

BOXKIT-PAC

PAC Edge Control DemoBox



Features

- AMAX edge controller + EtherCAT bus + drivers/motors
- Five industrial scenarios integrated: PV energy storage, PID constant-temperature control, coordinated feeding, chase cut, and flying shear
- Mainstream CODESYS toolchain
- Industrial-grade hardware throughout

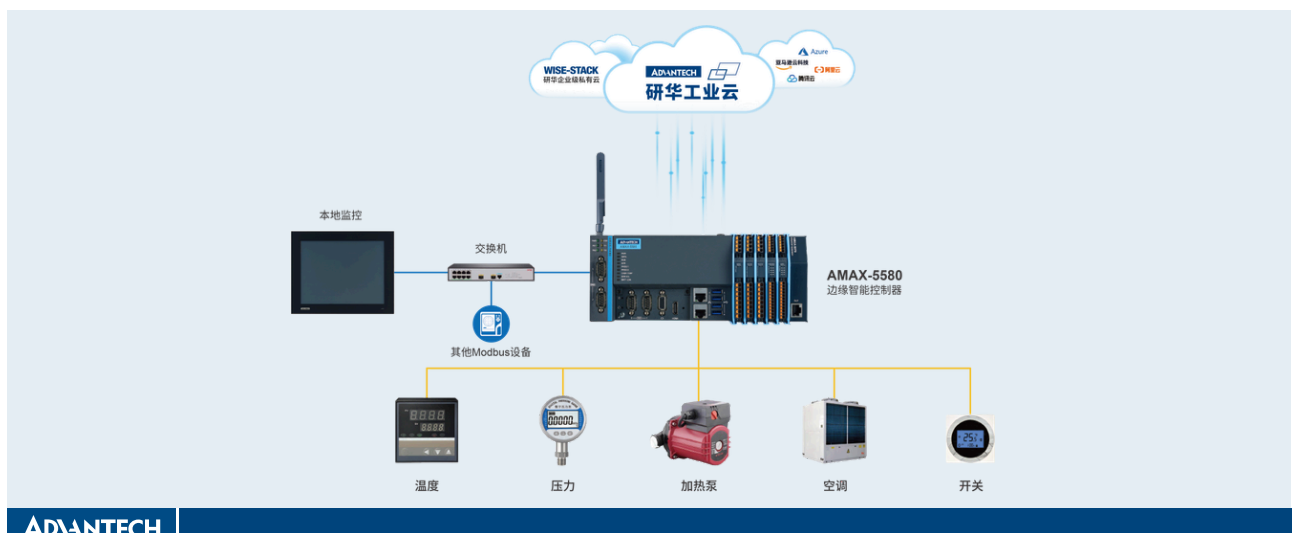
Overview

The DemoBox is a portable, all-in-one motion-control training platform designed for new engineering education. Built around the AMAX-5580 edge controller as the control core, the platform connects slice I/O modules and two motor drivers via the EtherCAT bus, and is equipped with the WOP-107E industrial operator panel as the human-machine interface. The case also integrates typical industrial devices such as a solar panel, a PTC heating plate, an RTD sensor, push buttons, and indicator lights — packing "a miniature production line" into a portable aluminum case.

Highlights

- **Reproduces a real production-line control architecture:** AMAX edge controller + EtherCAT bus + drivers/motors — the same control chain as the industrial floor
- **Five industrial scenarios in one box:** PV energy storage, PID constant-temperature control, coordinated feeding, chase cut, and flying shear — covering process control through multi-axis synchronization
- **Mainstream CODESYS toolchain:** IEC 61131-3 standard programming with PLCopen motion-control function blocks; lab code carries over to production lines
- **Industrial-grade hardware throughout:** the controller, I/O, and HMI are all Advantech industrial products — the classroom environment is the industrial environment

Technical Architecture



System Architecture

Step	Control Chain	Observable Results for Students
1. Signal Input	Push buttons, the solar panel, the RTD sensor, etc. generate digital/analog signals	Panel device states, battery-level and temperature indications change
2. Data Acquisition	AMAX-5017H / AMAX-5051 read voltage, temperature, and switch status	The HMI displays temperature, voltage, and operating status in real time
3. Analysis & Processing	CODESYS executes the PID algorithm, energy-storage logic, and motion-control programs	Control outputs and multi-axis motion commands
4. Output Control	AMAX-5056, the solid-state relay, and EtherCAT drivers execute actions	PTC heating, motor rotation, and indicator-light status feedback

Training Subjects

Subject	Core Content	Competency Developed
PV Energy Storage	Acquire solar-panel voltage, manage a virtual battery for energy storage, and drive the motor to discharge	Understanding the fundamentals of photovoltaic power generation, energy storage, and energy management
PID Constant-Temperature	PT100 temperature acquisition, CODESYS PID algorithm, relay-driven PTC heating	Mastering PID control principles and parameter tuning methods
Coordinated Positioning &	Multi-axis coordination between the master axis feeding and the slave axis indexing rotation	Understanding multi-axis coordination and position-synchronized control
Chase Cut (追剪)	Master axis runs at constant speed; the slave axis accelerates, synchronizes for cutting, and returns to	Mastering the concept of synchronized motion control (electronic cam)
Flying Shear (飞剪)	Master axis runs at constant speed; the slave axis cuts in synchronization and decelerates to 360 °	Understanding rotary-cutting synchronized control processes

Applicable Majors

Major Directions	Key Applications
Automation; Electrical Engineering and Automation; Mechatronics	Logic control, I/O control, PID process control, EtherCAT network configuration
Mechatronic Engineering; Vehicle Engineering; Intelligent Manufacturing Engineering	Multi-axis coordination, electronic cam, chase-cut/flying-shear synchronized control, motion-control commissioning
Electronic Information Engineering; Computer Science; Internet of Things Engineering	CODESYS programming, HMI configuration, industrial communication, and data acquisition
Vocational programs: Electrical Automation Technology; Mechatronics Technology	Equipment commissioning, production-line scenario simulation, comprehensive training, and skills competitions

Courses & Subjects

Course Area	Representative Courses	Training Content
Control Fundamentals	Programmable Logic Controller; Automatic Control Theory	Ladder/ST programming, DIO control, PID parameter tuning
Motion Control	Motion Control Technology; Electromechanical Drive Control	EtherCAT networking, multi-axis coordination, electronic cam, chase cut and flying shear

General Specifications

Item	Specification
Case & Dimensions	Aluminum multifunction display/storage case; acrylic panel approx. 44 × 31.8 × 0.8 cm; interior approx. 44 × 31.8 × 10.5 cm; exterior approx. 45.5 × 34 × 13 cm
Power *	Input 85 – 132 / 176 – 264 VAC, 47 – 63 Hz; outputs 5 VDC / 2.2 A and 24 VDC / 1 A, 35 W total; AC power switch integrated on the panel

Core Module Specifications

Module	Key Specifications
AMAX-5580 Edge Controller	6th-gen Intel Core i7/i5/Celeron, up to 2.6 GHz, 4/8 GB DDR4; 2 × GbE, 4 × USB 3.0, 2 × RS-232/422/485, VGA+HDMI; fanless DIN-rail design; BIOS/OS optimized for CODESYS and EtherCAT; supports EtherCAT line, star, and ring-redundant topologies
AMAX-5001	2-channel power input + 4-ch digital input (dry/wet contact), 24 VDC, dual power input
AMAX-5051	8-ch digital input (dry/wet contact), 24 VDC, 3 ms input filter
AMAX-5056	8-ch digital output (sink type), 0.3 A per channel, 10 – 30 VDC
AMAX-5017H	4-ch high-speed analog input (differential), V/mA: ± 10 V, 0 – 10 V, 0 – 20 mA; 16-bit; 10 kS/s per channel
WOP-107E Operator Panel	7" WVGA (800 × 480) resistive touch; ARM9 32-bit RISC, 128 MB SDRAM; HMNavi configuration software, supporting 500+ industrial communication protocols
Motion-Control Components	EtherCAT bus motor drivers × 2 (CoE / CiA402), with motors × 2 and photoelectric origin switches × 2

Standard Configuration

Category	Contents
Core Devices	AMAX-5580 × 1; AMAX-5001 / 5051 / 5056 / 5017H × 1 set; WOP-107E × 1; EtherCAT drivers × 2; motors × 2
Teaching Panel	Three-color running-status indicators, battery-level indicator, solar panel, PTC heating plate, PT100 RTD with temperature transmitter, start/stop push buttons, pass-through Ethernet ports, AC power socket
In-Case Electrical	24 V / 150 W power supply, switch, solid-state relay, terminal blocks, photoelectric switches × 2, power cord
Software & Documentation	CODESYS RTE with example projects for all five scenarios, HMINavi project, training manual, installation manual, scenario posters × 5

Ordering Information

Item	Description
Product Name / Part Number	Advantech PAC Edge Control DemoBox; please confirm the ordering part number with Advantech sales or your local FAE.