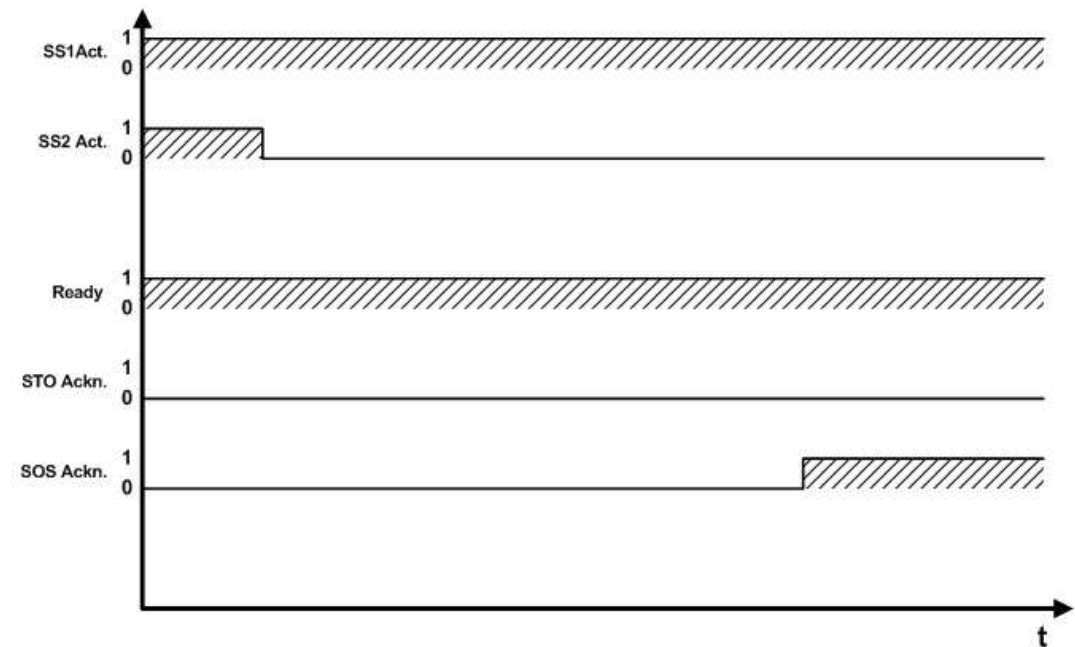
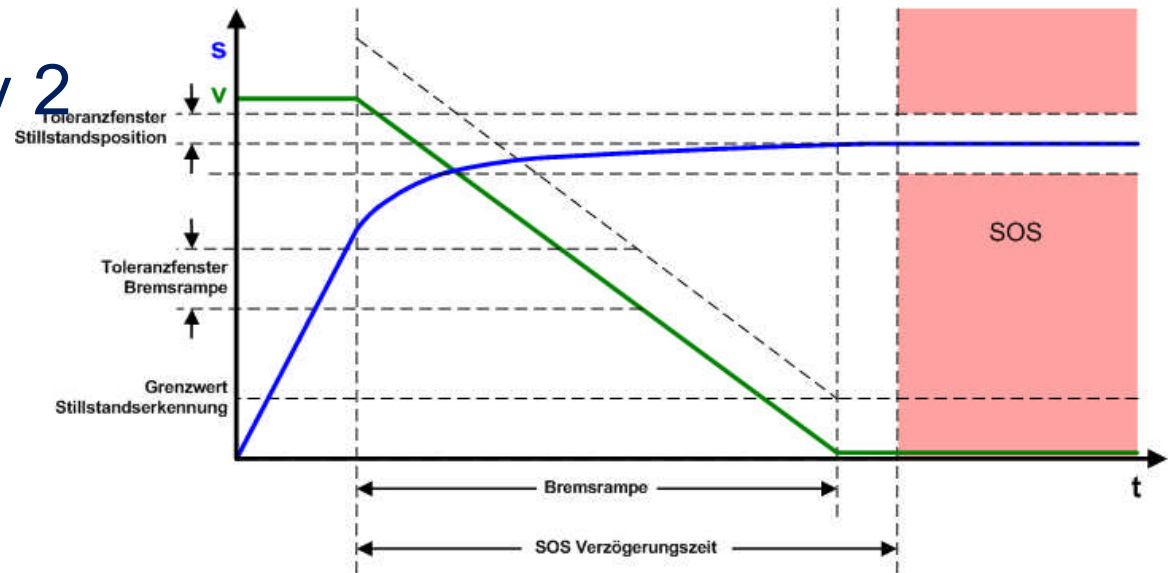
Safety Function SOS – Safe Operating Stop

- Motor is in controlled state (with torque)
- Limit value is defined as a position window
- Is part of SS2



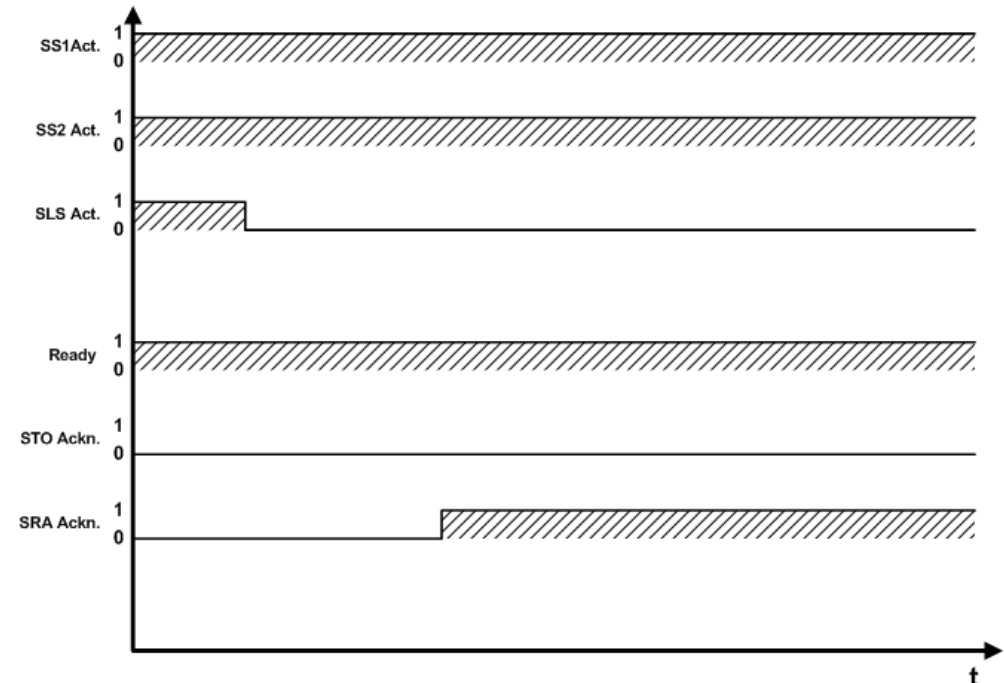
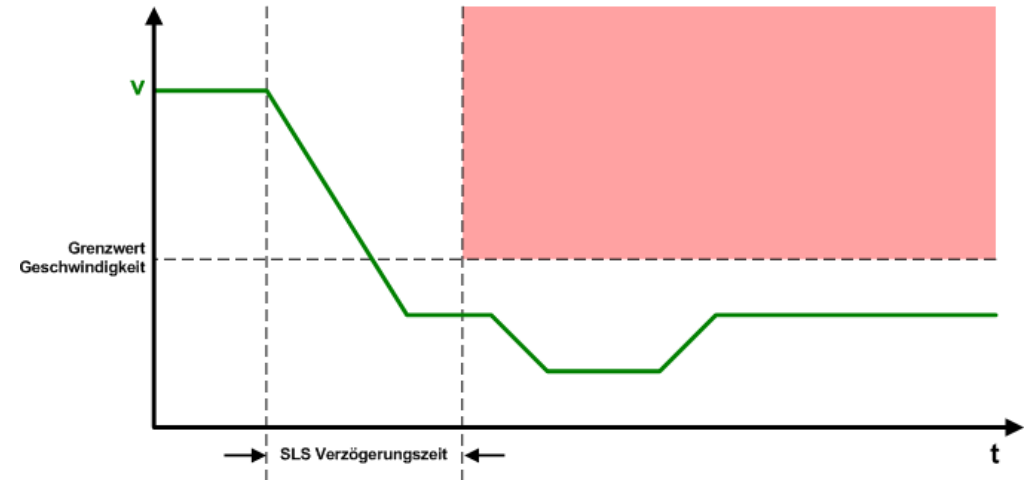
Safety Function SS2 – Safe Stop 2

- Equivalent to a category 2 stop acc. to EN 60204-1 (controlled stop and controlled standstill supervision)
- Standard function with supervised time delay
- Option „Automatic standstill detection“
- Option „Brake ramp supervision“
- Motor delay controlled by drive or PLC



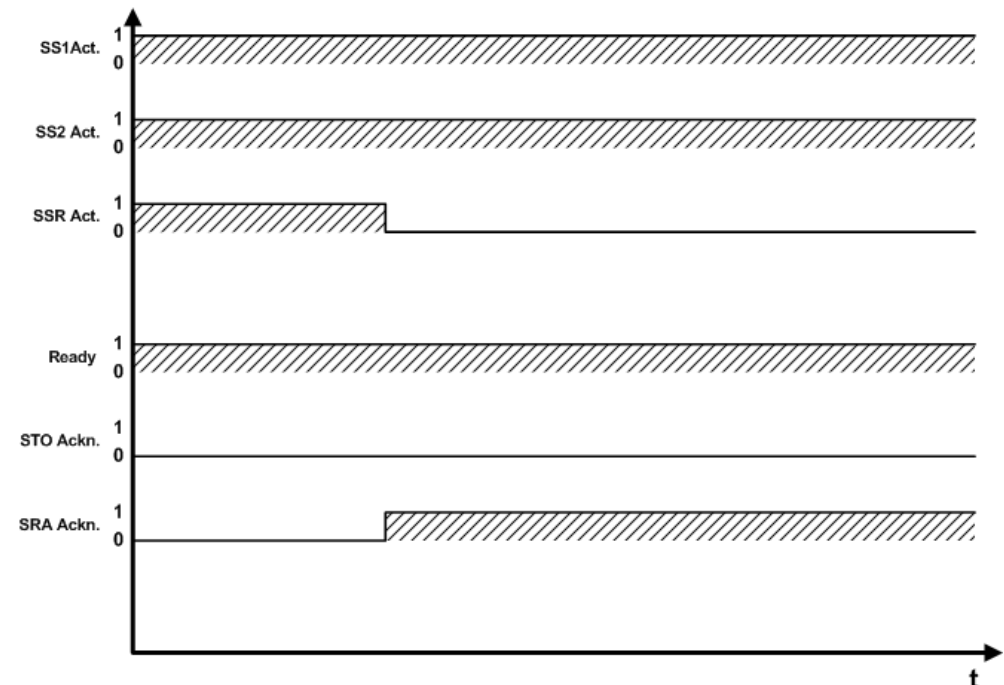
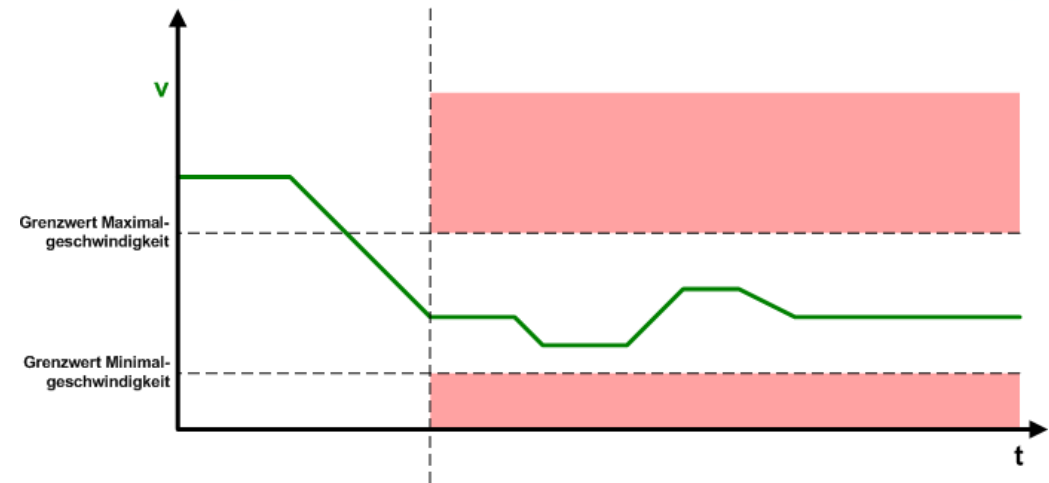
Safety Function SLS – Safely Limited Speed

- Well known safety function
- Setting of a delay time



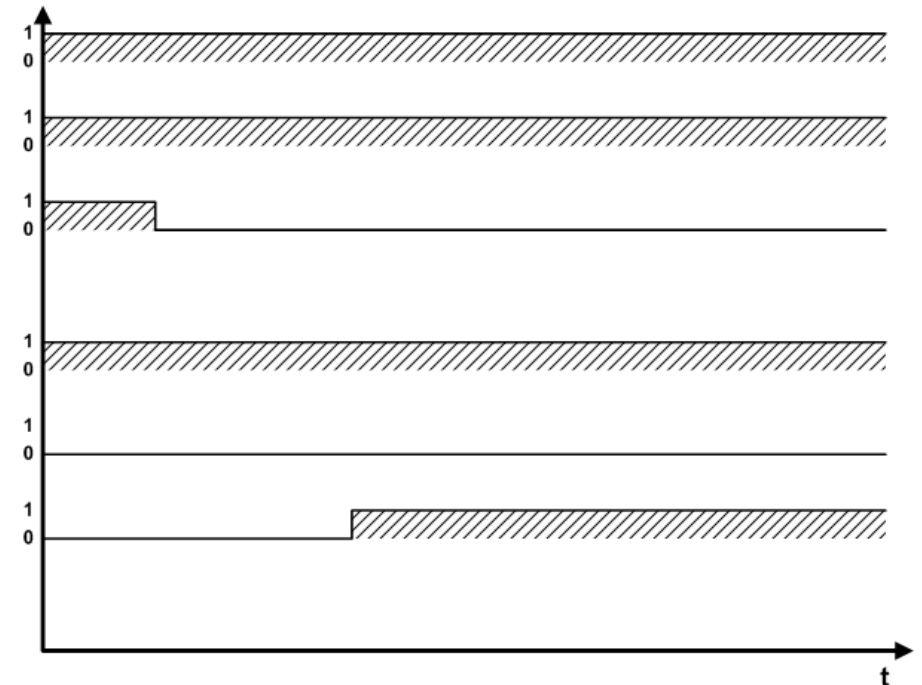
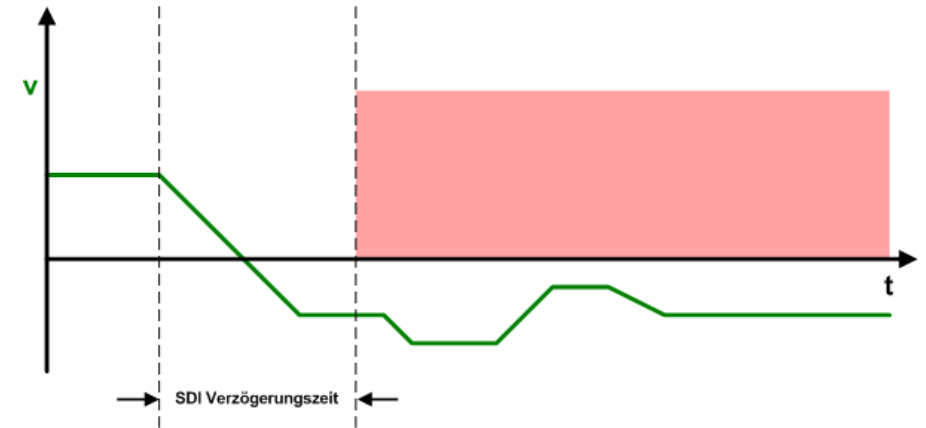
Safety Function SSR – Safe Speed Range

- Supervision of the lower limit value
- Continuous supervision possible

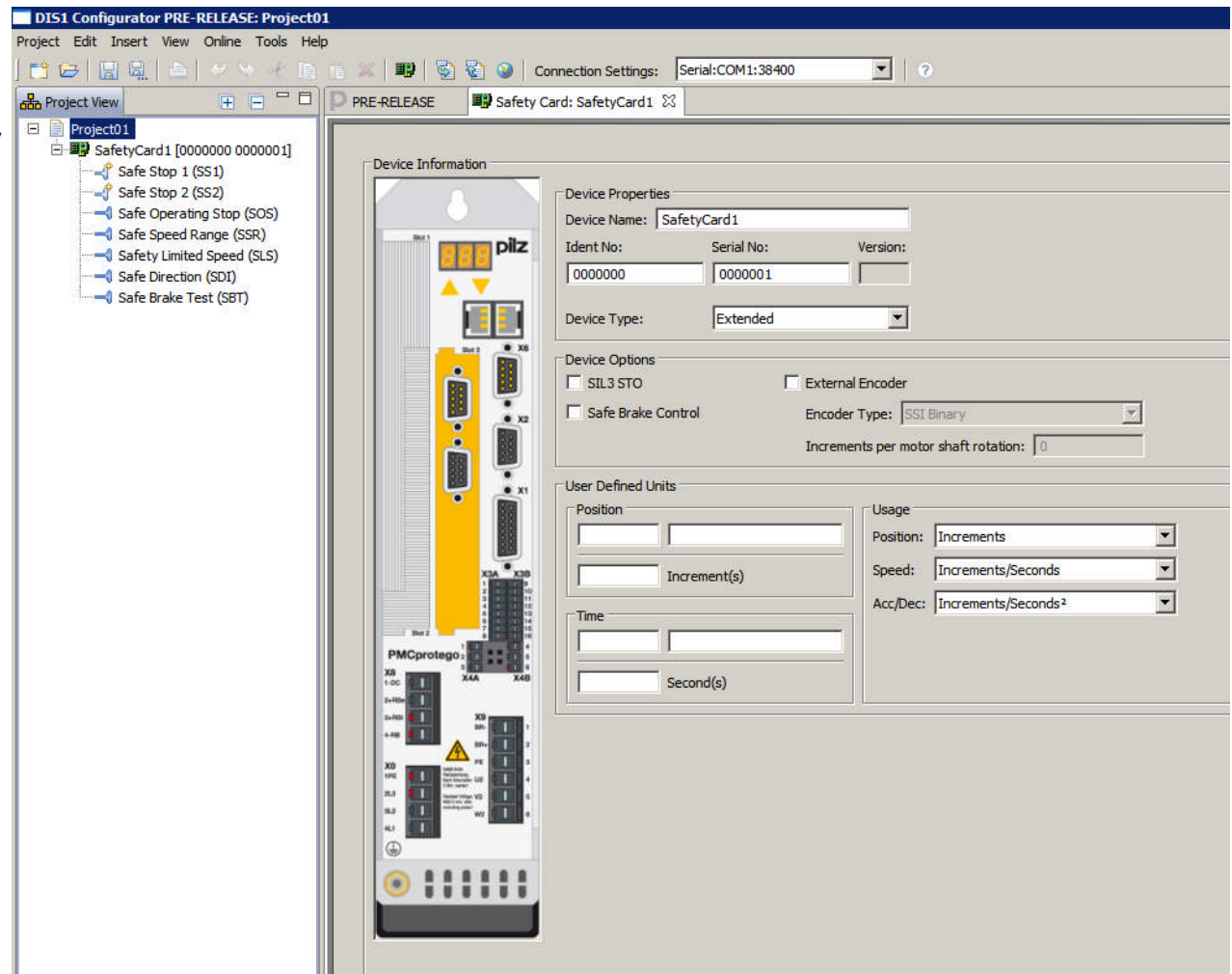


Safety Function SDI – Safe Direction

- Combination with SLS

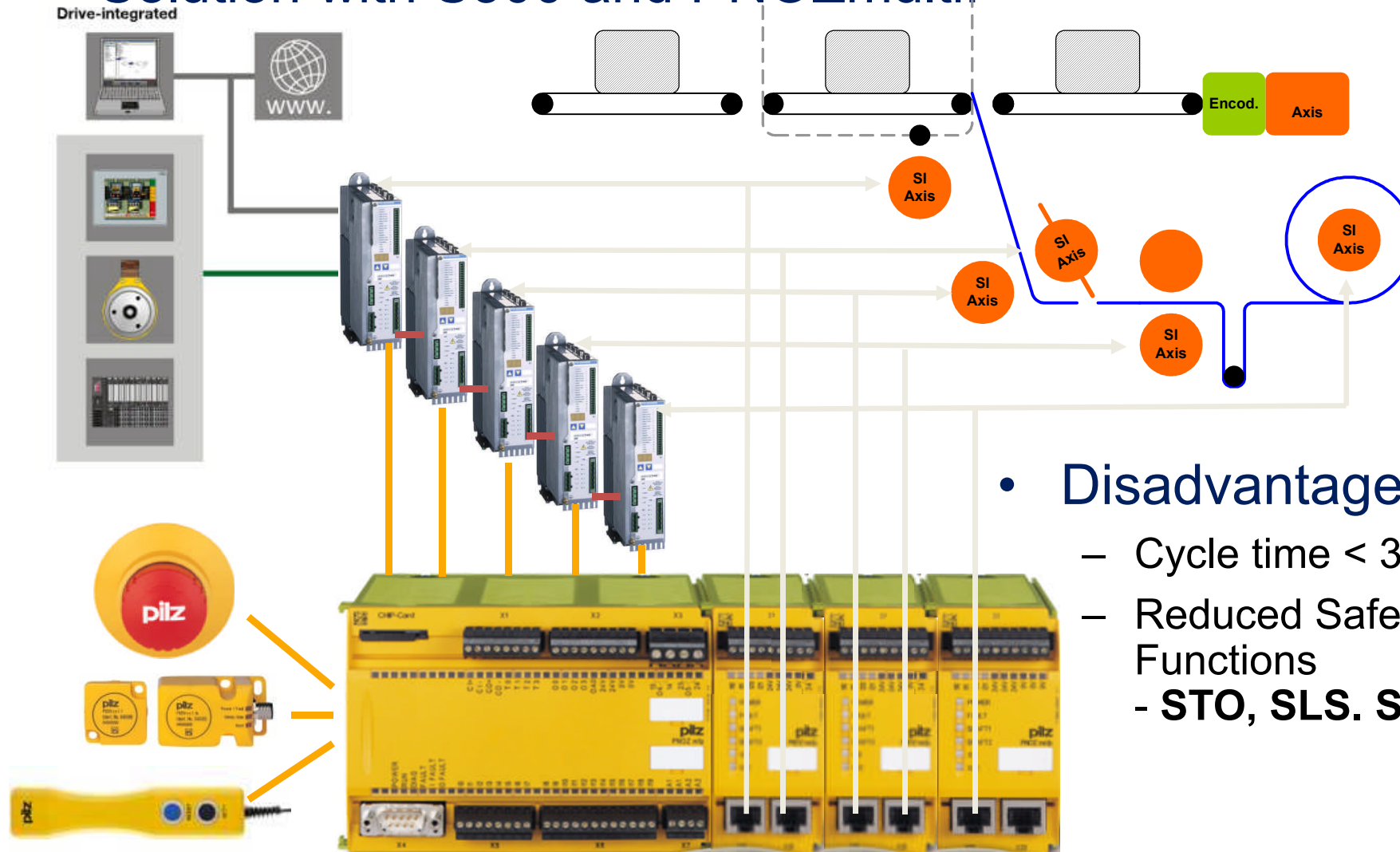


- Changing projects with password only
- SI units can be used
- Serial number of the safety card must be used.



Application example: Packaging (foil)

- Solution with S300 and PNOZmulti:

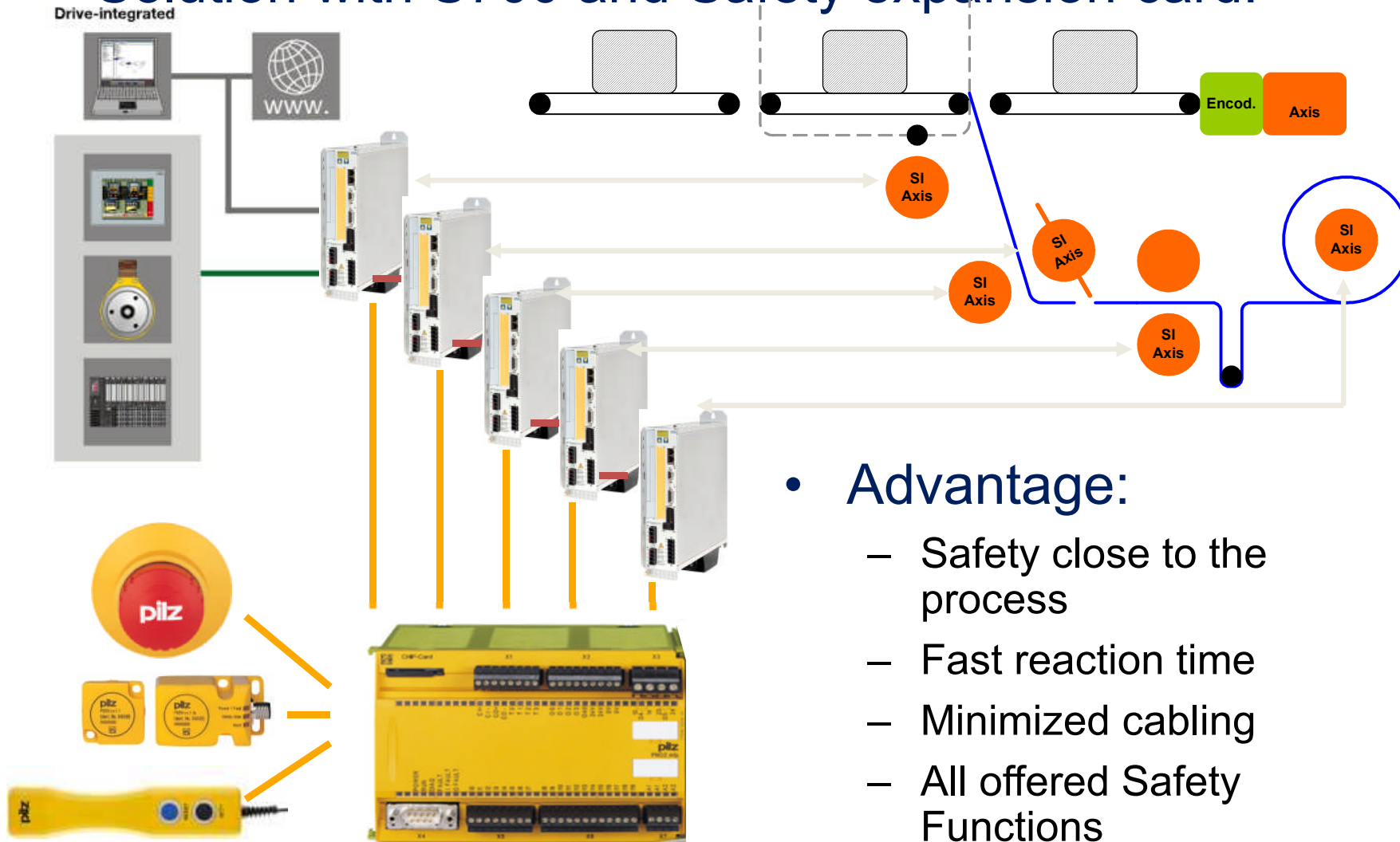


- Disadvantage:

- Cycle time < 30ms
- Reduced Safety Functions
- **STO, SLS. SS1**

Application example: Packaging (foil)

- Solution with S700 and Safety expansion card:



- Advantage:

- Safety close to the process
- Fast reaction time
- Minimized cabling
- All offered Safety Functions
 - **STO, SS1, SS2, SOS, SLS, SSR, SDI**

some more.....

GUI Sr300 e Sr700

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The screenshot shows the DriveGUI software interface. The window title is "Untitled - DriveGUI". The menu bar includes "File", "Edit", "Communication", "Drive", "Tools", "View", and "Help". The toolbar contains various icons for file operations, drive control (STOP, EN, DIG), and communication (CLR, FLY). The "OPMODE" dropdown menu is set to "0: Digital Velocity".

The left sidebar shows a tree view under "DRIVED" with the following items:

- Setup Wizard
- Basic Setup
- Units / Mechanical
- Motor / Feedback
- Motion Service
- Status
- Monitor
- Homing
- Motion Tasks
- Oscilloscope
- Bode Plot
- Terminal
- Profibus

The main display area shows three drive units. Below the drives, the text reads:

**WELCOME to the S300 / S700
Drive Graphical User Interface**

The Danaher Motion logo is located in the bottom right corner of the main display area.

The status bar at the bottom left shows "Ready". The status bar at the bottom right shows "Online", "Disabled", "Warning", and "not homed".

- S30
- Easy

Welcome to the Drive Setup Wizard

This Setup Wizard will help you configure your drive. Start by choosing the type of set up from the list below: "Quick Motor/Drive Setup", "Analog Application Setup", "Gearing Application Setup", "Motion Task Application Setup" or "Complete Setup".

Click "Next" and "Previous" to move between screens, or move directly to any screen by clicking in the tree on the left. Click the "Refresh" toolbar button to bring back the original data for the screen currently showing.

When a new wizard page is opened, the current parameter values related to that page are reloaded from the drive.

Select Type of Setup Wizard

- Quick Motor/Drive Setup
- Analog Application Setup
- Gearing Application Setup
- Motion Task Application Setup
- Complete Setup

Enter Setup Wizard

- User units simple to describe

The image displays three screenshots of the Servostar 700 software GUI, illustrating different motor configurations and their corresponding units.

Top Left Screenshot (Gearing):
- Control panel: **Gearing**
- Radio buttons: Kein, Umdrehungen, Zähne
- Motor : Last: 100 : 10
- Labels: Zähne 100, Zähne 10
- Diagram: Shows a motor connected to a gear system with two gears of different sizes.

Top Right Screenshot (Getriebe):
- Control panel: **Getriebe**
- Radio buttons: Kein, Umdrehungen, Zähne
- Motor : Last: 100 : 10
- Label: Vorschub
- Diagram: Shows a motor connected to a rack and pinion drive mechanism.

Bottom Screenshot:
- Control panel: **Gearing**
- Radio buttons: Kein, Umdrehungen, Zähne
- Motor : Last: 100 : 10
- Label: Zähne / Umdrehung
- Diagram: Shows a motor connected to a gear system with a large gear and a small gear.
- Labels: Zähne : Länge, 250 : 1 100nm

- Motors DataBase for Kollmorgen motors

Select Motor from Data Base

Motor Family: AKM

Mains Voltage: 6SM45...100
6SM27...107
6SM109/GOLDLINE BH
PLATINUM DDL Ironcore
2SM17...37
DBL/DBK
SBL
SBK
AKM
PLATINUM DDL Ironless
Cartridge DDR
129

Number	Name	Top Speed	Mains Volt.
19000	AKM11B	4000 rpm	115
19001	AKM11B	8000 rpm	230
19002	AKM11C	6000 rpm	115
19003	AKM12C	4000 rpm	115
19004	AKM12C	8000 rpm	230
19005	AKM12E (120... 2.72 10.9	8000 rpm	115
19006	AKM13C (120... 1.48 5.93	3000 rpm	115
19007	AKM13C (240... 1.48 5.93	7600 rpm	230
19008	AKM13D (120... 2.4 9.6	7000 rpm	115
19009	AKM21C (120... 1.58 6.32	2500 rpm	115
19010	AKM21C (240... 1.58 6.32	8000 rpm	230
19011	AKM21E (120... 3.11 12.4	7000 rpm	115
19012	AKM22C (120... 1.39 5.56	1000 rpm	115
19013	AKM22C (240... 1.39 5.56	3500 rpm	230
19014	AKM22C (400... 1.39 5.56	8000 rpm	400

Show Record Cancel Select and return

- Math app

Motor-Einstellungen [?] [X]

Motor-Typ: 1: Rotat. Synchronmotor

Motor-Name: NN

Dauerstrom: 3.5 A

Spitzenstrom: 9 A

Grenzdrehzahl: 3000 1/min

Motor-Polzahl: 6

Motor-Drehmomentkonstante: 1 Nm/A

L. Leiter-Leiter: 1 mH

Stator-Wicklungswid.: 1 Ohm

Motor-Trägheitsmoment: 3 kg cm²

Haltebremse: ohne

Disable-Verzög. (Haltebremse): 100 ms

Enable-Verzög. (Haltebremse): 20 ms

Abschaltwert Motortemp. (Wid.): 300 Ohm

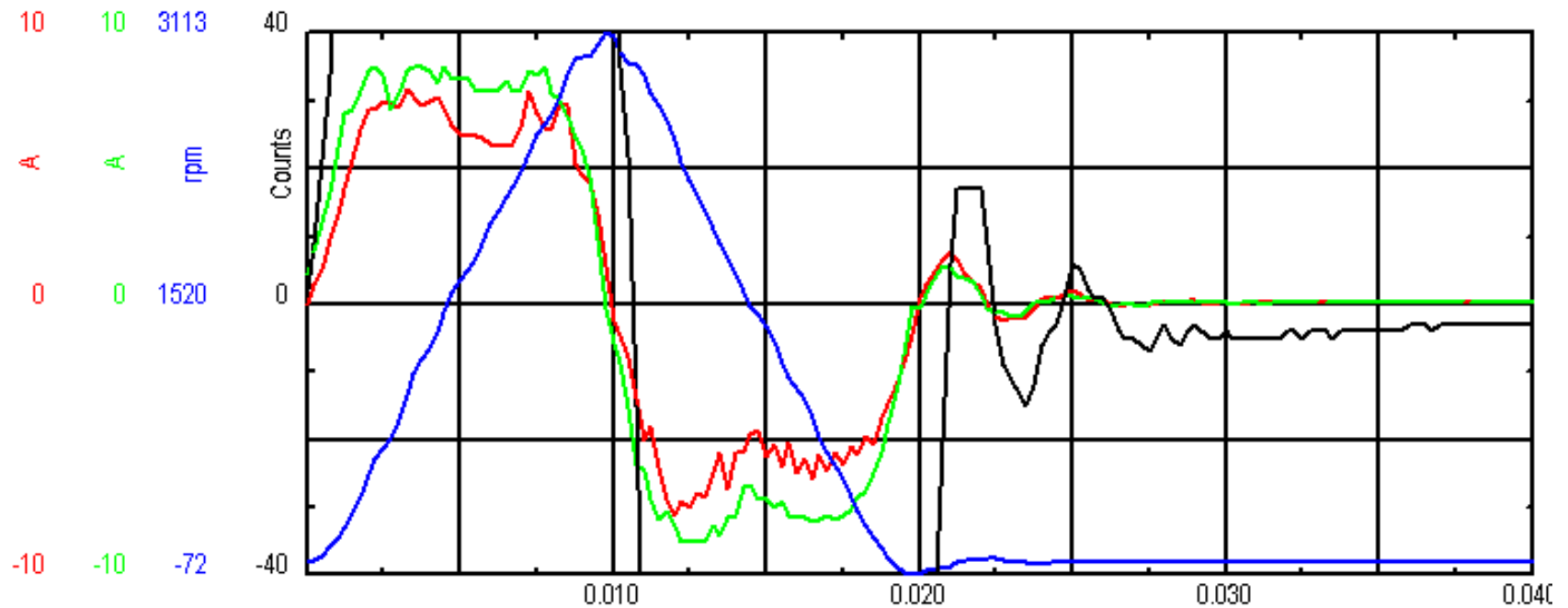
Feedback-Typ: 0 Resolver - Anschluss X2

Max. zul. Netzspannung: 110 V

Abbrechen OK

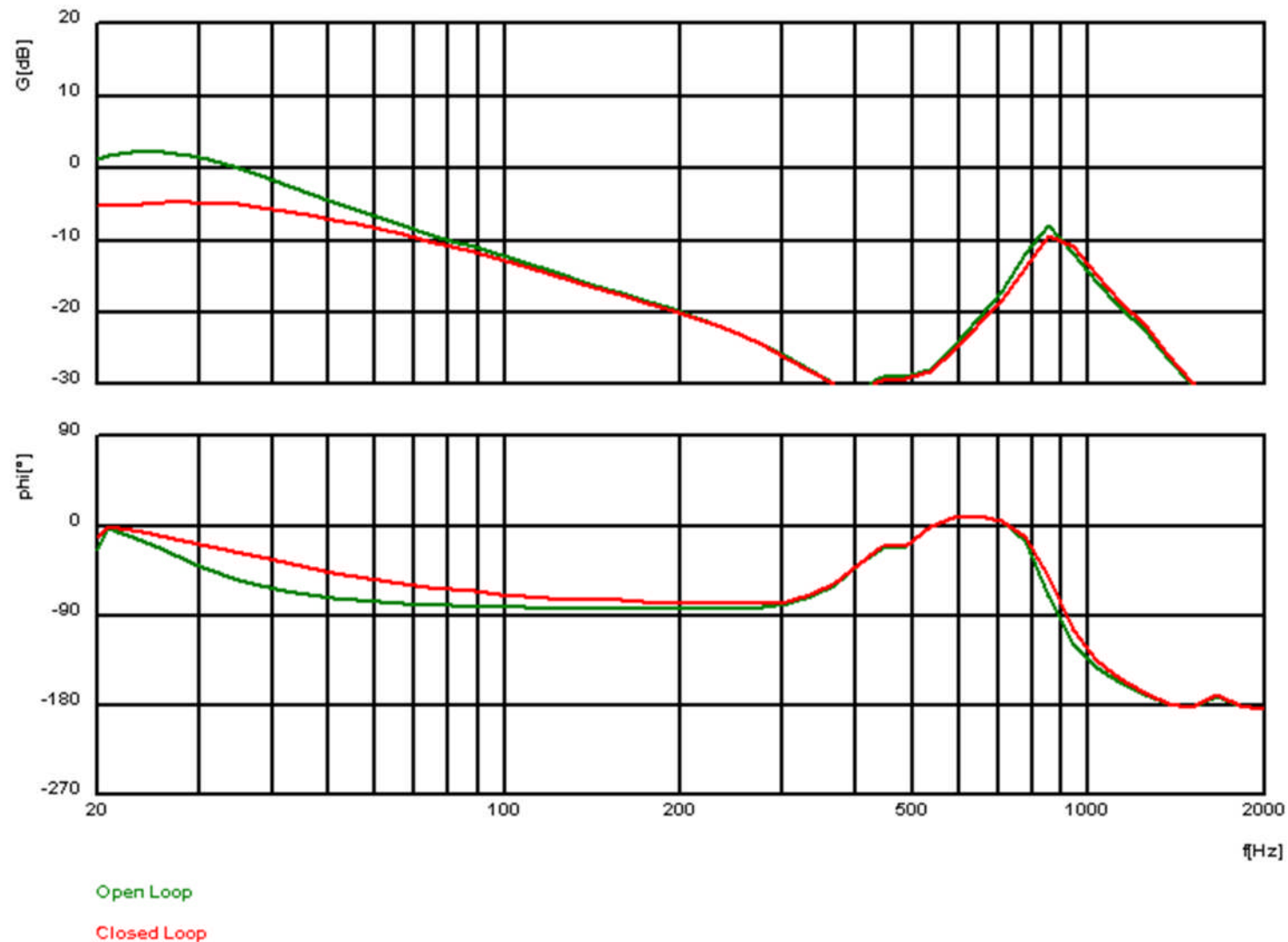
motors

- 4 channels scope



Time:
Ch. 1: I_act
Ch. 2: I_cmd
Ch. 3: v_act
Ch. 4: PError

- Bode plot analysis



- Autotuning

Level 2: Dynamic Tuning

Step 3:

Velocity-Loop Parameters to be tuned

- Proportional Gain (K_p_v)
- Filter (LP / HP Freq.)
- Integral Time (T_{n_v})

Step 4:

Auto-Tuning

Progress

0% 100%

StartStop

Absolute Error

Min.

Act.

Max

< Previous Next >

- 16 Position Registers (PLS function)

Configure Mask for POSRSTAT

Note: this is an advanced function.

Bit	Bit
0 <input type="checkbox"/> Pos reg. 1 active	8 <input type="checkbox"/> Pos reg. 9 active
1 <input checked="" type="checkbox"/> Pos reg. 2 active	9 <input type="checkbox"/> Pos reg. 10 active
2 <input type="checkbox"/> Pos reg. 3 active	10 <input checked="" type="checkbox"/> Pos reg. 11 active
3 <input type="checkbox"/> Pos reg. 4 active	11 <input type="checkbox"/> Pos reg. 12 active
4 <input type="checkbox"/> Pos reg. 5 active	12 <input type="checkbox"/> Pos reg. 13 active
5 <input checked="" type="checkbox"/> Pos reg. 6 active	13 <input type="checkbox"/> Pos reg. 14 active
6 <input type="checkbox"/> Pos reg. 7 active	14 <input checked="" type="checkbox"/> Pos reg. 15 active
7 <input type="checkbox"/> Pos reg. 8 active	15 <input type="checkbox"/> Pos reg. 16 active

Note: each bit of POSRSTAT represents one of 16 fast position registers. These registers are configured in the Motion Tasking set up screens (see Operation Mode screen).

Done

Position Registers: enabled, w/o CAN Msg. | Current Position: | Counts

No.:	Check:	Enable:	Signal, if Pos. [Counts]	No.:	Check:	Enable:	Signal, if Pos. [Counts]
1	once	<input checked="" type="checkbox"/>	<= 10	9	always	<input checked="" type="checkbox"/>	>= 1
2	once	<input checked="" type="checkbox"/>	>= 20	10	always	<input checked="" type="checkbox"/>	>= 3
3	always	<input checked="" type="checkbox"/>	<= 30	11	always	<input checked="" type="checkbox"/>	>= 10
4	always	<input checked="" type="checkbox"/>	>= 123	12	always	<input checked="" type="checkbox"/>	>= 0
5	always	<input checked="" type="checkbox"/>	<= 456	13	always	<input checked="" type="checkbox"/>	>= 0
	ys	<input checked="" type="checkbox"/>	>= 1000	14	always	<input checked="" type="checkbox"/>	>= 0
	ys	<input checked="" type="checkbox"/>	<= 1000	15	always	<input checked="" type="checkbox"/>	>= 0
	ys	<input checked="" type="checkbox"/>	>= 0	16	always	<input checked="" type="checkbox"/>	>= 0

Input 1: 0: Off | Input 2: 0: Off | Input 3: 0: Off | Input 4: 0: Off

Output 1: 40: Position Register OR Bit | Output 2: 0: Off

Position Register Mask: P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16

< Previous | Next >

- Motion Tasking – Up to 300 (200 stored)

No.	Target Position / Distance	Velocity	Control Word (Hex.)	Acc.	Dec.	Velocity Profile No.	Following Motion Task No.	Delay Time	Motion Type
1	5000	1000	12009	10	10	1	2	500	REL INPOS
2	0	1000	12009	10	10	1	1	500	REL INPOS
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									

Motion Task Parameters

Number:

Trajectory / Profile: v_cmd

Table / Acc. No.: Analog-In 1

Motion Type:

Target Position / Distance: Counts

Units:

Next Motion Task

Next Number: Start Condition:

Motion blending: a b c

Start by I/O Edge:

Delay Time: ms

- Easy to tune

