

Industrial Real-Time Control and Data Acquisition Systems: **ADwin**



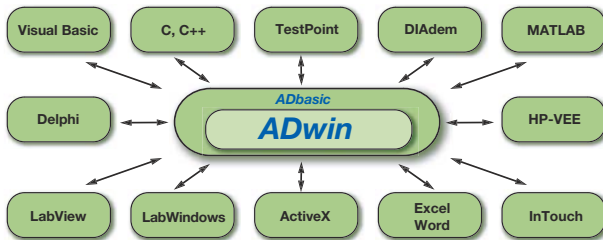
ADwin – Real-Time Control, Measurement and Automation Systems

- Deterministic and robust operation from a dedicated CPU with a real-time operating system
- Working with a Windows-PC, connected to a PLC or stand-alone
- 32-bit Floating-Point CPU (Analog Devices SHARC-DSP), local DSP-RAM, up to 128 MB DRAM
- Analogue and digital I/Os, parallel synchronized analogue inputs, multiplexed analogue inputs, counters, PWM-I/Os, filters, isolation amplifier, thermocouple and RTD inputs; interfaces for CAN-bus, Profibus, Interbus, RS-232, RS-485, Bootloader for stand alone applications
- Ethernet or USB interface for PC communication
- Real-time development software **ADbasic**

Supported operating systems

- Windows 95/98/ME/2000/NT/XP
- Linux

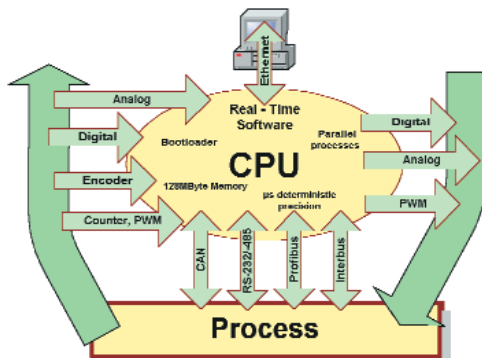
Drivers for ADwin systems



Real-Time Software

Running independently of the PC, its operating system, application software and associated overheads are individually controlled. The PC can access **ADwin** at any time to exchange data, start or stop processes or load new processes to the system. **ADwin** systems add real-time capability to a Windows PC! If the Windows PC crashes, the **ADwin** system will continue to run, maintaining integrity of the application.

ADbasic is the integrated development environment to create fast real-time measurement and control processes for **ADwin** systems.



The ADwin Concept

MS Windows™ is not designed for real-time applications. The best solution for fast real-time applications is to place a dedicated CPU close to the signal source and therefore having its own resources for the purpose of processing the data. Only this structure gives the ability of exact response times with predictable delays. **ADwin** applications always run in real-time; every sampled value or event can be evaluated in the same step and a control function or online analysis etc. can follow immediately. This is provided by the **ADwin** systems' concept with a local CPU, additional analogue & digital interfaces and different expansions or options.

Typical ADwin Applications

- Production and R & D test stands
- Production line automation systems
- Data acquisition systems for laboratory or mobile use
- Fast machine control applications
- Automotive test stands for: vibration, diesel/gasoline engines, gearbox, CAN-devices, ABS, brakes, tyres, control units, exhaust systems, bearings, valves ...
- Positioning controls with servo motors, stepper motors, piezo drives ...
- Component test for: relays, switches, electronic components, ICs, semiconductors, control units ...
- Control of scanning processes for: microscopes, surface refinements with electron beams or lasers ...
- Stand-alone applications, fast intelligent programmable automation devices, etc.

Typical ADwin Functions

- Data acquisition: multiplexed and parallel measurements, timer or event based, threshold-control, complex triggering, online analysis and data reduction, parallel simultaneous measurements, different sample rates per channel, wide range RPM measurements, process identification
- Fast digital controller: PI-, PID-, cascade, adaptive, state space controllers, design and test of different control strategies, i.e. multi-channel PID (from kHz to hundreds kHz)
- Signal synthesis and generation: multi-channel frequency generators, periodic or non-periodic wave forms, random interference signals; frequency, phase, amplitude and offset, online adjustable, values directly output and/or passed as variables for parallel controller processes (e.g. PID controllers)
- Online signal processing, statistical evaluations, digital filtering, LP, BP, HP, FIR, IIR, FFTs, etc.

ADwin-Light-16

Compact Industrial Real-Time System with Different Designs

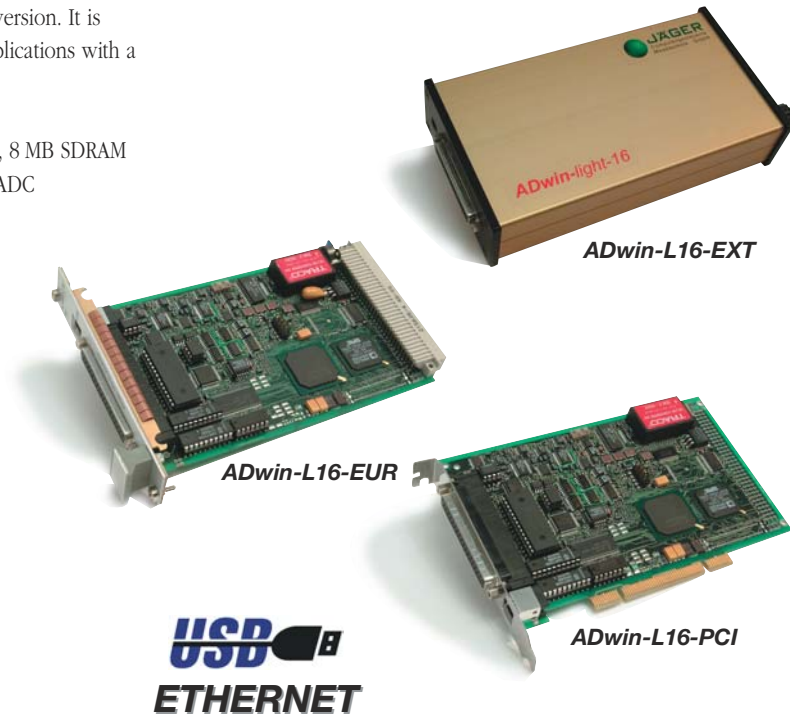


The **ADwin-Light-16** follows the standard **ADwin** concept with a fast local CPU, analogue and digital inputs/outputs on a single system. Based on one common design, there are four different versions: a PCI plug-in board, a Euro-size plug-in board, an external system in a robust metal enclosure, and a cPCI version. It is designed as a reasonably priced solution for applications with a limited number of I/Os.

- 32-bit Floating-Point DSP, 256 kB CPU SRAM, 8 MB SDRAM
- 8 Analogue Multiplexed Inputs, 16-bit 10 μ s ADC
- 2 Analogue Outputs: 2 \times 16 bits DAC 16-bit, 10 μ s FSR (3 μ s FSR/10)
- 6+6 Digital Inputs/Outputs, TTL/CMOS
- Software Calibration of analogue I/O
- 2 32-bit Counters
- 1 Trigger Input, TTL/CMOS
- USB or Ethernet Interface

Optional:

- CAN Interface
- additional Digital I/O
- Up/Down Counter, Encoder Interface
- Bootloader



ADwin-Light-16 Series Ordering Information

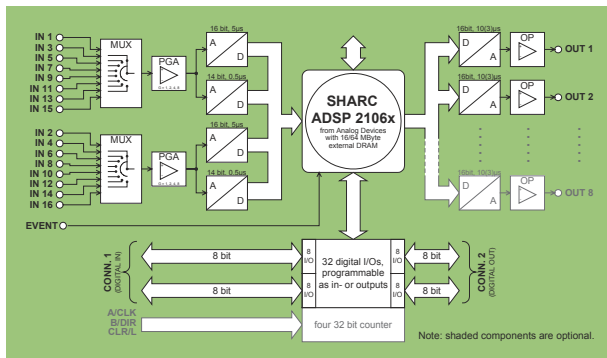
ADwin-L16-PCI	PCI plug-in board
ADwin-L16-CPCI	Compact PCI plug-in board
ADwin-L16-EURO	EURO-size plug-in board, needs 5 VDC from DIN-connector 96pin, USB interface
ADwin-L16-EU-ET	EURO-size plug-in board, needs 5 VDC from DIN-connector 96pin, Ethernet interface
ADwin-L16-EXT	In a robust metal enclosure, needs 10-18 VDC power supply, USB interface
ADwin-L16-EX-ET	In a robust metal enclosure, needs 10-18 VDC power supply, Ethernet interface
Options (manufacturing options only, no upgrade possible)	
ADwin-L16-CO1	1 channel up/down counter, quadrature evaluation, replaces standard counters
ADwin-L16-DIO1	32 DIOs, 32 Bit, CAN interface, 2 counters with 32 bit resolution (software selectable for: event counter, pulse period measurement, pulse width and duty cycle measurement, or up/down counter with clock/direction or quadrature evaluation)
ADwin-L16-Boot	Bootloader for standalone operations (only in combination with Ethernet interface)
ADwin-L16-Mount	Mounting kit for ADwin-L16-EX-ET and ADwin-L16-EXT only
ADwin-L16-Power	Power supply device (12 VDC) for ADwin-L16-EX-ET and ADwin-L16-EXT only

ADwin-Gold

Compact Robust Industrial Real-Time System

The **ADwin-Gold** system follows the standard **ADwin** concept with a fast local CPU, memory, analogue & digital inputs/outputs on a single system. It is designed in a robust metal enclosure and has to be connected to a PC or a notebook computer via Ethernet or USB.

ADwin-Gold has 16 diff. analogue inputs. There are two input blocks, with 8 analogue inputs each, connected to a multiplexer. The multiplexer outputs are connected with two different ADCs: a 14-bit ADC (0.5 μ s) to execute very fast measurements and a 16-bit ADC (5 μ s) for highly accurate measurements. The ADCs can be started in synchronous or asynchronous mode.



The standard version of the **ADwin-Gold** system is equipped with two analogue outputs with 16-bit Resolution, optionally up to eight are possible. The full range settling time (20 V) is 10 μ s. A synchronous update of the DAC outputs is possible.

The system has 32 user-defined, TTL-compatible digital I/Os, configurable in groups of eight as input or output, and a trigger input (EVENT). The trigger input is used for external control of program sequences. The counter option **ADwin-G-CO1** provides four 32-bit Counters for period width measurement, pulse measurement, or up/down counters with clock/direction or quadrature evaluation. The bootloader option **ADwin-G-Boot** allows standalone operations (only in combination with Ethernet interface).

- 32-bit Floating-Point DSP, 256 kB CPU RAM, 16 MB DRAM
- 16 analogue inputs
 - 2 × 16-bit 5 μ s ADC and
 - 2 × 14-bit 0.5 μ s ADC
- 2 Analogue Outputs: 2 × 16 bits DAC 16-bit, 10 μ s FSR (3 μ s FSR/10)
- 32 digital inputs/outputs, TTL/CMOS
- Analogue I/Os on BNC sockets
- 1 trigger/event input, TTL/CMOS
- Ethernet or USB interface to PC
- Compact Metal Enclosure



Optional configurations

- 4 × 32-bit Counters, event, period, up/down with encoder interface, PWM input
- Up to 8 analogue Outputs
- 64 MB memory/512 kB CPU RAM
- Bootloader



ADwin-Gold Ordering Information

ADwin-Gold Standard System	
ADwin-Gold-USB	ADwin-Gold with USB interface adapter, 1.8 m USB cable, power supply cable for desktop PC included
ADwin-Gold-ET	ADwin-Gold with Ethernet 10/100 Mbit interface adapter (TCP/IP protocol), Ethernet cross-over cable, power supply cable for desktop PC included
Options (manufacturing options only, no upgrade possible)	
ADwin-G-MEM-64	Memory expansion from 16 MB to 64 MB + 512 kB CPU-memory
ADwin-G-DA	Additional analogue outputs, 6 channel, 16-bit
ADwin-G-CO1	Counter option, 4 counters with 32 bit resolution (software selectable for: event counter, pulse period measurement, pulse width and duty cycle measurement, or up/down counter with clock/direction or quadrature evaluation)
ADwin-G-Boot	Bootloader for standalone operations (only in combination with Ethernet interface)
ADwin-G-Power	Power supply device (12 VDC) for ADwin-Gold
ADwin-G-Mount	Mounting kit

ADwin-Pro

Industrial Modular 19-inch System



ADwin-PRO is a modular, expandable, intelligent real-time system for fast data acquisition and control applications in industrial environments. The modular design of the **ADwin-PRO** offers flexible adapted solutions for all kind of applications, with signal counts from single channels up to several hundred. A wide range of I/O modules, chassis, microprocessors and memory options allows customization of the system for universal use, especially in industrial applications. The system runs via USB or Ethernet in conjunction with a Windows PC, via a Fieldbus interface with a PLC, or as a standalone unit with a boot loader.



- Modular, flexible design, VARIOUS chassis
- Operation with a Windows PC, a PLC or standalone
- 32-bit Floating-Point DSP
- Memory options
- Analogue input and output modules
- Analogue inputs with parallel ADC
- Digital input and output modules, Comparator inputs
- Counter, Encoder and PWM modules
- Filters, fixed or programmable types
- Amplifiers for thermocouple and RTD
- Isolation amplifier
- CAN bus, Profibus and Interbus interfaces, others on request
- RS-232, RS-485 interface
- Boot loader for standalone applications
- Ethernet or USB interface to PC
- Customized VHDL code on DIO or analog modules for
 - Special serial interfaces
 - MHz pre-processing of analog/digital data
 - Adapted counters
 - State machines
 - Pattern generators

Digital I/O modules	
Type	Channels
TTL I/O module	32
Opto-coupler input	16
Relay module output	16
Transistor module output	16
Comparator module	16

Fast analogue input modules, per channel one ADC		
Channels	Bit	Conversion time
4	16	10 μ s
8	16	10 μ s
4	14	0.5 μ s
8	14	0.5 μ s

Counter modules	
Type	Channels
Pulse counter	16
Pulse counter	8
Up/Down counter Encoder Interface	4
PWM input module	4
PWM output module	4

All modules are TTL versions or galvanically isolated.

Signal conditioning modules	
Type	Channels
Thermocouples, K, J, ...	4, 8, 16
RTD modules	4, 8
Filters	4, 8
Galvanic isolation	4, 8



ADwin-PRO-Light



ADwin-PRO full 19" chassis



ADwin-PRO-mini

Analogue output modules, per channel one DAC		
Channels	Bit	Conversion time
4	16	3 μ s
8	16	3 μ s

Analogue input modules, multiplexed channels		
Channels	Bit	Conversion time
8	14	0.5 μ s
16/32	14	0.5 μ s
8	16	10 μ s
16/32	16	10 μ s



ADwin-Pro

Industrial 19-inch system

ADwin-Pro Ordering Information – Base Modules

ADwin-Pro Standard Chassis	
The 115/230VAC power supply is a series regulator type.	
ADwin-Pro	16 slots, 19", 3U, 115/230 VAC at 50/60 Hz, 70 W
ADwin-Pro-BM	Like ADwin-Pro but 15 slots, module access from the rear side
ADwin-Pro-light	7 slots, 9", 3U, 115/230 VAC at 50/60 Hz, 40 W
ADwin-Pro Optional Chassis	
ADwin-Pro-DC	16 slots, 19" W, 3U, 10-35 VDC, 75 W
ADwin-Pro-mini	5 slots, requires regulated 5.1 VDC
ADwin-Pro-mini-2	5 slots, requires 10-18 VDC 40 W
ADwin-Pro-mini-3	5 slots, requires 20-35 VDC 40 W
ADwin-Pro CPUs	
All memory options and the bootloader are manufacturing options only, no update possible.	
Pro-CPU-T10-ET	Processor module, CPU: SHARC-DSP ADSP21160 (80 MHz/512 kB local RAM), 128 MB DRAM, Ethernet interface 10/100 Mbits, trigger input
Pro-CPU-T9-ENET	Processor module, CPU: SHARC-DSP ADSP21062 (40 MHz/256 kB local RAM), 16 MB DRAM, Ethernet interface 10/100 Mbits, trigger input
Pro-CPU-T9-USB	Processor module, CPU: SHARC-DSP ADSP21062 (40 MHz/256 kB local RAM), 16 MB DRAM, USB interface, trigger input
Pro-MEM-T9-64M	Memory expansion from 16 MB to 64 MB, 512 kB SRAM
Pro-BOOT	Bootloader for standalone operations, for Pro Ethernet versions only
Multiplexed analogue input modules	
Software calibration; connectors: shielded LEMO sockets CAMAC European standard; D-type version optionally available for Pro-Aln-8/14 and Pro-Aln-8/16 (D-SUB-socket)	
Pro-Aln-8/14	8 analog differential inputs, 14 Bit ADC, 0.5 μ s conversion time, LEMO sockets
Pro-Aln-32/14	32 single ended or 16 differential analog inputs, 14 Bit ADC, 0.5 μ s conversion time, D-SUB socket
Pro-Aln-8/16	8 analog differential inputs, 16 Bit ADC, 10 μ s conversion time, LEMO sockets
Pro-Aln-32/16	32 single ended or 16 differential analog inputs, 16 Bit ADC, 10 μ s conversion time, D-SUB socket
Parallel analogue input modules	
Synchronized conversions or individual conversions; connectors: shielded LEMO sockets CAMAC European standard; D-type version optionally available for all versions (D-SUB-socket)	
Pro-Aln-F-4/16	4 analog differential inputs, one 16 Bit ADC for each channels, 10 μ s conversion time per ADC, LEMO sockets
Pro-Aln-F-8/16	8 analog differential inputs, one 16 Bit ADC for each channels, 10 μ s conversion time per ADC, LEMO sockets
Pro-Aln-F-4/14	4 analog differential inputs, one 14 Bit ADC for each channels, 0.5 μ s conversion time per ADC, 2 MB RAM, LEMO sockets
Pro-Aln-F-8/14	8 analog differential inputs, one 14 Bit ADC for each channels, 0.5 μ s conversion time per ADC, 2 MB RAM, LEMO sockets
Analogue output modules	
Parallel synchronized conversions or individual conversions, low-pass filters to cut off glitches; Software calibration, connectors: shielded LEMO sockets CAMAC European standard; D-type version optionally available (D-SUB sockets)	
Pro-AOut-4/16	4 channels, 16 bits, settling time 10 μ s FSR (3 μ s FSR/10), voltage range \pm 10 V
Pro-AOut-8/16	8 channels, 16 bits, settling time 10 μ s FSR (3 μ s FSR/10), voltage range \pm 10 V
Digital input/output modules	
Standard connectors: 37-pin D-type	
Pro-DIO-32	32 TTL I/Os, software-selectable in blocks of 8 as input or output channels
Pro-OPT-16	16 digital inputs with optocouplers, 5/12/24 V voltage range
Pro-REL-16	16 relay outputs, 500 mA max per channel, max. 30 V AC/DC, normally-open contact
Pro-TRA-16	16 isolated transistor outputs, max. 100 mA per channel, 5-30 VDC, open emitter
Pro-COMP-16	16 comparator inputs, high/low level software selectable, with hysteresis

ADwin-Pro Ordering Information – Expansion Modules

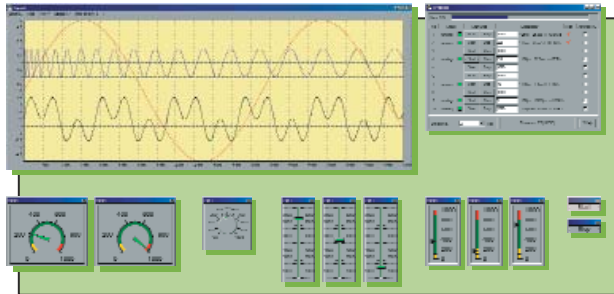
Counters, PWM modules	
It is possible to read each counter individually or to latch + read all counter-synchronized. Standard connectors: 37-pin D-type	
Pro-CO4-D	4 × 32-bit counter and two synchronous serial interface (SSI) decoders. Counter operating modes: event counter, pulse period measurement, pulse width and duty cycle measurement, or up/down counter with clock/direction or quadrature evaluation. Input signal level: 5 V differential
Pro-CO4-T	4 × 32-bit counters. Counter operating modes: event counter, pulse period measurement, pulse width and duty cycle measurement, or up/down counter with clock/direction or quadrature evaluation. Input signal level: 5 V TTL
Pro-CO4-I	4 × 32-bit counters. Counter operating modes: event counter, pulse period measurement, pulse width and duty cycle measurement, or up/down counter with clock/direction or quadrature evaluation. Isolated inputs, signal level: 5 V, 12 V or 24 V
Pro-CNT-16/16	16-channel, 16-bit Pulse Counters, TTL logic (Module Pro-CNT-16/16-I: opt. isolated inputs 5 V, 12 V or 24 V)
Pro-CNT-8/32	8-channel, 32-bit Pulse Counters, TTL logic (Module Pro-CNT-8/32-I: opt. isolated inputs 5 V, 12 V or 24 V)
Pro-PWM-4	4-channels (outputs); generates pulse-width-modulated signals (PWM). PWM resolution: 16-bit, TTL logic output Module Pro-PWM-4-I: opt. isolated transistor outputs 5-30 VDC
Thermocouple amplifiers modules	
One thermocouple amplifier per channel, the amplifier outputs are connected via a multiplexer to a LEMO socket, software commands select the multiplexer channel, the output must be connected to an additional analogue input module, type K or J, ±1°C accuracy, 10-ms settling time, on-chip cold junction reference, standard connectors: Omega sockets; D-type version optionally available, add “-D” to the module number. E.g. Pro-TC-4-K-D	
Pro-TC-4-K, -8-K	4- or 8-channels, type K, Omega sockets
Pro-TC-16-K	16-channels, type K, special D-type socket
Pro-TC-4-J, -8-J	4- or 8-channels, type J, Omega sockets
Pro-TC-16-J	16-channels, type J, special D-type socket
Pro-TC-16-Jcon	D-type connector for 4-/8-/16-channel type J Pro-TC modules with D-type connector
Pro-TC-16-Kcon	D-type connector for 4-/8-/16-channel type K Pro-TC modules with D-type connector
RTD amplifiers modules	
One RDT amplifier per channel, the amplifier outputs are connected via a multiplexer to a LEMO socket, software commands select the multiplexer channel, the output must be connected to an additional analogue input module; 2-/3- or 4-wire measurements; standard connectors: shielded 4-pin LEMO sockets CAMAC European standard; D-type version optionally available.	
Pro-PT100-4, -8	4- or 8-channels, 1 or 2 slots
Serial modules ¹⁾	
Serial interface modules are equipped with a 64-Byte receive FIFO and a 64-Byte transmit FIFO. Programmable features: Number of data bits, number of stop bits, baud rate, handshake and parity.	
Pro-RS232-2, -4	2- or 4-channel RS232 interface modules, 1 or 2 slots
Pro-RS485-2, -4	2- or 4-channel RS485 interface module, 1 or 2 slots
CAN modules ¹⁾	
The CAN interface provides 14 full-CAN mailboxes and 1 BASIC-CAN mailbox, according to CAN specification 2.0 Part A and Part B. The module provides standard CAN and extended CAN. The signals comply with the ISO 11898 standard – LS low speed version available	
Pro-CAN-1, -2	1 or 2 CAN bus interfaces
Pro-CAN-1-LS, -2-LS	1 or 2 CAN bus interfaces, low-speed
Profibus-DP slave module ¹⁾	
Functions: Cyclic data exchange, freeze, unfreeze, sync, unsync, clear. Bit rates from 9600 bit/s to 12 Mbit/s are supported. The interface transmits and receives up to 200 Bytes of data during each bus cycle. Other Fieldbus interfaces on request.	
Pro-PROFI-DP-SL	Interface for operating an ADwin-Pro system as a Profibus slave
Interbus slave module ¹⁾	
Functions: Cyclic and acyclic data exchange. Bit rate of 500 kbit/s is supported. The interface transmits and receives up to 20 Bytes of cyclic data and up to 200 Bytes of acyclic data.	
Pro-Inter-SL	Interface for operating an ADwin-Pro system as an Interbus slave
5B/MB carrier board	
This ADwin-PRO module takes up to eight 5B/MB modules, there are inputs to connect signals to the 5B/MB modules, and outputs to connect the 5B/MB modules to analogue input modules, all input/output connectors can be selected as Lemo or D-type.	
Pro-MB8-DD	D-type connectors for inputs/outputs, 3 slots
Pro-MB8-LL	Lemo connectors for inputs/outputs, 3 slots
Pro-MB8-LD	Lemo connectors for inputs, D-type connectors for outputs, 3 slots
Pro-MB8-DL	D-type connectors for inputs, Lemo connectors for outputs, 3 slots

¹⁾ With these serial or Fieldbus modules, use of a 512 kByte based CPU is highly recommended (T10 or T9 with memory option).

ADwin

Tools & Applications

ADtools – Easy to Use Visualisation Tools for ADwin



Easy to use graphical development tools for visualisation and control. **ADtools** are free of charge, supplied with all **ADwin** Systems.

ADwin Application Areas

- Automotive
- Aerospace
- Steel Industry
- Machine Building
- Research/Laboratory
- Test Stands
- Quality Control
- Materials Test
- Process Monitoring and Control
- Automation

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