ADWIN Technical Presentation



Description

ADwin systems are used by engineers and scientists around the world for Real-Time applications where deterministic timing is required.

ADwin programmable data acquisition and control systems allow many different types of applications to run with precise Real-Time performance. This makes **ADwin** a universal platform suitable for many different types of functions, applications and industries.

ADwin offers more than 16 years of experience in automation and deterministic Real-Time applications. With software solutions since 1987, and with **ADwin** hardware sytems since 1992, many thousands of users and applications worldwide, relying on these precise and robust systems.

ADwin offers standard hardware and software, developed by experienced engineers, produced in our high-tech production lines. For very specialized applications, customized hardware or software turnkey solutions are also available.

Pre- and post-sales **consultation and engineering** for our customers is one of the great benefits of using **ADwin** systems. Please take advantage of this and feel free to contact us, we will discuss your project jointly with you.

Real Time Functions

- Intelligent data acquisition
- Complex trigger applications
- Online analysis of measurement data
- Open-loop control functions
- Closed-loop control functions
- Signal/Waveform generation



Application Field

- Production and R&D test stands
- Production line automation systems
- Laboratory and mobile systems
- Fast machine control applications
- Material endurance tests
- Quality assurance tests



Typical Industries

- Automotive and Aerospace
- Semiconductor and component testing
- Machine builders
- Scientific and Industrial Research
- Nano-Science
- Laser and Electron Beam Industries

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ADAS
NEXEYA Products Division

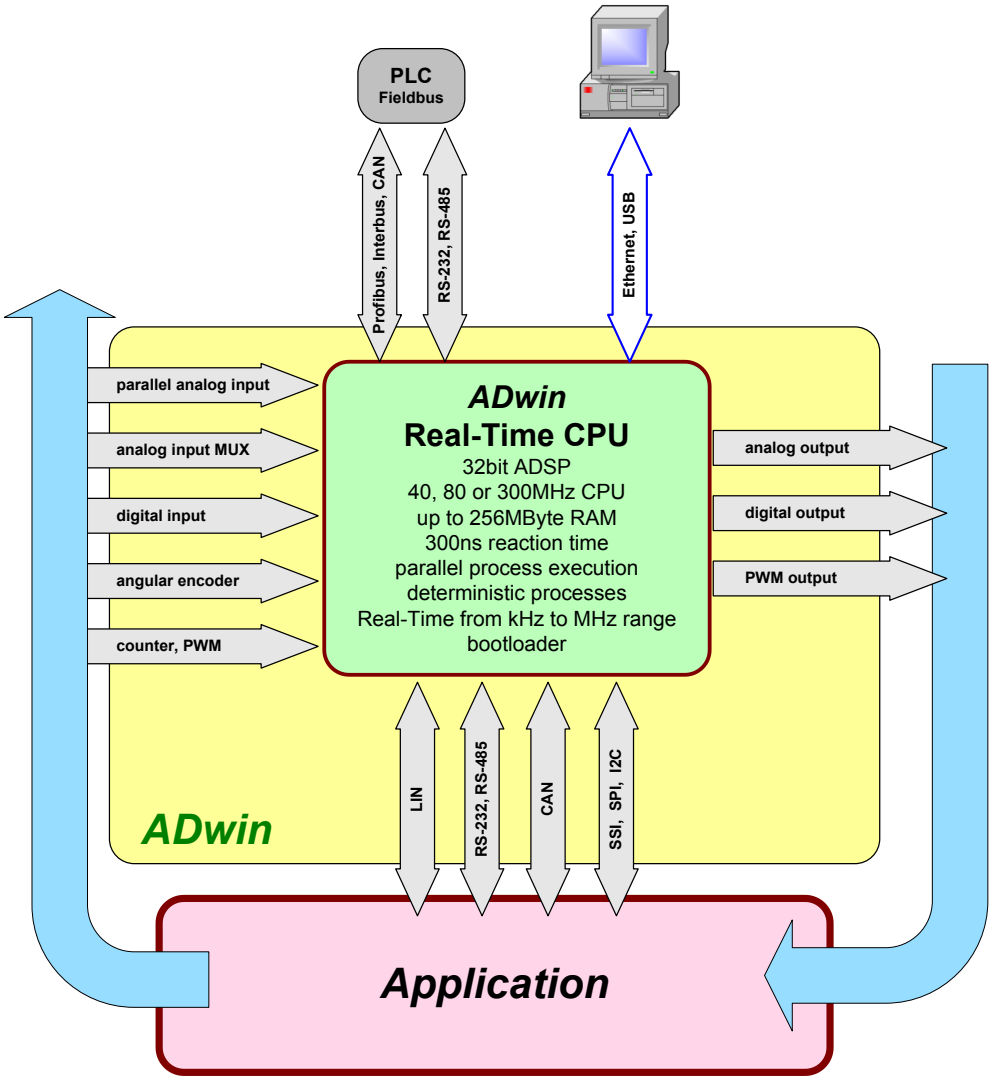
ADwin Real-Time Concept

ADwin systems are characterized by deterministic execution of intelligent data acquisition and control applications. This is achieved by a local CPU (DSP), the Real-Time heart of every **ADwin** system. The CPU is responsible for all Real-Time functions and guarantees deterministic process execution, independent of the PC and its workload. **ADwin** systems work in close cooperation with the Windows-PC, but there is a clear job sharing: the job of the **ADwin** system is to execute fast and deterministic processes in Real-Time, while the Windows PC performs standard functions such as displaying graphical user interfaces for applications, visualization of data, and data base accesses.

ADwin systems add Real-Time capability to a Windows PC; if the Windows PC crashes, the **ADwin** system will continue to run, maintaining the integrity of the application.

In addition to the CPU, there is a large local memory for program code and measurement data, analog I/Os, digital I/Os, counters, different interfaces, expansions and options.

The communication between the **ADwin** system and the PC is done via Ethernet or USB. Fieldbus interfaces allow the connection to PLCs, while a bootloader supports complete stand-alone operation of the **ADwin** system.



ADwin Real-Time – with sub-microsecond precision !

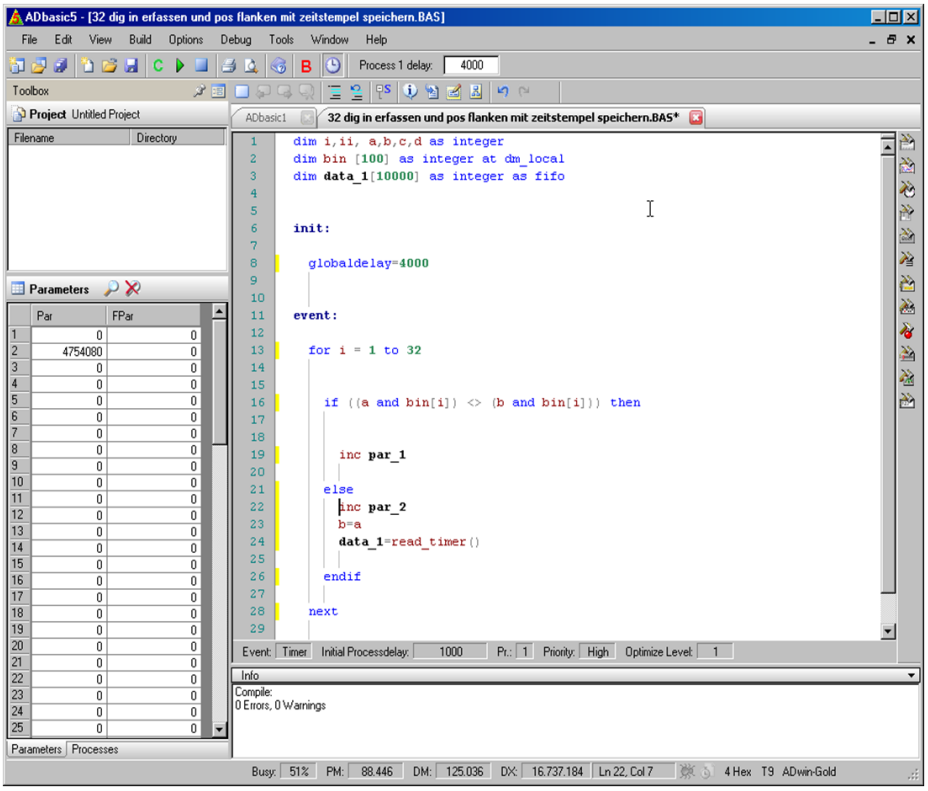
ADwin applications always run in Real-Time; every sampled value can be evaluated in the same sampling step and a control function, or an online analysis can follow immediately. The best solution for fast Real-Time applications is to place a dedicated CPU close to the signals with its own resources for processing the data.

The **ADwin** CPU runs an optimized Real-Time multi-tasking operating system; only this combination provides exact, predictable process response times as short as 300 ns. Applications with process cycle times from ‘ms’ down to ‘µs’ range, from kHz up to a MHz, can run perfectly on **ADwin** in Real-Time.

REAL-TIME SOFTWARE DEVELOPMENT TOOL – *ADBASIC*

ADbasic is the easy-to-use Real-Time software development tool for deterministic, time-critical processes on ***ADwin*** systems. Whether you need to run intelligent data acquisition with online analysis or complex trigger conditions, use open and closed-loop controllers, or generate any kind of periodic or non-periodic waveforms, ***ADbasic*** is always the key for the development of various Real-Time applications with precise and deterministic operations and timings.

ADbasic is an integrated development environment that runs under Windows with many online debugging features. Its easy-to-learn, standard command syntax has been expanded with a number of functions to access all inputs, outputs and interfaces of an ***ADwin*** system as well as functions for process control and communication with the PC.




```
DIM a,b as FLOAT
DIM X1,X2 as INTEGER
DIM X3,X4 as INTEGER

INIT:
a=12
b=0,34

EVENT:
X1=adc(1)
X2=adc(2)
X3=adc(3)
X4=adc(4)

Y=X1/a+ X2*b
dac(1,Y)

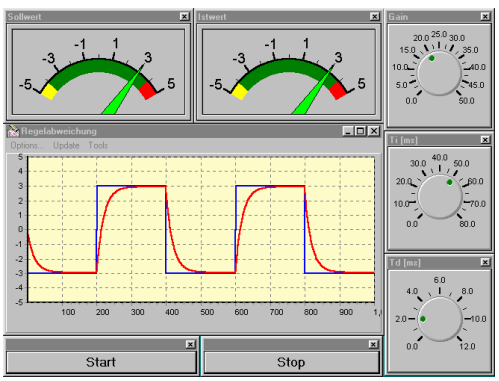
Z=func(X3,X4)
dac(2,Z)
```

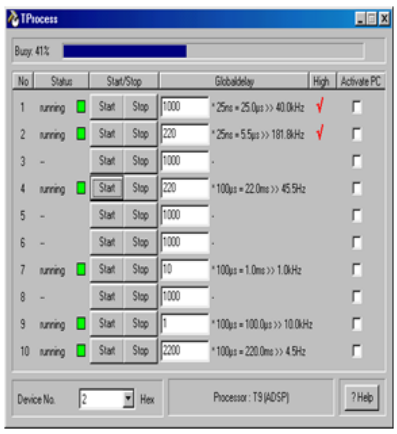
Along with **ADbasic**, the **ADwin** Real-Time operating system is optimized for the shortest possible response times, down to 300 ns. It manages parallel processes which can be executed simultaneously in a multi-tasking mode, with different priorities and process cycle times.

ADbasic is source code compatible to previous versions; the same code can be executed on different ADwin systems with different CPUs. This means that by using **ADbasic**, the **ADwin** concept gives you a great advantage in the long term perspective, by using future hardware together with your currently developed code. This saves your today's development costs in a long term perspective.

GRAPHICAL USER INTERFACE AND DEBUGGING TOOLS – *ADTOOLS*

ADtools is a collection of indicators and controls to exchange parameters with the **ADwin** system and for the visualization of measurement data. These tools are ideal for the **ADbasic** software development and for quick lab-applications. They offer direct access to all **ADwin** resources, as well as data storage to files and direct data transfer to Excel.





FREE DATALOGGING PACKAGE – *ADLOG*

ADlog is a data logging program for **ADwin** systems. Analog, digital, counter, and CAN signals can be acquired, visualized and stored in different file formats, such as ASCII, CSV, binary and DIAdem.

ADtools and **ADlog** are supplied free of charge together with an **ADwin** system.

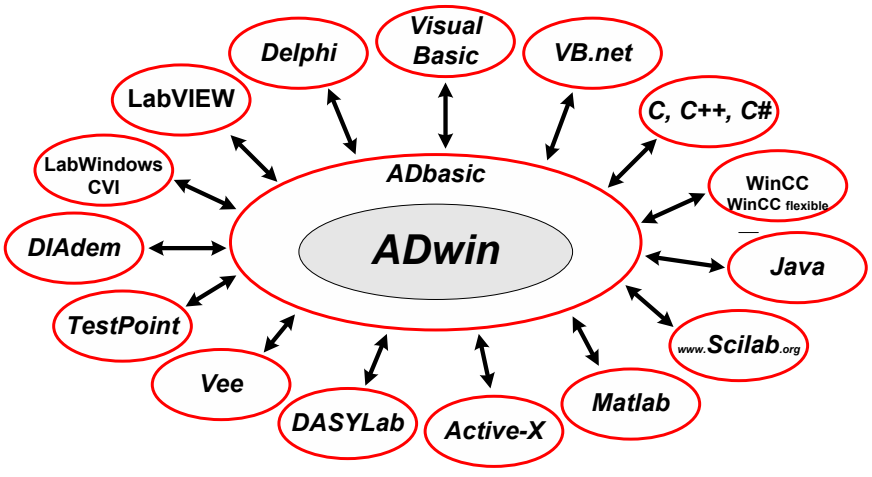


ADWIN DRIVERS

Drivers are available for a wide range of PC programs under the Windows, MacIntosh or Linux operating systems. The software drivers provide functions for communication between PC, the **ADwin** system and **ADbasic** processes:

- bi-directional data exchange of variables,
- arrays and data structures,
- FIFO data exchange,
- system booting and process downloads,
- starting and stopping processes,
- monitoring and control of system variables and resources.

One of the key benefits in the **ADwin**-to-PC communication is the possibility to run fast deterministic Real-Time processes AND communicate data and parameters between PC and **ADwin** system at the same time. Both have no influence on each other: the communication does not disturb the deterministic timing of the Real-Time processes and vice versa.



COMPACT REAL-TIME SYSTEMS

ADwin-Gold II, **ADwin-Gold** and **ADwin-light-16** are powerful Real-Time systems in very compact packages at a reasonable price.

ADwin-Gold II and **ADwin-Gold** are built in a robust metal enclosure and include a fast, local Real-Time CPU and memory, analog and digital inputs and outputs, as well as an Ethernet or USB interface for the communication with a PC.
Options include additional functions such as counters, encoder interfaces, serial and CAN bus interfaces, and SSI interfaces. The systems can be used in laboratories, on a DIN-rail in industrial machines, or in mobile and in-vehicle applications.

ADwin-light-16 offers similar functionality to the **ADwin-Gold** system, but with a reduced number of channels. Based on one common design, there are three different versions: a PCI plug-in board, a Euro-size plug-in board, and an external system in a robust metal enclosure.

Because of their compact design, all three systems are ideal for OEM applications.

*ADwin-Gold **

• 32-bit floating-point Real-Time DSP, 40 MHz
• 256 kB CPU RAM, 16 MB or 64 MB DRAM
• 16 differential analog inputs via MUX and 2 × 16-bit 5 µs ADC and 2 × 14-bit 0.5 µs ADC
• 2 or 8 analog outputs, 16 bit DAC 16-bit
• 32 digital I/Os, 1 Trigger input, TTL/CMOS
• Counter, 4 × 32-bit, event, period, duty cycle, up / down, encoder interface, PWM input
• 4 × SSI, 2 × RS-232/485
• 2 × CAN bus, Automotive CAN, CANopen
• Ethernet or USB interface to PC, Bootloader
• Compact metal enclosure, DIN rail mounting kit





*ADwin-Gold II **

• 32-bit floating-point Real-Time DSP, 300 MHz
• 768 kB CPU RAM, 256 MB DRAM
• 16 diff. analog inputs, MUX, 2 × 18-bit 2 µs ADC
• 2, 4 or 8 analog outputs, 16-bit DAC
• 32 digital I/O, 1 Trigger input, TTL/CMOS
• 4 Counter, 32-bit; event, period, duty cycle, up/ down, encoder interface, PWM, frequency
• Interfaces 4 × SSI, 2 × RS-232/485
• 2 × LS-Bus for HSM module access
• 2 × CAN, Automotive, CANopen, Profibus, others
• Ethernet interface to PC, Bootloader
• Compact metal enclosure, DIN rail mounting kit

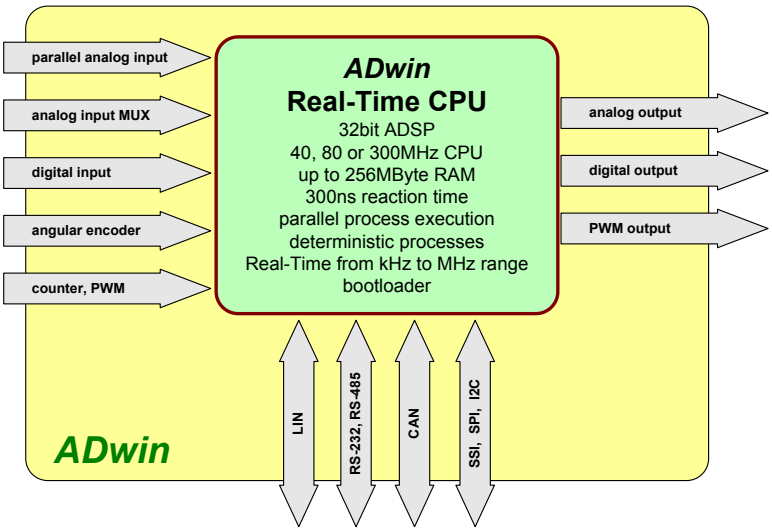
*ADwin-light-16 **

• 32-bit floating-point Real-Time DSP, 40 MHz
• 256 kB CPU RAM, 16 MB RAM
• 8 differential. analog inputs, MUX, 16-bit 2 µs ADC
• 2 analog outputs, 16 bit DAC
• 6+6 digital I/O, 1 trigger input, TTL/CMOS
• 32 digital inputs/outputs, TTL/CMOS
• 1 or 2 counter; event, period, duty cycle, up/down, encoder interface, PWM, frequency
• 1 × CAN bus, Automotive CAN, CANopen
• 1 × LS-Bus for HSM module access
• Ethernet or USB interface to PC, Bootloader
• Customized OEM versions available



TiCo processor

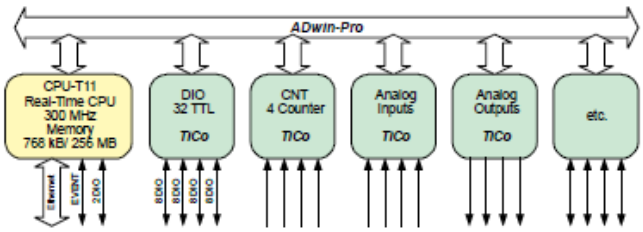
There is a new enhanced Real-Time CPU for **ADwin** systems, the embedded **TiCo** processor (Timing Controller). This processor is used as a co-processor in the system and it has access to the specific module inputs/outputs, while the **ADwin** main CPU has access to the **TiCo** variables, data and processes. The **TiCo** can handle several programs in parallel in a multitask mode.



The **TiCo** processor opens a new door for deterministic applications with a timing precision of nanoseconds. The user can quickly create Real-Time code for this processor, and load it in the **TiCo** CPU with one click.

TiCo programs run fast like FPGA based systems (VHDL or graphically programmed), but the TiCo development time is much shorter.

The **TiCo** program development environment is T**iCoBasic**, it has the same look and feel, and it is as easy as the existing **ADbasic** language.



Typical TiCo applications

- Pre-processing of data
- Online analysis of measurement values
- Intelligent and programmable trigger conditions
- On-board controller functions
- Flexible digital filters
- Noise reduction using moving average filter
- Revolution and revolution variation measurement
- SPI protocol generation, interface simulation
- CAN bus analysis, logging, bus stimulation
- LIN bus communication handling
- … and many more

For OEM applications there are also customized modules and stand-alone modules with **TiCo** processor available, please contact us for consultation.

TiCo processor specifications

• 32-bit integer CPU, 50 MHz clock
• Co-processor on ***ADwin*** systems
• Highly optimized CPU instruction set for application code accurate to nanosecond level
• ***TiCoBasic*** development tool
• Bootloader

TiCo Availability

The TiCo processor is available in

- **ADwin-Pro II**
- **ADwin-Gold II**

and is used in addition to the standard **ADwin** CPU. Up to 15 TiCo processors in tandem with the main **ADwin** CPU, make **ADwin-Pro II** an extremely powerful Real-Time system.

ADWIN PRO II

ADwin-Pro II is a modular, scalable, expandable, intelligent Real-Time system for fast data acquisition and control applications in industrial and scientific environments.



The modular design of the **ADwin-Pro II** offers a flexible, adaptable solution for various applications. It supports signal counts from a single channel up to several hundred channels. A wide range of I/O modules, chassis, processors and memory options allows a customization of the system for universal use, especially in industrial applications.

The system communicates via Ethernet to a Windows PC, via a Fieldbus interface with a PLC, or is running stand-alone with a bootloader option.

FAST DETERMINISTIC CPUS

The heart of every **ADwin-Pro** system is a fast dedicated Real-Time CPU, responsible for all deterministic functions in the system. The applications run independently from the PC and its operating system. The CPU software timing is completely predictable, which enables precise control of all processes. Run multiple processes (tasks) in parallel with high speeds from kHz to hundreds of kHz, even up to MHz – in Real-Time.

Pro-CPU-T11-ENET

Real-Time execution is based on a 32-bit floating- point DSP and optimized operating system. The Pro-CPU-T11 processor module contains a 300 MHz ADSP processor, 768KB CPU RAM, 256 MB DRAM, Ethernet interface (10/100Mbit/s) for PC communication and a trigger input.

Pro-Boot

Boot-loader option for Ethernet Pro-CPUs; loads the software to the ADwin-Pro CPU without a PC and starts the software processes automatically.

ANALOG INPUT MODULES

The ADwin-Pro II system provides many different solutions for analog measurements. There are modules with:

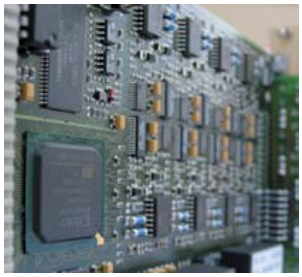
- multiplexed analog inputs
- parallel synchronous analog inputs, with one ADC per channel
- on-board RAM buffer for high-speed measurements
- embedded TiCo Real-Time co-processor
- signal conditioning, extended voltage ranges, filters

PARALLEL ANALOG INPUT MODULES

The parallel analog measurement modules acquire all channels simultaneously, without any phase shift between the measurement channels. This measurement technique is achieved by using one ADC per channel. Different 4 and 8 channel modules are available, with a resolution/ speed of 14 bits at 50 MHz or 18 bits at 500 kHz.

Parallel sampling is a great advantage if measurement signals must be correlated to each other and if, based on these signals, controls loops or an online signal analysis are executed. For instance for the determination of phase shift between signals. If the application requires more channels, additional modules can be used simultaneously, up to 120 channels in a single system.

ADWIN



Parallel Analog Output Modules

Generating waveforms is largely used for many test and automation applications to reproduce any kind of specific signals. **ADwin** offers (non-) periodical waveforms, numerical waveform generation, arbitrary wave form generation, adaptive signal generation with feedback measurement, internal timer or external triggered signals, single or multiple channels. The signals can be used at analog or digital outputs, or used internally as set-points for controller functions.

The **ADwin-Pro II** system offers 4 or 8 channels analog output modules with 16 bit resolution. The output range is ±10V and the settling time is 10 µs (20 V) or 3 µs (1 V). It is possible to have up to 120 channels in a single system.

Counter and PWM Modules

ADwin's high-speed digital counter and PWM modules offer flexible solutions for a wide range of counting and measurement applications. These modules allow the user to read quadrature encoders, measure signal periods or the length of pulses, acquire SSI signals, evaluate or generate PWM signals, measure frequency and revolution speed, detect revolution speed variations, and more.

The **ADwin-Pro II** counter modules provide 4 × 32- bit independent multifunction counters, with software selectable counter modes. For high channel count there is a 16 channel counter module for event counting. The counters have TTL/CMOS inputs or isolated 5 V, 12 V or 24 V inputs. There is also a PWM module which provides 4 PWM outputs.

Digital I/O Modules, Compartors

There are different digital input/output modules for the **ADwin-Pro II** with TTL/CMOS level, optically isolated 5 V, 12 V or 24 V input modules, isolated transistor output modules, and relay output modules. A comparator input module is also available with software selectable thresholds in the range of ‑ 2 V…8 V, other ranges are possible on request.

Signal Conditioning and Filter Modules

ADwin offers signal conditioning modules for RTD/ PT100, thermocouple, and low voltage ranges. Or with standard 8B modules, strain gage, current, resistance and high or low voltages inputs.

Interface Modules

The following modules are available to connect the ADwin system to a PLC, or any automotive bus, or to connect any other external system via a standard interface:

. CAN for automotive; CAN database software tool
. RS-232/485/422
. LIN
. SPI, I2C
. LS-Bus
. Profibus, Interbus, CANopen, Profinet, etc.

TiCo Processor on ADwin-ProII Modules

The TiCo embedded Real-Time processor is used on ADwin-Pro II modules as a co-processor in the system. This processor has access to the inputs/outputs of the specific module it resides on, while the ADwin main CPU has access to the TiCo variables, data and processes. Use the TiCo to improve ADwin-Pro II modules to an intelligent Real-Time front end.

Cables and Adapters

A variety of cable sets and adapters are available to connect the ADwin-Pro II modules to sensors and other hardware.

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Specifications are subject to change. Please, verify the latest specifications at time of order.