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AKD2G with ProfiNet connectivity

19.01.2021

AKM2G based on PROFIdrive over PROFINET IO

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- *PROFINET IO is one of two open Ethernet standard automation "views" from Profibus International. While PROFINET IO focuses on Programmable Controller data exchange, PROFInet CBA (Component Based Automation) focuses on distributed automation systems.*

- *The AKD2G is defined as an I/O Device in PROFINET IO. A PLC or IO-Controller can establish a connection using application relations (AR).*

- *AR has different profiles such as PROFIdrive, PROFIsafe, etc.*

- *The AKD2G uses the PROFIdrive AR.*

PROFInet introduction

PROFINET IO is a real time protocol based on Ethernet. It is used as network for industrial automation applications. PROFINET IO is similar to PROFIbus and focuses on the data exchange for programmable controller.

A PROFINET IO network consists of following devices:

IO controller: This is typically the PLC which controls the whole application.
IO device: A decentralized IO device (e.g. drive, encoder, sensor) which is controlled by the IO controller.
IO supervisor: HMI (Human Machine Interface) or PC for diagnostic purposes or commissioning.
The real time channel (RT) is used for IO data and alarm mechanism.

PROFINET IO RT (conformance class A and B), the RT data is transferred using a prioritized Ethernet frame. No special hardware is required. Due to this prioritization a cycle time < 10ms can be achieved.
I PROFINET IO IRT is used for higher timing requirements. Cycle times < 1ms is possible, but also specific hardware for IO Devices and switches are required.
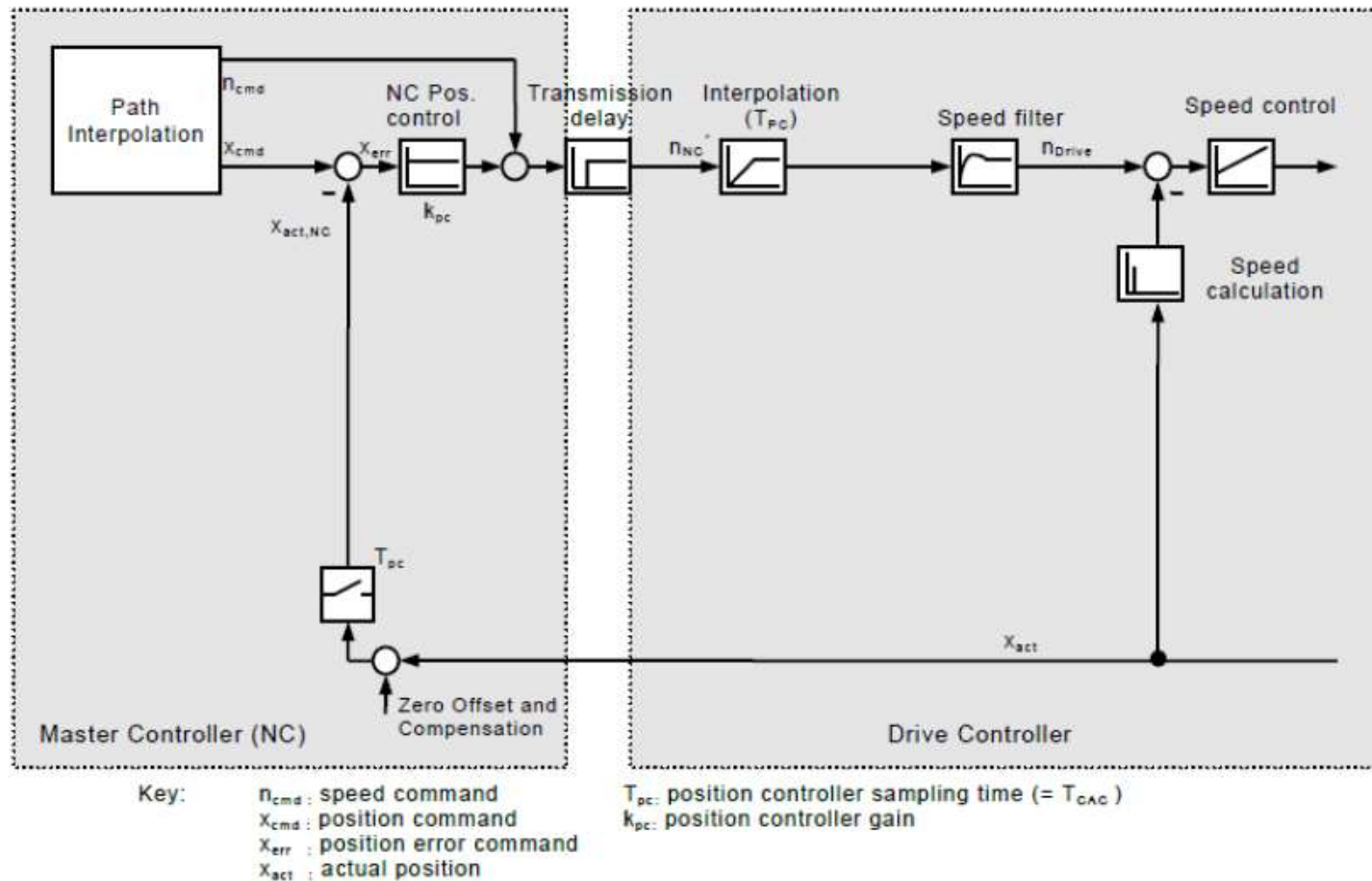
All diagnostic and configuration data is transferred using the non real time channel (NRT). The common UDP

protocol is used for this purpose. Timing determinism cannot be guaranteed and typical cycle times are >100ms.
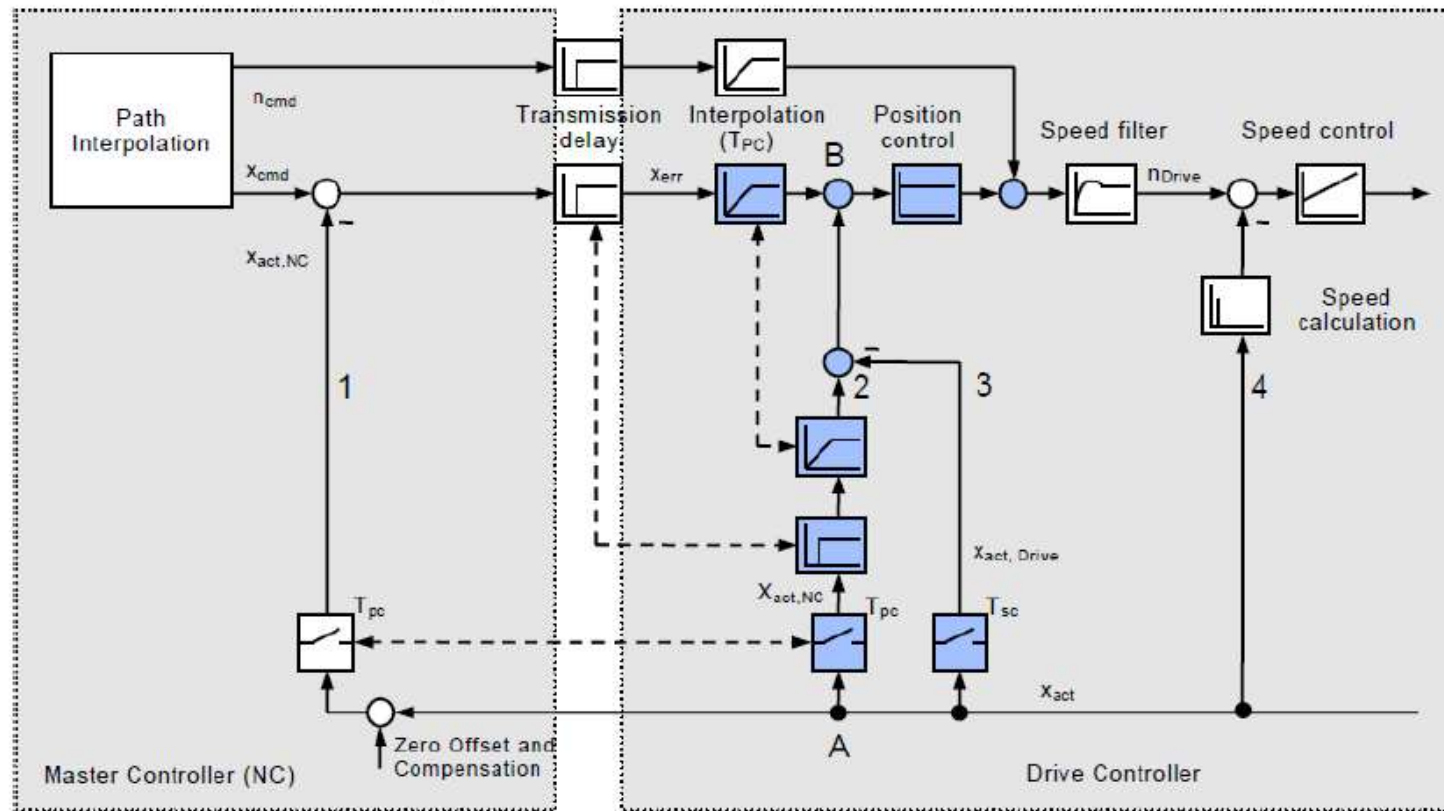
AKD2G Operating modes

- Velocity Mode
  - Application Class 1 (open loop speed controller) RT
  - Application Class 4 (position loop closed in the PLC) IRT
    - Dynamic Servo Control (DSC) (position loop closed in the drive) IRT

- Position Mode (Application class 3) (motion task like in the drive) RT

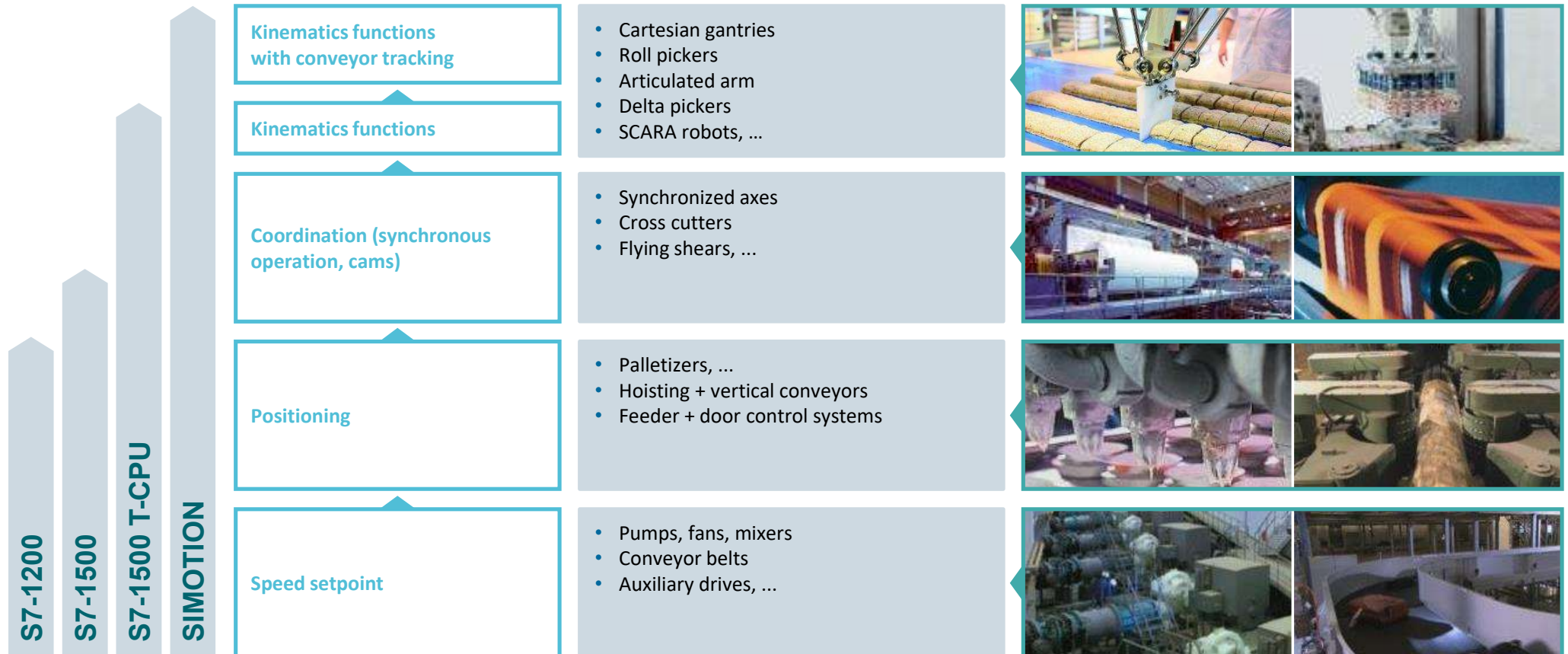# Velocity setpoint without DSC

Key:
- n_{cmd} : speed command
- X_{cmd} : position command
- X_{err} : position error command
- X_{act} : actual position

- T_{pc}: position controller sampling time (= T_{CAC})
- k_{pc}: position controller gain

Velocity setpoint with DSC

Key:

n_{cmd} : speed command
x_{cmd} : position command
x_{err} : position error command
x_{act} : actual position

T_{sc}: speed controller sampling time
T_{pc}: position controller sampling time (= T_{CAC})
k_{pc}: position controller gain

Overview Siemens PLC motion related

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S7-1200

S7-1500

S7-1500 T-CPU

SIMOTION

Kinematics functions with conveyor tracking	• Cartesian gantries • Roll pickers • Articulated arm • Delta pickers • SCARA robots, …
Kinematics functions	
Coordination (synchronous operation, cams)	• Synchronized axes • Cross cutters • Flying shears, …
Positioning	• Palletizers, … • Hoisting + vertical conveyors • Feeder + door control systems
Speed setpoint	• Pumps, fans, mixers • Conveyor belts • Auxiliary drives, …

Tia Portal screenshot

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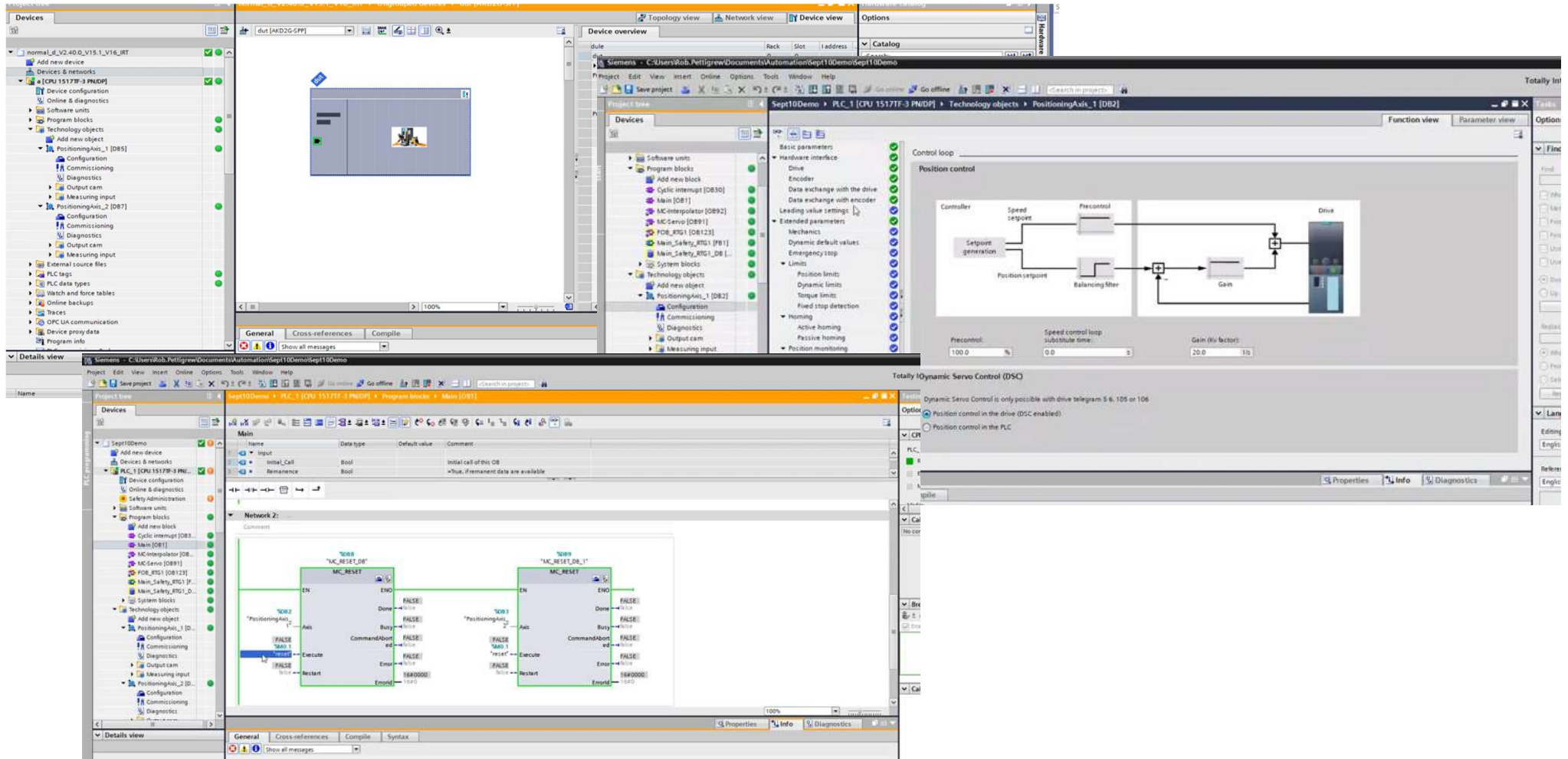
ProfiNet conformal certificate

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AKD2G model AKD2G-SPP-xVxxx-xxxx-xxxx

Certificate

PROFIBUS Nutzerorganisation e.V. grants to

Kollmorgen
Pempelfurtstrasse 1, 40880 Ratingen, Germany

the Certificate No: **Z12974** for the PROFINET Device:

Model Name:	AKD2G-SPP-xVxxx-xxxx-xxxx
Revision:	SW/FW: V5.2.100; HW: 1
Identnumber:	0x0105; 0x0002
GSD:	GSDML-V2.35-KOLLMORGEN-AKD2G-20201208.xml
DAP:	Pofidrive_DAP: AKD2G-SPP, 0x3A000001

This certificate confirms that the product has successfully passed the certification tests with the following scope:

☑	PNIO_Version	V2.35
☑	Conformance Class	C
☑	Optional Features	Legacy, MRP
☑	Application Class	Isochronous
☑	Netload Class	III
☑	PNIO_Tester_Version	V2.41.0 with annex spirta
☑	Tester	SIEMENS AG, Fürth, Germany; PN640-1

This certificate is granted according to the document:
"Framework for testing and certification of PROFIBUS and PROFINET products".
For all products that are placed in circulation by **December 08, 2023** the certificate is valid for life.

Karlsruhe, January 19, 2021   Board of PROFIBUS Nutzerorganisation e. V.

(Official in Charge)   (Karsten Schneider)

(Dr. Jörg Hähniche)

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