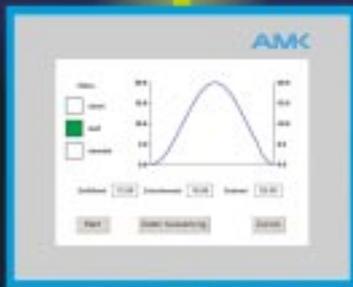## AMKASYN Control Technology
Standardized, scalable, centralized, decentralized.

AMK

AMK

Uncompromising freedom.

When you decide on a control solution, don't choose compromises. Choose a technology that provides you with all the necessary degrees of freedom in the configuration of your machine: AMKASYN control technology combines motion control engineering with standardized PLC technology, from the single drive and machine control to an intelligent system.

Do you want a centralized or decentralized structure, or even both? No problem! Due to flexible system architecture you can decide which option suits you best. And you don't have to tie yourself down: subsequent add-ons can be implemented at any time without any problems. Due to scalable computing power the system can grow in line with your requirements. Another crucial advantage is the ideal interaction between the various components from AMK's complete range of products and services.

From control engineering, programming and visualization down to the drive – you are provided with a comprehensive, expandable solution that is specially tailored to your needs.

In addition, you save money since you only purchase what you actually require. The complete package from a single source.

Standardized control technology, from the HMI to the actuator

Benefits

- Customized control solutions with all the possible combinations of centralized and/or decentralized structures from a single source

- Cost-optimized configuration of machines with flexible add-on options

- Real-time capable control system with high-precision synchronization of all drives (jitter < 1µs)

- Simple, standardized programming conforming to IEC 61131-3 with intuitive user interface

- Predefined motion control and technology functions

- Integrated visualization

Controller Options. From High-End to Low-Cost.

SYMAC – the PLC for highly complex machinery.

PLC as a controller series

Fields of application

- Machine control
- Synchronized system network with hundreds of axes
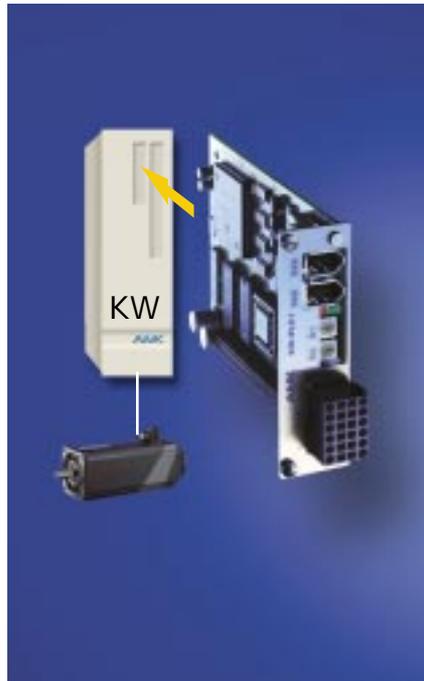- High-end solution with large degree of freedom

Special features

- Up to 150,000 instructions per ms
- PLC program size 8,191 kBytes max.
- Data size 4,096 kBytes max.
- Non-volatile data memory
- Cross-communication

Communication

- Sercos master and slave
- Profibus DP
- CANopen, synchronized
- Ethernet

KW-PLC1 – the drive integrated PLC for more complex control tasks.

PLC as an option card in the drive

Fields of application

- Machine control
- Axis group control
- Synchronized interconnection of several axis groups
- Low-cost, intelligent multi-axis solutions

Special features

- 3,500 instructions per ms
- PLC program size 383 kBytes max.
- Data size 128 kBytes max.
- Non-volatile data memory
- 2 fast binary inputs for measuring functions

Communication

- Profibus DP
- CANopen, synchronized

KW-R03P – the onboard PLC for simple control tasks.

PLC functionality on the controller card in the drive

Fields of application

- Local axis or relatively small machines
- Decentralized control structures
- Low-cost, compact single-axis solutions

Special features

- 600 instructions per ms
- PLC program size 79 kBytes max.
- Data size 32 kBytes max.

Communication

- Profibus DP
- CANopen, synchronized

4

Centralized, decentralized or even both? AMK offers the right mix!

Implement centralized, decentralized or combined control structures simply and flexibly. With hardware-independent programming conforming to IEC 61131-3 various PLC programs can be exchanged between the individual controls quickly and in an uncomplicated manner.
The standardized engineering tool makes commissioning, parameterization and diagnosis trouble-free and efficient.
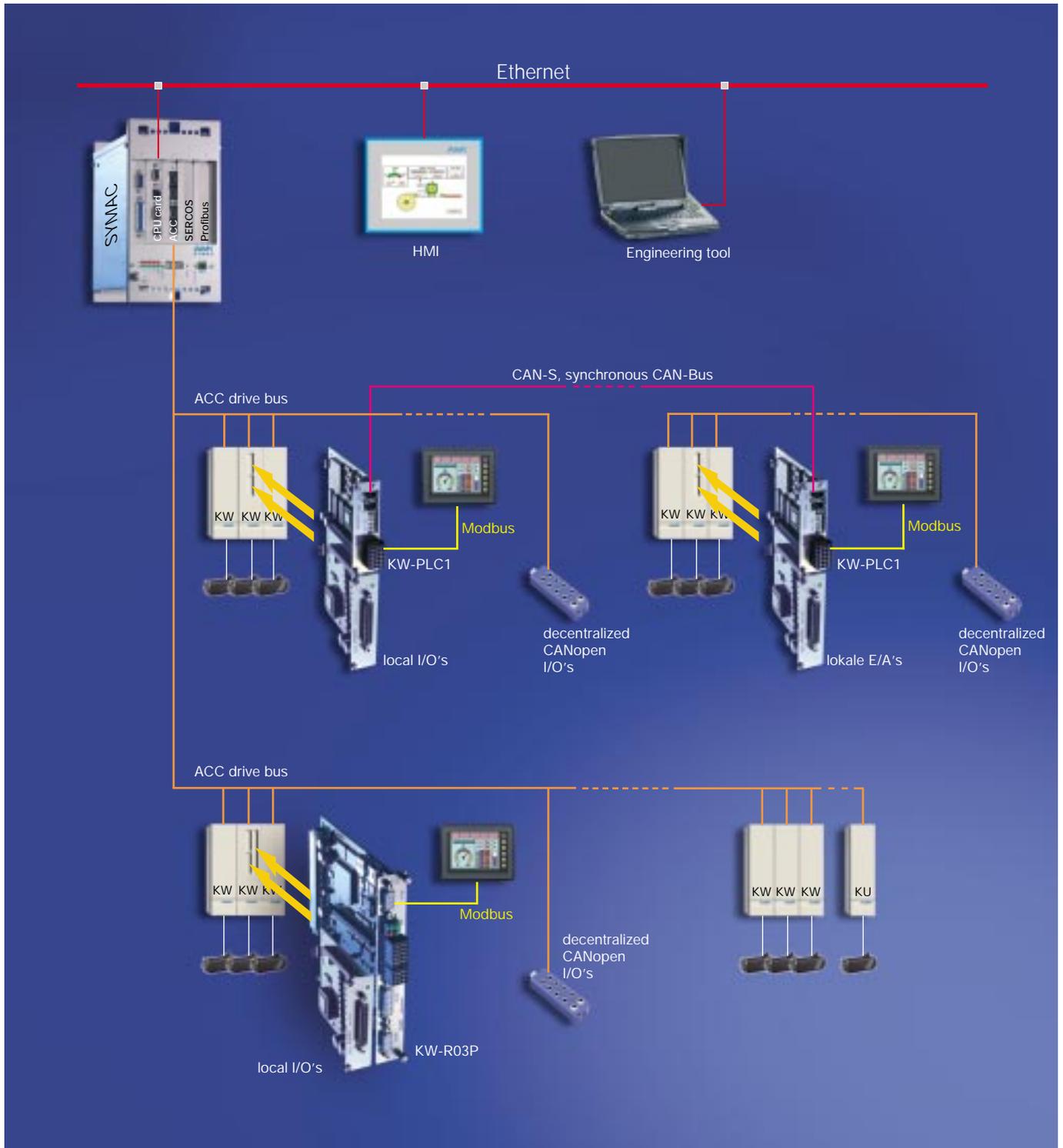
Configuration options of AMK control components

SYMAC – the PLC
for highly complex machinery.
Fast, flexible, scalable.

Fast processing of PLC code with ample program and data memory ensures efficient utilization of your resources.

You select your custom-configured multi-axis controller from three performance classes and a wide range of possible add-ons to assemble a high-end solution with all degrees of freedom.

Benefits:

- High-performance PLC for controlling complex machinery

- High-precision synchronization with a jitter of 1 µs max. across the entire axis network

- Programming acc. to IEC 61131-3 with AMK technology library and integrated visualization

- Ethernet port for programming, parameterization, visualization and data exchange with Ethernet variables and for utilization of FTP

- Option selection based on modularity

- Networked synchronous systems with hundreds of axes

SYMAC Control Structure.
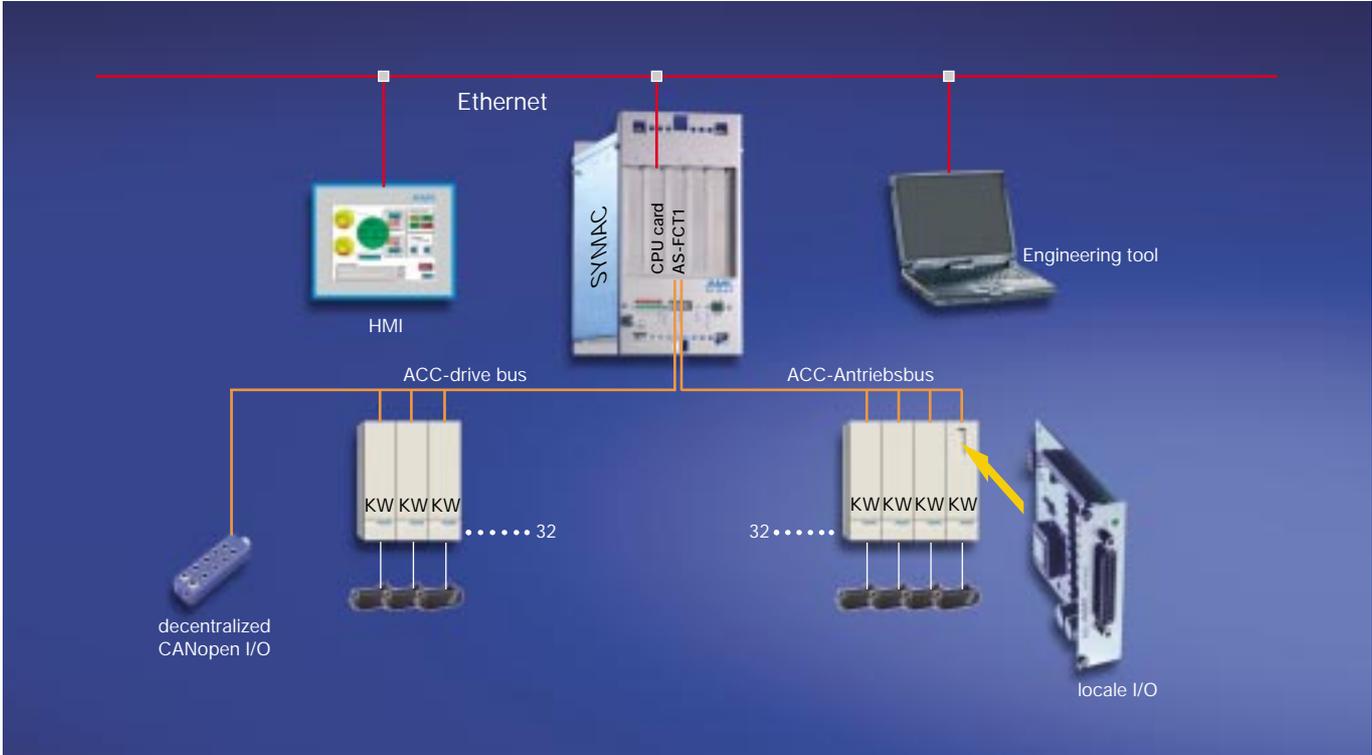
Control of up to 60 axes and decentralized I/O assemblies with ACC drive bus; visualization and HMI via Ethernet

Properties	Description
Interfaces	1 x RS 232/RS 422/RS 485 (Modbus) + 1 x RS 232 Ethernet 10/100 Mbit/s
Optional interfaces	CANopen, synchronized, SERCOS interface, Profibus DP (see table of option assemblies)
Measurement inputs	2 per inverter
I/Os	External: any number of decentralized I/Os
Programming	IEC 61131-3 (CoDeSys)
Program size (max.)	8 191 kByte
Data size (max.)	4 096 kByte
Number of tasks	32 (1 synchronous, 1 asynchronous, 30 adjustable)
Instructions per ms	up to 150,000
Non-volatile data memory	32 kBytes (with AS-FCT1)

Applications (typical, but not limited to the following):

- Printing presses
- Injection-molding machines
- Paper processing machines
- Textile machines
- Packaging machines

SYMAC in a Multi-Machine Network
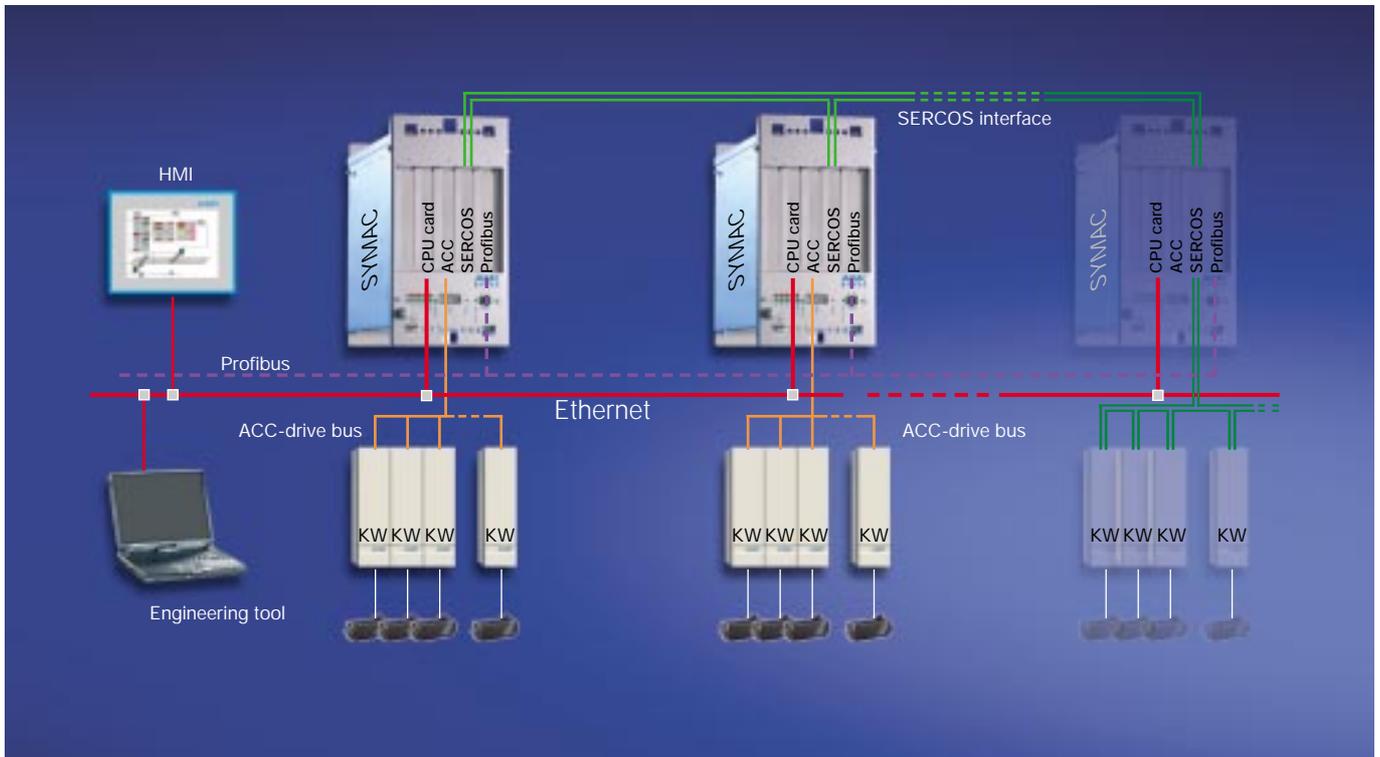
SYMAC cross-communication even with redundant SERCOS for multi-axis systems/multi machines

Technical data

SYMAC devices have a 32-bit CPU with floating-point unit plus RAM and flash memory. There are three basic control systems to choose from in different performance classes:

Properties	SYMAC AS-PL11-0	SYMAC AS-PL12-0	SYMAC AS-PL21-0
Clock rate in MHz	100	300	≥700
Ethernet port in Mbit/s	10	10/100	10/100
User memory for PLC and run time variables in MBytes	0,5	2,0	4,0
Flash memory for PLC program in MBytes (code)	1,0	4,0	8,0
Input current of 24V DC power supply, typically in A, (in brackets: max. in A)	1,0 (1,8)	2,0 (3,5)	2,5 (5,5)
Instructions per ms	15 000	50 000	150 000

Optional assemblies

For communication with drives, SYMAC devices, decentralized input/output and external controls there are various optional assemblies available that can be plugged into the vacant slots of the basic control unit as required.

Optional assemblies	Designation
Two active CANopen interfaces for AMK drive bus ACC, 32 kBytes non-volatile memory	AS-FCT1
SERCOS interface, master functionality with compatible AMK extensions	AS-FSM1
SERCOS interface, slave functionality with compatible AMK extensions	AS-FSS1
SERCOS Dual interface Two integrated SERCOS interfaces on one card With master and slave functionality	AS-FSD1
SERCOS interface, redundant Double SERCOS FOC transmitter and receiver Automatic FOC ring switchover in the event of a line break	AS-FSR1
Profibus DP slave 9.6 kbit/s to 12 Mbit/s, D-Sub 9-pin connector	AS-FP1
Profibus DP master 9.6 kbit/s to 12 Mbit/s, D-Sub 9-pin connector	AS-FPM1

Enclosure dimensions
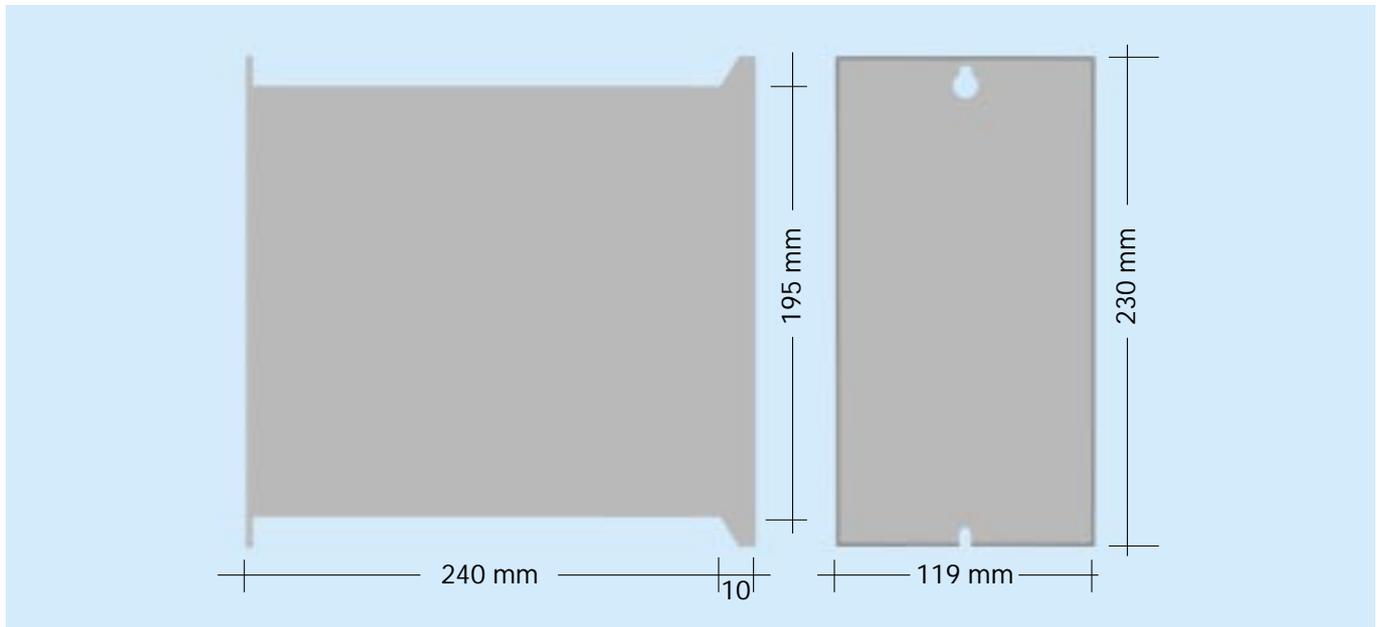
KW-PLC1 – the drive integrated PLC for more complex control tasks.
Intelligent, modular, flexible.

KW-PLC1 is an option card for piggy-back mounting on the controller card inside the drive. It turns the drive control into a complete control solution, to implement the configuration of complex multi-axis applications at low cost. In conjunction with Modbus HMIs and decentralized I/Os it is possible to create sophisticated machine control systems.

Benefits

- Low-cost control

- Synchronous networking of axis groups

- 2 additional fast inputs for measuring functions

- 32 kBytes memory area for non-volatile application data without buffer battery

- Programming acc. to IEC 61131-3 with AMK technology library

Control structure with KW-PLC1
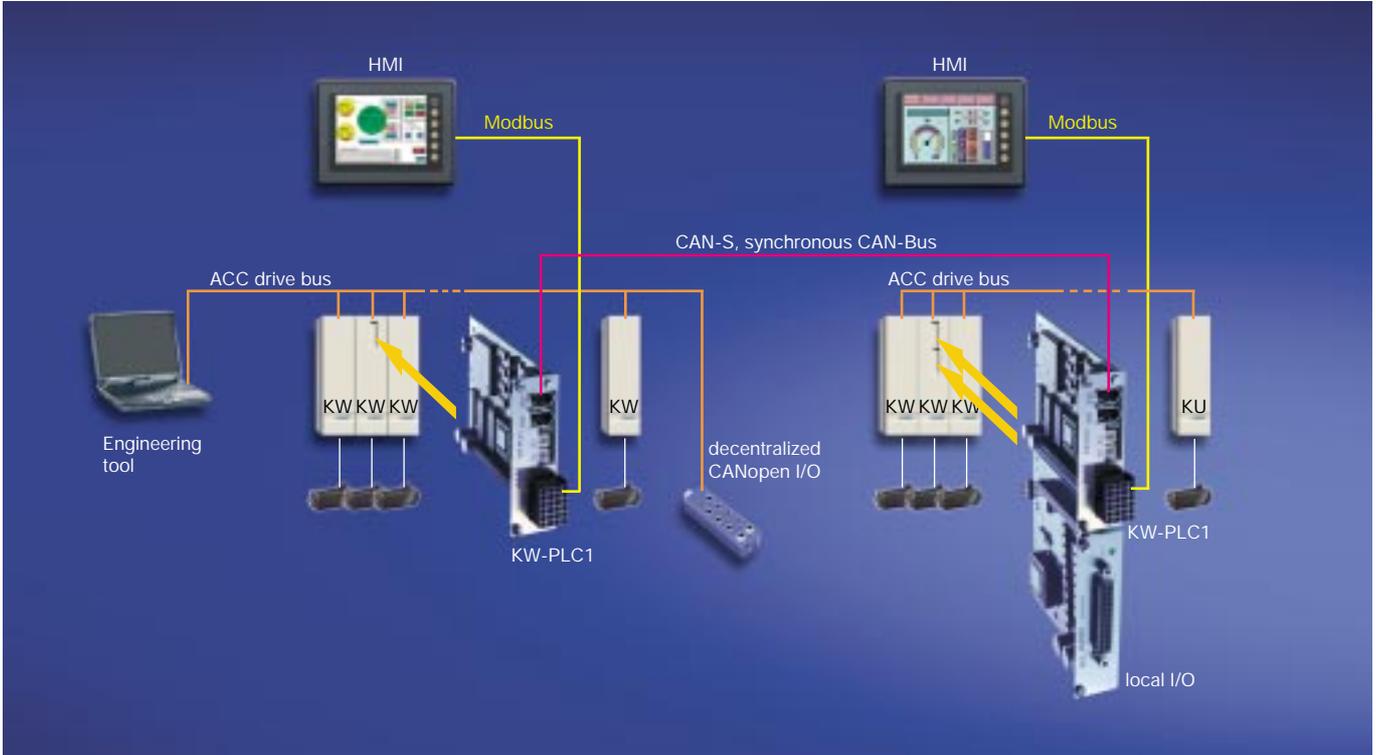
Drive groups linked via synchronous CAN bus

Properties	Description
Serial port	RS 422 (Modbus)
Communication	ACC drive communication bus CAN-S for linking a number of KW-PLC1s Profibus DP slave (option card) SERCOS interface slave (option card)
Measurement inputs	2 per drive and 2 additional fast inputs (200 ns min.)
I/Os	3 binary inputs and outputs per drive For each KW-EA2 option card: 12 galvanically isolated, binary inputs, 8 outputs any number of decentralized I/Os
Programming	IEC 61131-3 (CoDeSys)
Program size (max.)	383 kByte
Data size (max.)	128 kByte
Number of tasks	2 (1 synchronous, 1 asynchronous)
Instructions per ms	3 500
Non-volatile data memory	32 kByte

Applications (typical, but not limited to the following):

- Reel changers
- Envelope machines
- Oscillators
- Winding machines
- Packaging machines
- Textile machines
- Labeling machines

KW-R03P – the onboard PLC for Simple Control Tasks.
Compact, low-cost, decentralized.

The KW-R03P is the plug-in controller card for the KW servo drive module. Apart from the basic drive functions and interfaces it features extensive PLC functionality.

With this compact solution you can implement decentralized structures easily and at low cost. Each axis can be equipped with its own PLC, for example.
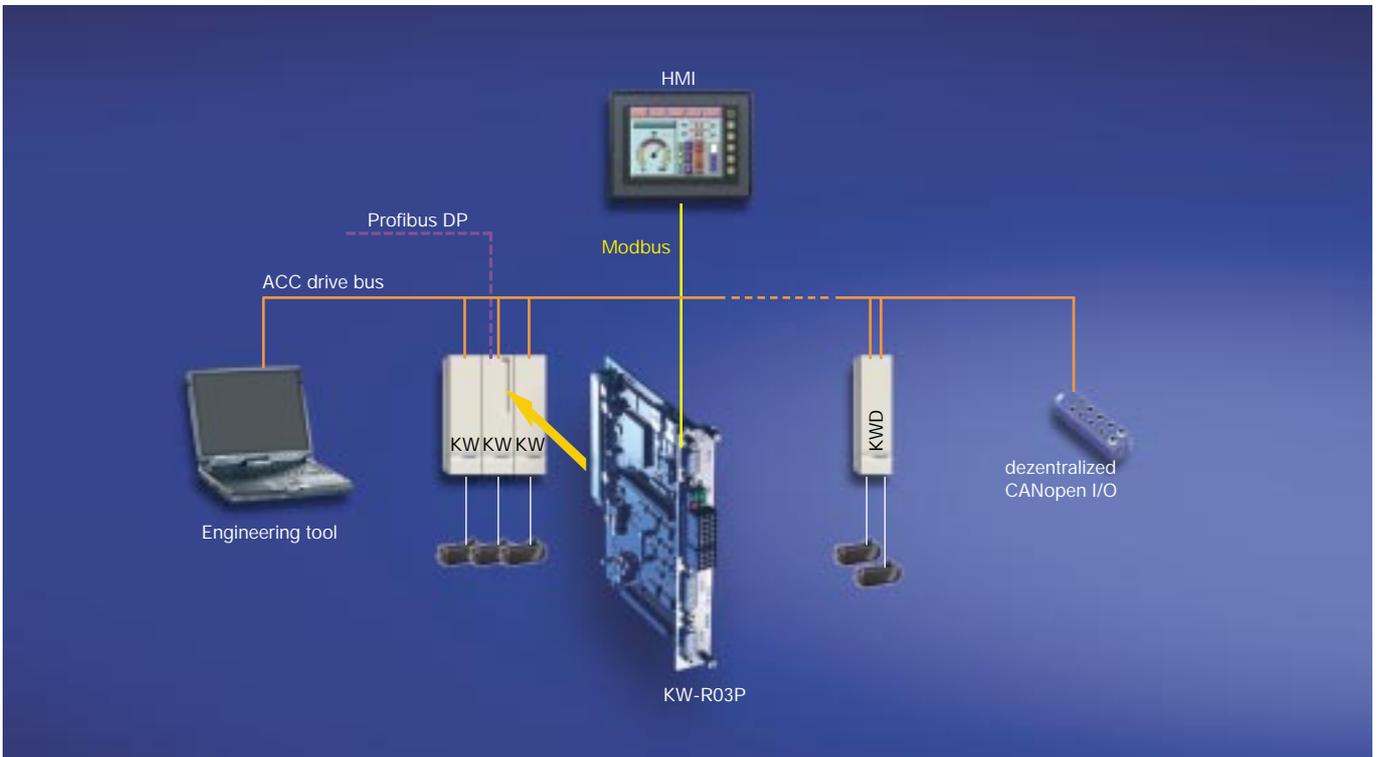
Integrated into the KWD dual servo drive module, the KW-R03P is probably the most compact PLC solution on the market.

Benefits

• Low-cost PLC

• 2 fast inputs for measuring functions per drive

• Application program on plug-in parameter module of the drive

• Programming acc. to IEC 61131-3 with AMK technology library

Control structure with KW-R03P

Local PLC in a drive group

Properties	Description
Serial port	RS 232 (Modbus)
Communication	ACC drive communication bus SERCOS interface slave (option card) Profibus DP slave (option card)
Measurement inputs	2 per card
I/Os	Drive: 3 binary inputs and outputs KW-EA2 option card: 12 galvanically isolated, binary inputs, 8 binary outputs External: any number of decentralized I/Os
Programming	IEC 61131-3 (CoDeSys)
Program size (max.)	79 kByte
Data size (max.)	32 kByte
Number of tasks	2 (1 synchronous, 1 asynchronous)
Instructions per ms	600

Applications (typical, but not limited to the following):

• **Labeling units**

• **Rewinders/unwinders**

• **Feed units**

• **Cross cutters**

Engineering Tool – Programming in Compliance with IEC 61131-3.
Many tasks – one tool.

Here's how to minimize your engineering costs: with a standardized engineering environment for all motion and control tasks irrespective of the hardware being used.

The world-proven CoDeSys development platform makes programming in compliance with IEC 61131-3 simple and reliable. As a result your training is reduced to a minimum.

Use all standard programming languages and combine them any way you like. You can exchange your respective PLC programs between the various controls quickly and easily.

Depending on the application you can process parts of tasks in the servo drive decentralized or in the SYMAC controls centrally.

Benefits

• Low engineering costs

• CoDeSys – a programming tool that is established throughout the world

• Extensive technology functions

• All programming languages in compliance with IEC 61131-3

• Integrated visualization

User interface
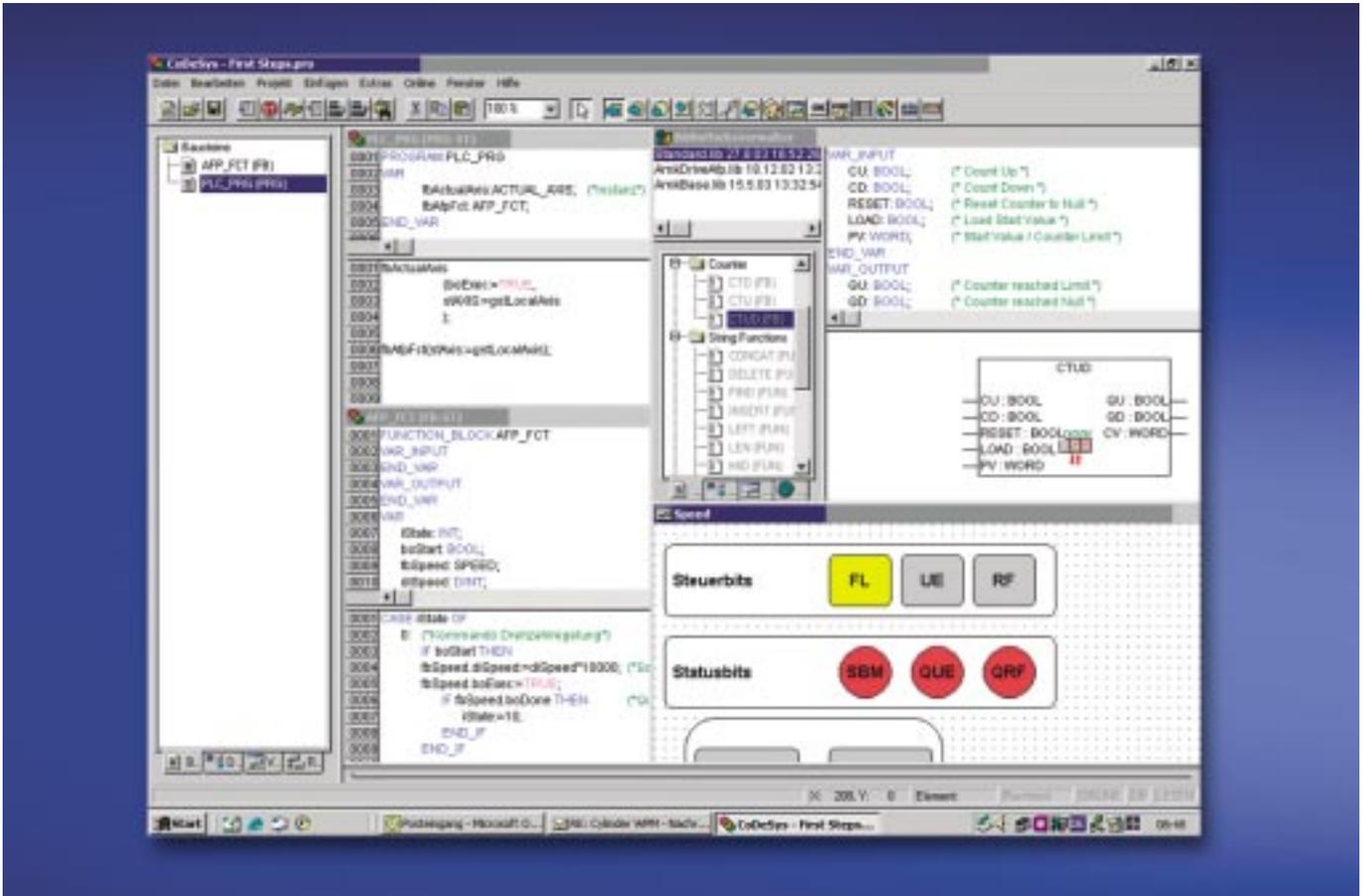
Programming tool with the use of various programming languages and integrated visualization tool

Properties	Description
Programming languages	Instruction list Structured text Function block diagram Ladder diagram Sequential function chart Free graphic function chart editor
Visualization	Integrated visualization Touch panel using Modbus Touch panel using Ethernet
Library administration	CoDeSys libraries AMK libraries User libraries
Development environment	Program input in compliance with IEC 61131-3 PLC program download to the target systems of KW-R03P, KW-PLC1, SYMAC Starting and stopping the PLC program Setting breakpoints Single-step runs Monitoring and description of PLC variables Graphic recording of variables

Engineering Tool –
AMK Technology Library.
Cost-effectiveness by default!

No matter which control solution you choose, the extensive technology functions are already available.

With the AMK technology library you have at your disposal another tool that keeps your programming effort to a minimum. Take advantage of our control know-how and make it contribute to your success: we control the motion – you concentrate on your application!

It couldn't be simpler.

Technology functions

- Positioning
- Electronic gearboxes
- Controllers
- Virtual master
- Electronic cam profiles
- Print mark controls
- Electronic cam switch control
- All types of winders
- Measurement functions
- Read/write drive parameters
- Communication via field buses and Ethernet with TCP/IP and UDP
- Access to all system parameters and system functions
- etc.

Benefits

- **Simplification of engineering due to the use of Function blocks**
- **Saves time and money when programming**
- **Proven motion control functions**
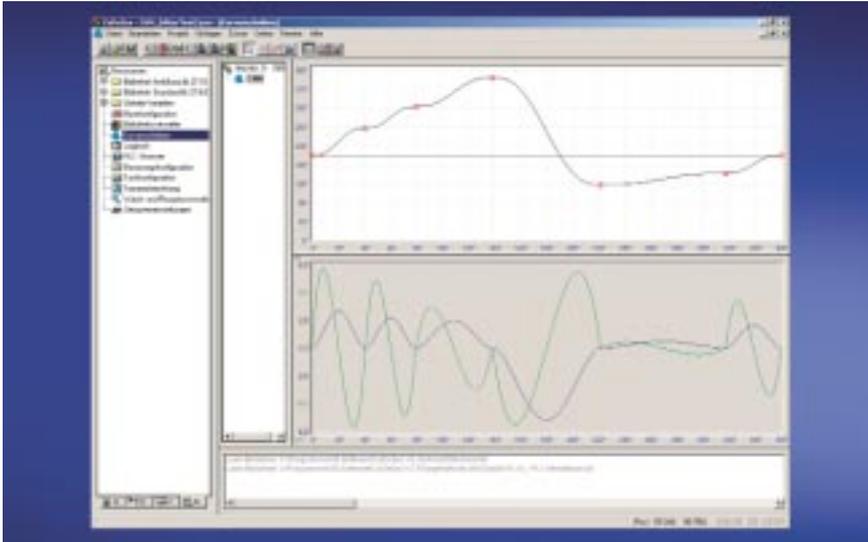
Cam Profile Editor

Synchronized motions on sophisticated machinery often call for complex cam profiles. The cam profile editor integrated into CoDeSys is the ideal tool for this: it is extremely simple to enter the dependencies between the master axis and the slave axis. The curve is generated graphically on the PC or in tables. On the monitor you can not only keep track of the curve but also explicitly follow speed and acceleration. Optimized transfer of data to the technology module allows extremely efficient execution of the splines acting between the individual points, on all AMK PLC platforms.
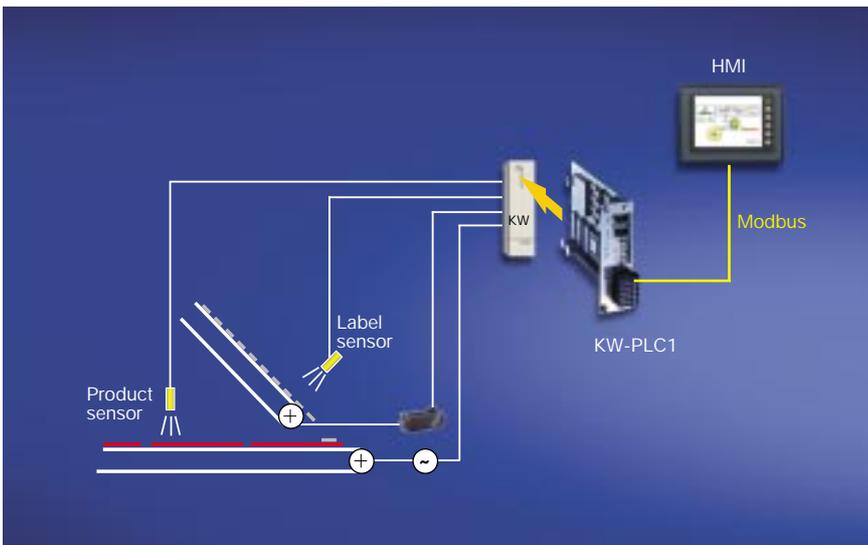
Print Mark Control

With the print mark control library function you can implement your application quickly and easily: consequently you can synchronize two products with one another that come from two different conveyors.

• Position detectors using two measurement inputs of the drive

• Automatic control of product position or, alternatively, automatic control of the position of products from attached machining stations (insetting) selectable

• Correction window freely selectable

• Electronic cam profile can be added later
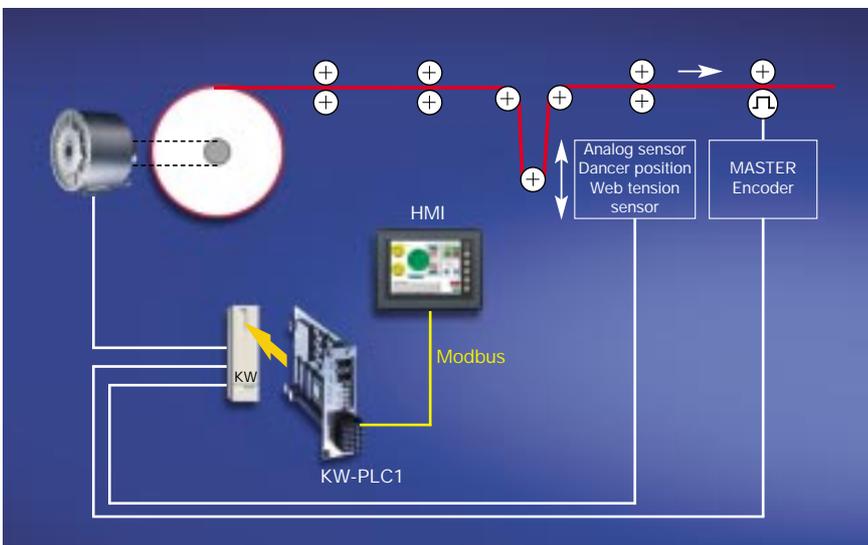
Winders

The winder technology functions provide you with rewinder and unwinder functions. Through dancer, tension loadcell or sensorless – with this technology function implementation of your application solution is simple and quick.

• Rewinders or unwinders with/without sensors

• Web tension detection via dancer or tension loadcell

• Dancer position controller with dancer monitoring

• Diameter calculator with diameter monitoring

Engineering Tool –
SYMAC Web Visualization.
Simple, integrated, low-cost.

Reduce your engineering costs and take advantage of synergies with integrated web visualization over Ethernet on the SYMAC controller platform.

Due to integration into the CoDeSys PLC programming environment and access to all the PLC variables without any elaborate listing of communication data the development of machine visualization is made very simple. With CoDeSys, you can intuitively edit and insert visualization elements.

Access to web visualization via Ethernet, Intranet or Internet is limitless from virtually any location worldwide.

Simply connect a terminal to a web browser (e.g. Internet Explorer) via the Ethernet port. With a click activate "Web Visualization" in the CoDeSys target system setting: enter the SYMAC address in the web browser, and the machine environment appears on your HMI with full operator access.

Benefits

- Low engineering costs
- Integrated into development environment
- Access from any location even with more than one terminal
- Simple, direct access to all variables and parameters
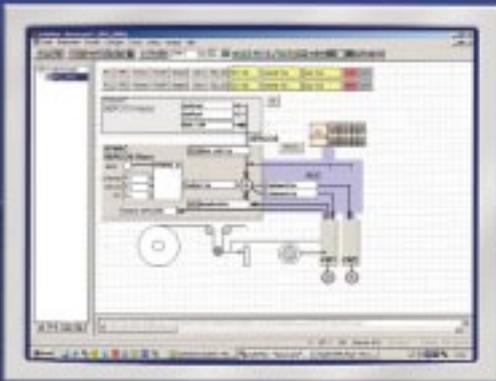
The structure of web visualization

Web-Touch-Terminal

Ethernet

SYMAC

CPU card
AS-FCT1

Webserver

Visualization tool
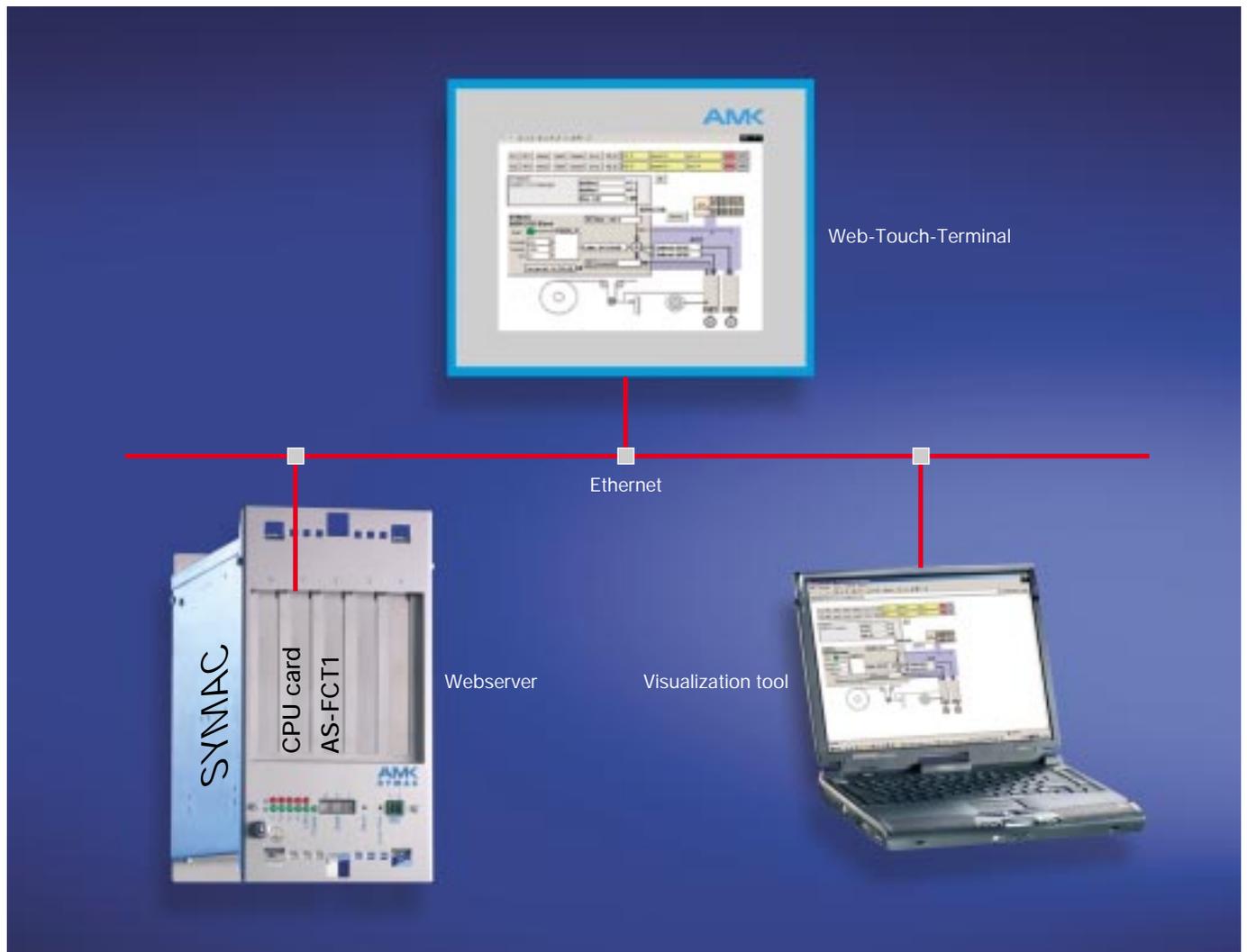
Web visualization, from generation to operator control, easily integrated

Properties	Description
Generation	Integrated into PLC development environment
Input	Switches, buttons, etc., alphanumeric input on displayed keyboard
Output	Alphanumeric, instrumentation, tables, bar graph, curves
Animation	Slide, rotate, scale, visible/invisible, color
Languages	Language selection, texts in text file or XML file
Images	Bitmap import, background bitmap
Authorization	Granting of rights to workgroups
Alarms	Display of alarms in tabulated form
Recipes	Load/save recipes

HMI.
Customized, reliable, user-friendly.

Select the HMI to suit your specific application: AMK's HMIs were specially developed for industrial use and they serve as a platform for sophisticated visualization tasks.

The special emphasis is on performance capability and user convenience.

You can generate the HMI environment with Ethernet control devices either very easily and conveniently using the programming tool for the machine program direct or with dedicated configuration software belonging to the HMI.
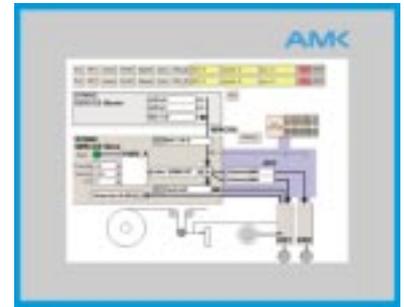
The engineering environment for the Modbus HMIs provides you not only with many different input and output options but also message management and language selection.

Benefits

- Low engineering costs
- Integrated into development environment
- Standard terminals can be used

HMI for SYMAC via Ethernet

Properties	Web-Touch Panel	Touch Panel
Display, diagonal	12"	12"
Display, type	TFT color display with at least 65,000 colors	
Interfaces	Ethernet	
Programming	Visualization programming via CoDeSys	Independent programming
Degree of protection	Front panel IP 65	
Power supply	24 V DC (+/- 10%)	
Certificate	CE/UL	

HMI for all systems via Modbus

Properties	Touch Panel V606eM20	Touch Panel V606iC10
Display, diagonal	5,7"	
Display, type	STN monochrome LCD, 8 grey scales	STN color LCD, 16 colors
Display, resolution	320 x 240 pixels	
Flash Memory	640 kByte	1 MByte
Recipe administration	STN monochrome LCD, 8 grey scales	STN color LCD, 16 colors
Interfaces	Modbus via RS232 / RS422 / RS485 also RS 232 for programming	
Degree of protection	Front panel IP 65	
Power supply	24 V DC (+/- 10%)	
Certificate	CE/UL	

I/O Modules.
Flexible, local, decentralized,
practically unlimited.

How many peripherals would you like?

**The intelligent servo drives in the KE/KW
series feature local, binary and analog
interfaces as standard.**

**By using the KW-EA2 option card in the
drive you can even increase the number
of inputs and outputs locally. To suit
your requirements you can also use
virtually any number of decentralized I/O
modules.**

Benefits

- **Local, in-drive**
- **Number can be increased and is
  unlimited**
- **Flexible**

Integrated I/Os on the controller card

Each servo drive provides a number of I/Os for open configuration:

• 2 binary outputs, galvanically isolated, sustained short circuit proof (max. current 100mA)

• 1 binary output for control and monitoring of a holding brake (max. current 2 A)

• 3 binary inputs, galvanically isolated, 2 can be configured as fast inputs for measuring functions for positioning feedback and/or external distance measuring scales

• 2 analog inputs 12 bit, +/-10V

Through use of the KW-PLC1 an additional 2 local fast inputs for measuring functions with a resolution of 200ns can be implemented.

Local I/O terminals with KW-EA2 option card

The number of local inputs and outputs can be easily extended in the drive by using the KW-EA2 option card with isolated inputs and outputs:

• KW-EA2 option card with 12 binary inputs and 8 binary outputs, sustained short circuit proof (Imax=100mA)

Decentralized I/O Modules

Standard CANopen I/Os can be integrated into the drive bus. In addition it is possible to use decentralized I/O assemblies for binary and analog I/Os etc. from a wide variety of manufacturers with the following field bus couplers:

• CANopen
• Profibus DP

Control your Motion.

- ■ **AC servo and main drives**

- ■ **Multi-axis controls**

- ■ **CNC controls**

- ■ **Custom-designed special motors**

- ■ **Linear drives**

- ■ **Customized special-purpose motors**

- ■ **Built-in motors and gear motors**

- ■ **Frequency inverters**

AMK

AMK Arnold Müller GmbH & Co. KG
Antriebs- und Steuerungstechnik

Postfach 13 55
D-73221 Kirchheim/Teck

Gaußstraße 37–39
D-73230 Kirchheim/Teck

Telefon: 0 70 21/50 05-0
Telefax: 0 70 21/50 05-199
info@amk-antriebe.de
www.amk-antriebe.de