IDEC

Think Automation and beyond...

featuring
Pentra
with **Logic**
Engine

IDEC *MicroSmart*

IDEC Presents the MicroSmart Family of Micro-PLCs

A trusted name for over 60 years

IDEC has been a global leader in industrial automation for over half a century. Our customers know that they can trust IDEC to provide high quality products, from simple ON/OFF controls to complex HMIs, and to maintain each product line with responsive support and innovative design.
IDEC is committed to maintaining the same excellence in products and services that we have been known for since 1945.

Our promise is our performance

Micro-controllers play an increasingly central role in today's industrial applications. You have many controllers to choose from, but the one you turn to most often is the one that fits best, physically and practically. You'll find IDEC PLCs in various applications from water treatment plants to HVAC to printing press operations and more. They're always dependable, easy to program and almost as smart as you are.

"We value uptime. Our machinery has to work for at least 10-15 years, and we want to invest in a versatile controller that will really last. The MicroSmart Pentra is the answer for us."
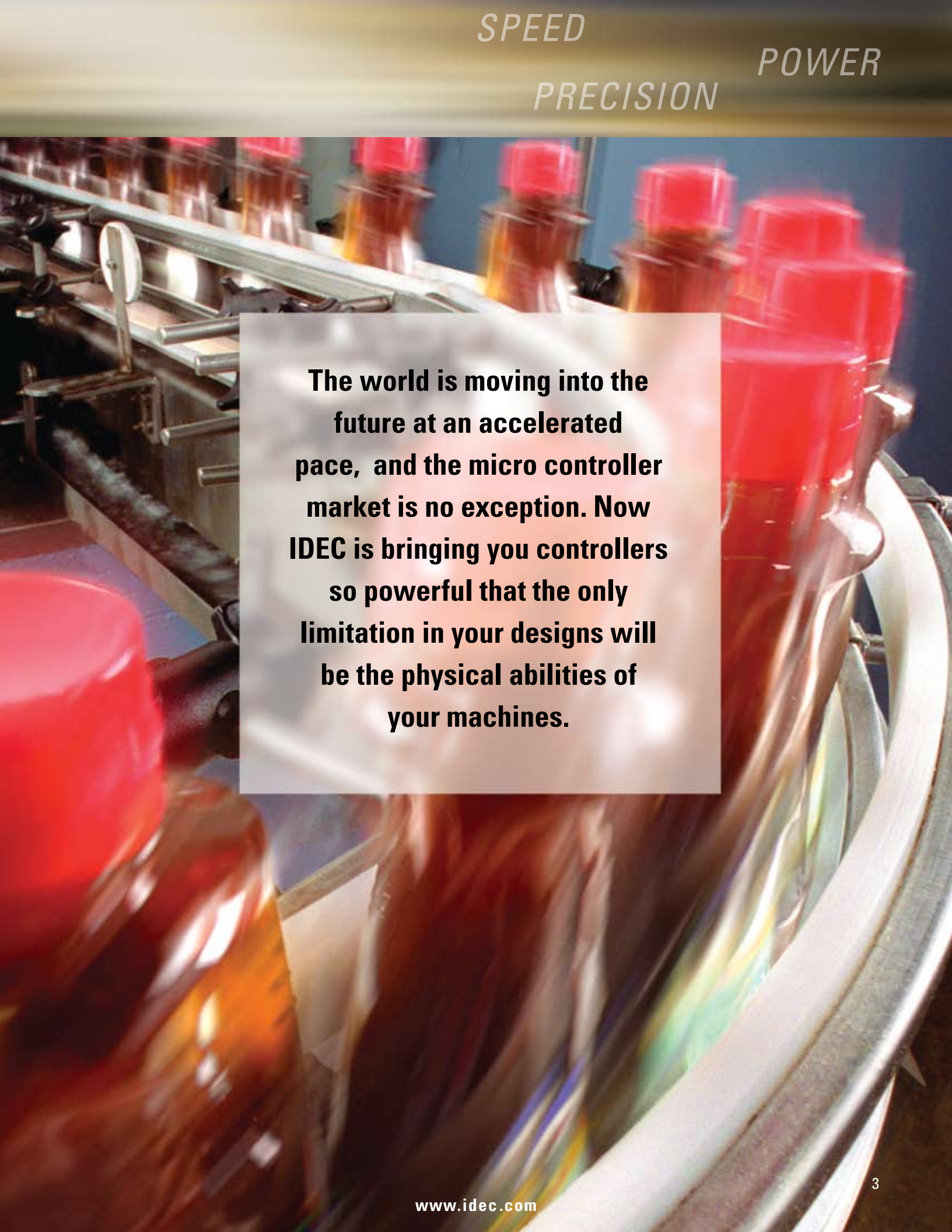
Machine Engineer
Packaging Manufacturer

The world is moving into the future at an accelerated pace, and the micro controller market is no exception. Now IDEC is bringing you controllers so powerful that the only limitation in your designs will be the physical abilities of your machines.

MicroSmart — One Controller Does it All

IDEC brought some of the first micro-PLCs to the market, and has been meeting your changing control automation needs for decades. Our controllers meet the highest standards for safety, flexibility and value.

International approvals

All MicroSmart controllers have regulatory agency certifications for the worldwide market including being cULus Listed for Class 1 Division 2 Hazardous Locations, TUV approved, and certified for marine use by Lloyd's Registry.

Rugged, compact, modular design

Every CPU module comes equipped with embedded I/O points, and you can conveniently add snap-on expansion modules for up to 512 I/Os based on your system requirements. All MicroSmart controllers are DIN-rail and panel mountable.

Write and run your programs now

Relax. Programming MicroSmart is fast and straightforward. Use IDEC's WindLDR Software to configure, modify and monitor your MicroSmart programs with ease. This powerful and intuitive software makes it simple to get your system up and running. See page 16-17 for more.

Upgrade without downtime

For added convenience, the same expansion I/O modules and accessories can be used on both the MicroSmart and MicroSmart Pentra controllers. In fact, both controllers share the same architecture, instruction set and programming software. The use of a single platform for all IDEC PLCs means you won't have to reprogram or learn a new system to move from one to another.

Make your choices

Feel the freedom. The ability to customize for the functions you need allows you to create the perfect system for your applications. Add an HMI module, a RS232C/RS485 communications port, a Real Time clock module or even an optional EEPROM module.
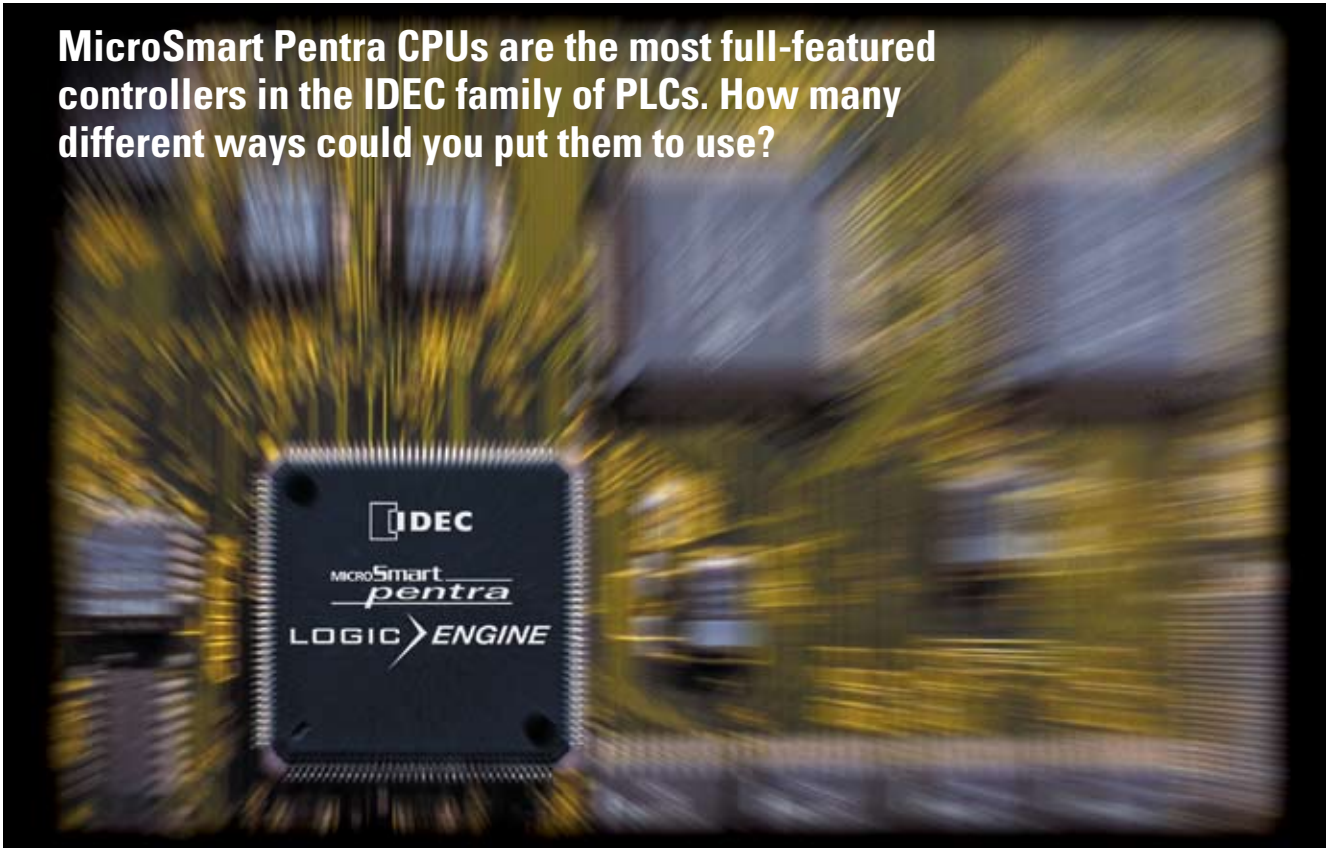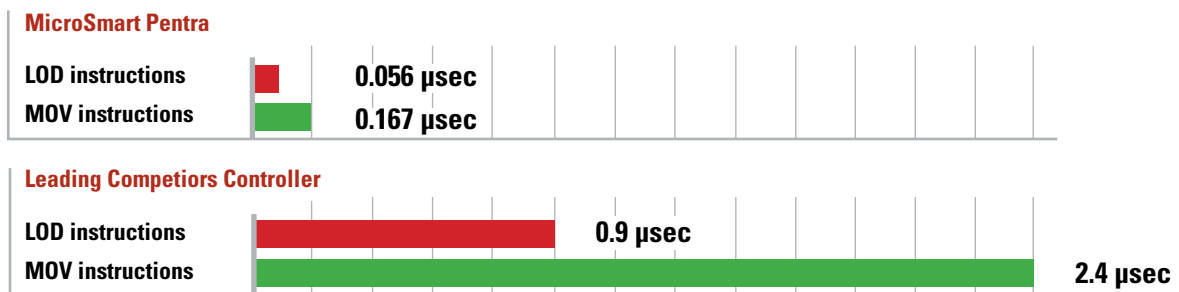
Applications:

- Food and Beverage Equipment
- Packaging Machinery
- Textile Machinery
- Printing Press Equipment
- HVAC
- Conveyer Systems
- Car Wash Systems
- Doors/Gate Controls
- Environmental Rooms and Chambers
- Woodworking Machinery
- Water Pump Systems
- Water Treatment Plants & Systems
- Marine Industry
- Mail Sorting Equipment
- Oil & Gas Refinery Equipment
- Semiconductor Industry
- Building Management

MicroSmart Pentra CPUs are the most full-featured controllers in the IDEC family of PLCs. How many different ways could you put them to use?

MicroSmart Pentra Speed Comparison

MicroSmart Pentra

LOD instructions — 0.056 µsec
MOV instructions — 0.167 µsec

Leading Competiors Controller

LOD instructions — 0.9 µsec
MOV instructions — 2.4 µsec

The Fastest Processing Speed

MicroSmart Pentra is the fastest micro controller available in its class. The overall processing speed of the new Logic Engine CPU is 16 times faster than our competitor's average controller for simple instruction execution, and more than 14 times faster when executing advanced instruction sets.

Don't wait for your old PLC to catch up to today's demands. Get faster scan times and better throughput today.

Supports Double Word and Floating Point Math

From billions to one-millionth, get the numbers you need with 32-bit data processing. MicroSmart Pentra supports double-word and floating point math operations, capturing and storing large values, and returning computed results accurate to seven decimal places. It's faster, it requires less maintenance and gives you more precise data.

Built-in Modbus Master and Slave

IDEC supports standard communication protocols for industrial electronic devices. See page 10 for more.

Field-Upgradeable Firmware

Extend the life of your PLC—upgrade your unit's firmware on-site as new functions and versions become available.

MICRO Smart
pentra
LOGIC >ENGINE

Expanded Memory

• 48,000 Data Registers
• 2048 Internal Relays
• 256 Timers
• 256 Counters
• 62.4 K Programming Capacity

More MicroSmart Features

• Available in traditional brick style and slimmer, space-saving book style
• Embedded I/O: each base model CPU is equipped with built-in I/O configurations of 10, 16, 20, 24, 32 and 40 I/O points.
• 100-240V AC or 24V DC power
• Optional memory cartridge for program backup and transport
• Optional HMI module to easily monitor and change your controller parameters
• Optional real-time clock cartridge for time-based applications
• Built-in analog trim potentiometers
• Built-in 1-pt analog input

Maximum 512 I/O

Choose from 23 different snap-on expansion modules to create the perfect system.

100 kHz Counters and Outputs

MicroSmart has built-in high-speed inputs with a maximum frequency of 100 kHz and 32-bit data processing capability, and can configure up to three high-speed outputs.

Up to 56 Analog I/Os

Your options include 0-10V, 4-20mA, RTD, thermocouple, thermistor inputs and ±10V output.

56 PID Loops with Auto-Tuning

Using MicroSmart in conjunction with PID brings unparalleled accuracy and stability to your process. See page 9 for more.

7 Communication Ports

RS232C is built in to every MicroSmart CPU. If you need other ports, add one of the available adapters or expansion modules; MicroSmart Pentra models can accommodate up to a total of seven communication ports. Plug in bar code readers, printers or any compatible devices, and go.

The success of your system might be dependent on a few millimeters. Most micro controllers lack the necessary tools for accuracy at any speed, much less at the very high speeds modern applications require. MicroSmart has always had the capability to operate high speed inputs and outputs, but MicroSmart Pentra can go even faster, up to 100 kHz – and so can your productivity.

High speed counters

- Four high-speed inputs with maximum frequency of 100 kHz
- Supports single or dual phase counters
- 32-bit counting range up to 4,294,967,295 pulses
- Integrated Functions
  - Execute Interrupt Programs
  - Frequency Measurement
  - High Speed Counter Refresh
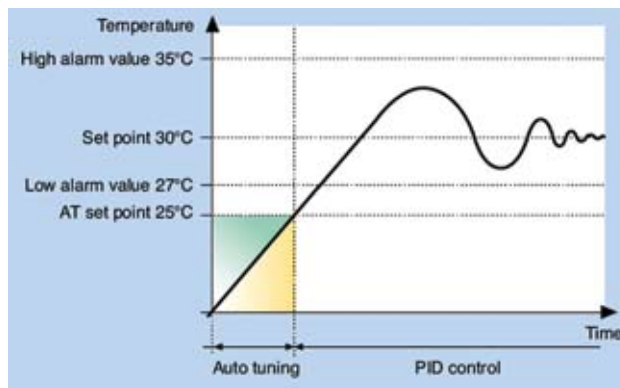 - Multi Stage Comparison

High speed outputs

Configure as many as three high speed pulse outputs, up to 100 kHz, and get the simple position control you want for stepper or servo motors.

MicroSmart gives you all the benefits of PID quickly and easily—with none of the drawbacks. No extra components required.

PID Implementations	
Water level control	PID creates a constant water level by manipulating control valves
Environmental room and chamber control	PID algorithm controls the temperature
Flow Controls	PID is used to control the amount of air flow through an air duct in a heating application.
Oven Controls	PID is utilized to control the natural gas burner for an oven system.
Speed Controls	PID is used to maintain the speed of the motor at a constant level.

PID (Proportional Integral Derivative) is a common industrial control component that uses loop feedback methods to maintain a set process variable, such as temperature or pressure control. This loop allows accurate maintenance and stabilization of the set point, adjusting the control outputs based on history, or rate of change on an error signal.

When you want the kind of stability PID loops offer, but don't have the kind of time or experience that PID programming requires, turn to IDEC. These powerful but simple to use PID algorithms are included with the MicroSmart controllers. You can select from various control modes including Auto-tuning, Advanced Auto-tuning or Manual. A wide variety of alarms and conversion tools are provided as well, and the software dialog box is one of the easiest ways to implement PID quickly.

- Program up to 56 loops with Pentra, up to 14 with MicroSmart
- PID dialog box walks you through algorithm customization
- Advanced auto-tuning feature makes programming PID instructions easy, even for people with minimal algorithm experience
- Pre-defined parameters (such as time, temperature or volume); avoid spending extra time entering them manually
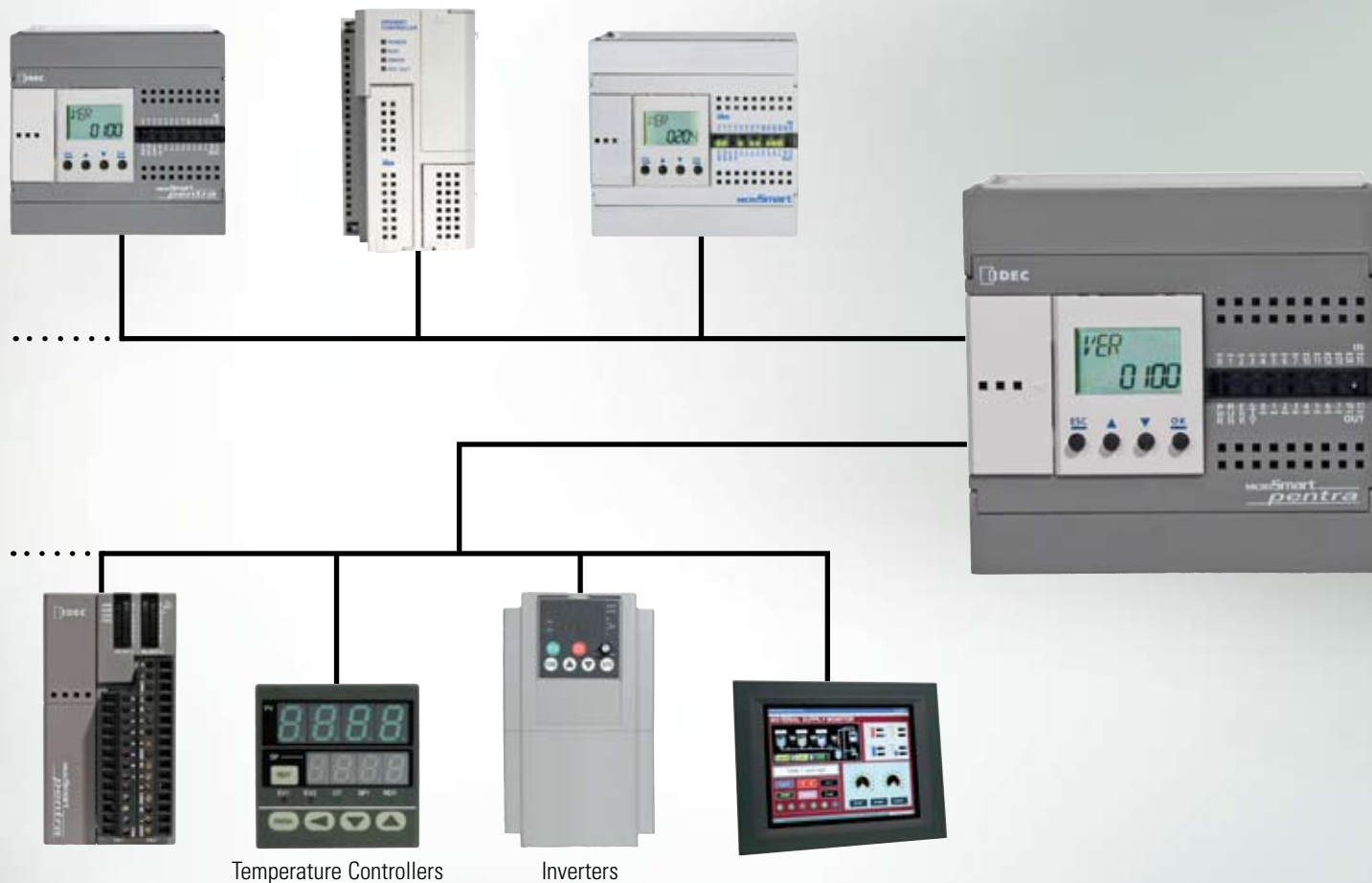
9

PLCs don't operate alone. Strong communication tools make everything in your network work together.

RS485 Datalink

IDEC PLCs can create a master-slave system of other IDEC controllers with up to 31 slave stations over RS485, using the available communication ports and RS485 modules. Plug in, attach two simple wires, and you are on the way to an effective, seamless network that can be extended up to 200 meters.

All MicroSmart modules, as well as older IDEC PLCs, support RS485 communication, so you can include your existing IDEC controllers in a new, more robust monitoring system.
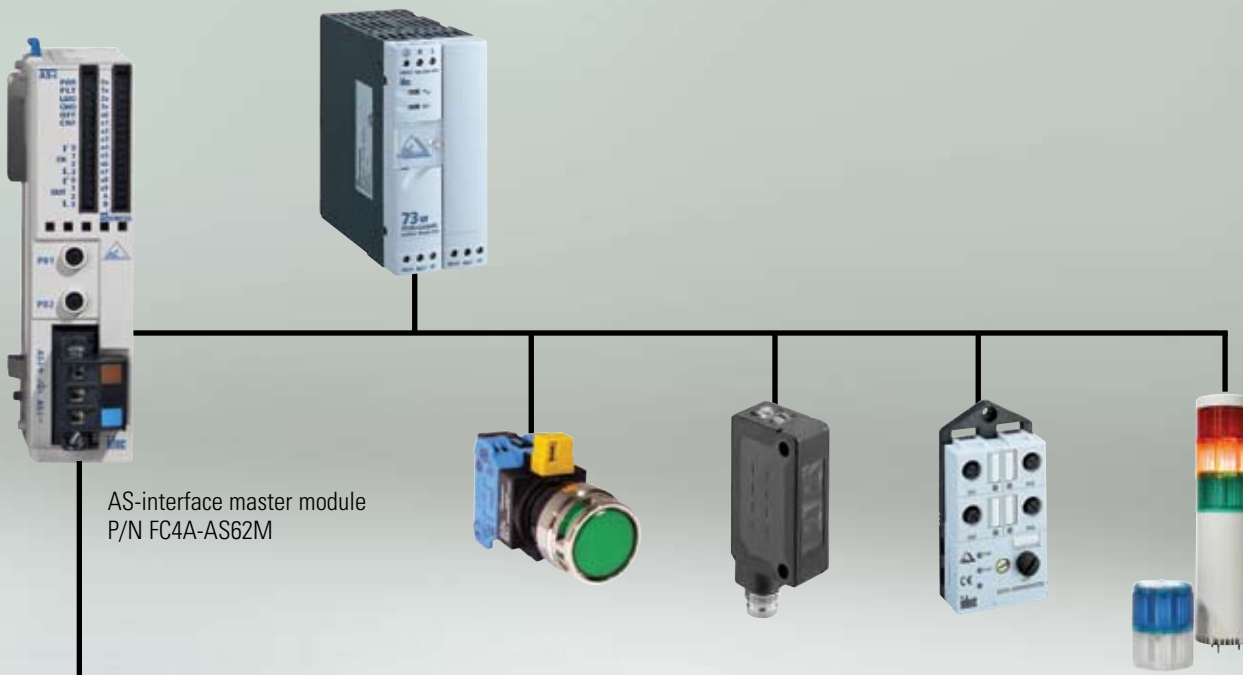
Temperature Controllers   Inverters

Modbus Master/Slave

Truly open standard, across devices and ideal for wireless communication, Modbus messaging protocol is a must-have for industrial networking. If you need to establish communication between multiple instruments from multiple manufacturers, monitor remote devices through a PC or HMI, or simply want to employ the most widely used network protocol, you're using Modbus.

With something this necessary, you should expect it to be standard in all controllers. And with MicroSmart Pentra, it is. IDEC offers support for Modbus RTU and ASCII, allowing the MicroSmart to be master or slave on any Modbus network. That's it. Don't buy another converter when you can buy a controller that does it all.

If you link 32 MicroSmart Pentras, maxed out with expansion modules and 512 I/Os per system, you can create a daisy-chain of 16,384 I/O points. Imagine what you could do with all those inputs and outputs!

AS-interface master module
P/N FC4A-AS62M

AS-interface Networking

The Actuator Sensor-interface (AS-interface) is the simplest and most cost-effective of the PLC-based, industrial-networking protocols. This type of field bus is primarily intended to be used to control sensors and actuators at distances of up to 100 meters. IDEC supports this open technology, which is in devices installed in automation systems worldwide.

IDEC offers a plug-in AS-interface master module (FC4A-AS62M) that is easy to configure; it can also connect to up to 64 slaves. With this module, you'll reduce the amount of engineering needed, employ simpler wiring and enhance your operations since it requires less maintenance. With an average cost savings of 15 to 40 percent compared with traditional cabling methods, using an IDEC AS-interface module is the easy choice.

The ability to communicate over an Ethernet network is no longer an option for most industrial systems, it's a must.

Ethernet is the fastest growing segment of industrial networking, allowing access-from-anywhere capability and easy remote-data archiving. It makes sense: You can't always be in the same location as your machinery, but with IDEC Web Server, you don't need to be. Monitor status in real-time, at a lower cost than with any other open standard or proprietary bus network.

Web Server Module
P/N FC4A-ENET

• **Remote maintenance**

Allows you to use IDEC software (WindLDR or WindSRV) to remotely monitor, download and upload any ladder program.

• **Web monitoring**

Lets you use Internet Explorer™ or Netscape Navigator™ to monitor or update your PLC with a custom, built-in, monitor dialog box.

• **Alarm messaging**

You can send up to 32 customized messages from the Web Server Module to a maximum of 64 e-mail addresses or cell phones. You can be notified immediately of any error or processing condition that arises.

• **Data exchange**

Enables communication between several IDEC MicroSmart PLCs over an Ethernet network.

• **O/I connectivity**

IDEC touchscreens and IDEC MicroSmart PLCs can communicate even when located in completely separate areas.

• **Password protection**

Secure your system by allowing you to password protect any unauthorized access.

Ethernet

Choose the CPU that works for you.

Review specifications and select your part number

	CPU Part Number	Rated Voltage	Embedded I/Os	Output Type	Max. I/Os	Program Capacity	Maximum Analog I/O	Processing Time	32-bit and Floating Pt.	Modbus	HSC	Pulse Outputs	Data ** Memory
MicroSmart Pentra	FC5A-C10R2	100-240V AC	6in/4out	Relay	10	13.8K bytes	–	LOD: 0.7µs MOV: 32µs	Yes	Master and Slave	50KHz	–	DR: 2000 TIM: 256 CNT: 256 IR: 2048
	FC5A-C10R2C	24V DC											
	FC5A-C16R2	100-240V AC	9in/7out		16	27K bytes	–						
	FC5A-C16R2C	24V DC											
	FC5A-C24R2	100-240V AC	14in/10out		88	54K bytes	32						
	FC5A-C24R2C	24V DC											
	FC5A-D16R*1	24V DC	8in/8out	6-Relay 2-Transistor	496	62.4K bytes	56	LOD: 0.056µs MOV: 0.167µs			100kHz	100kHz	DR: 48000 TIM: 256 CNT: 256 IR: 2048
	FC5A-D32*3		16in/16out	Transistor	512								
MicroSmart	FC4A-C10R2	100-240V AC	6in/4out	Relay	10	4.8K bytes	–	LOD: 1µs MOV: 46µs	–	–	20kHz	–	DR: 400 TIM: 32 CNT: 32 IR: 256
	FC4A-C10R2C	24V DC											
	FC4A-C16R2	100-240V AC	9in/7out		16	15K bytes	–						DR: 1300 TIM: 100 CNT: 100 IR: 1024
	FC4A-C16R2C	24V DC											
	FC4A-C24R2	100-240V AC	14in/10out		88	27K bytes	32						
	FC4A-C24R2C	24V DC											
	FC4A-D20R*1	24V DC	12in/8out	6-Relay 2-Transistor	244	31.2K bytes	56					20kHz	DR: 7300 TIM: 100 CNT: 100 IR: 1584
	FC4A-D20*3			Transistor	148	27K bytes							DR: 1300 TIM: 100 CNT: 100 IR: 1024
	FC4A-D40*3		24in/16out		264	31.2K bytes							DR: 7300 TIM: 100 CNT: 100 IR: 1584

* = K or S, Where K = sink and S = source outputs

**DR=Data Registers, TIM=Timers, CNT=Counters, IR=Internal Relays

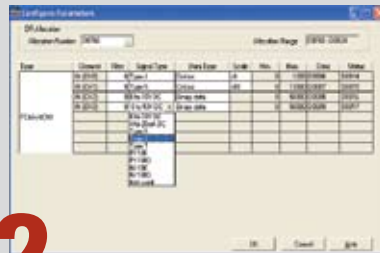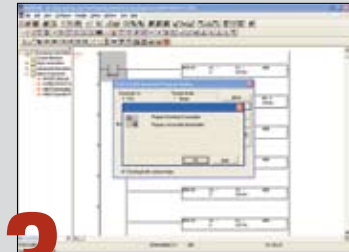## Wiring and programming analog signals could not be any easier. With IDEC, it takes just three steps.

1 Wire your device to the snap-on expansion module.

2 Select the device type in WindLDR.

3 You're up and running!

Analog Controls

For heightened precision and accuracy, you need analog controls, and IDEC can deliver. We offer a wide range of solutions, including 0-10V, 4-20mA, RTD, Thermocouple, Thermistor input modules and ± 10V output modules; there are 8 different modules to choose from, with 12-bit or 16-bit resolution.

The expansion units snap on easily to the MicroSmart CPU. Then configure the analog signal using the built-in macro instructions from the WindLDR programming software. The range of values in the analog signals can be combined with the PID algorithm to manage the desired response and outcome.

Analog Controls in Action

To control pressure, time, and temperature cycles in an industrial autoclave, multiple analog sensors feed input to the PLC. With analog expansion modules, these values are registered and translated into data accessible by the MicroSmart and, in many cases, sent through the built-in PID algorithm. Using a feedback loop, the PLC can control various elements that maintain the target values, and keep the entire process running at peak performance with no interruptions.

Digital Controls

To incorporate your sensors, switches, pushbuttons and other digital controls, IDEC offers an array of digital expansion modules with DC inputs, AC inputs, relay outputs and transistor outputs. Like all MicroSmart expansion modules, they snap on to the CPU with no extra cables.

Analog Expansion Modules

Part Number	Description
FC4A-L03A1	2-pt 0-10V, 4-20mA in; 1-pt 0-10V out
FC4A-L03AP1	2-pt RTD, Thermocouple in/ 1-pt 0-10V out
FC4A-J2A1	2-pt 0-10V, 4-20mA in
FC4A-K1A1	1-pt 0-10V out
FC4A-J4BN1	4-pt 0-10V, 4-20mA, RTD, Thermocouple in
FC4A-J8B1	8-pt 0-10V, 4-20mA in
FC4A-J8BT1	8-pt thermistor in
FC4A-K2B1	2-pt ± 10V out

Digital Expansion Modules*

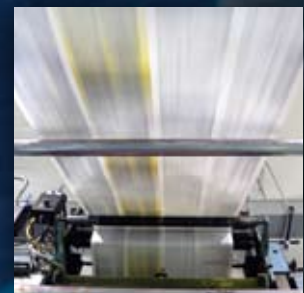| Part Number	Description
FC4A-N08A11	8-pt AC input module
FC4A-N08B1	8-pt DC input module
FC4A-N16B1	16-pt DC input module
FC4A-R081	8-pt Relay output module
FC4A-R161	16-pt Relay output module
FC4A-M08BR1	4-pt DC input, 4-pt Relay output
FC4A-T08K1	8-pt Sink output
FC4A-T08S1	8-pt Source output

* Other modules also available

"There's no uncertainty with IDEC products. We always get the right product, and if we need help I know we'll be able to get answers from the right people, too."

Business Manager
Water Treatment
Systems Manufacturer

Don't lose valuable hours programming your PLC when IDEC's WindLDR® software for Windows can get you up and running in no time!

Time is money. An IDEC PLC will save you both. All IDEC micro controllers are programmable with WindLDR ladder logic software. This icon-driven programming tool combines logic and intuition with an incredibly easy-to-use interface to allow you to take advantage of every MicroSmart feature. Even without ladder program experience, you can use the built-in editors, shortcuts and debuggers to configure programs. Lose the extra costs of engineering, installation and maintenance and get right to work!

WindLDR is an excellent, long-term investment for your control solutions. It programs every IDEC PLC, so it's adaptable to whatever hardware you need today and down the road. Software upgrades are always free for registered users.

WindLDR 5 runs on Windows 95, 98, 2000, NT and XP and is available in five languages: English, Japanese, Spanish, German and Chinese.

Online editing and programming

Shutting down for minor changes can be a major hassle, so WindLDR allows you to edit and download programs while the PLC is still in Run mode. You'll be able to write new values to counters, timers and registers at any time without switching between editor mode (for programming) and monitor mode.
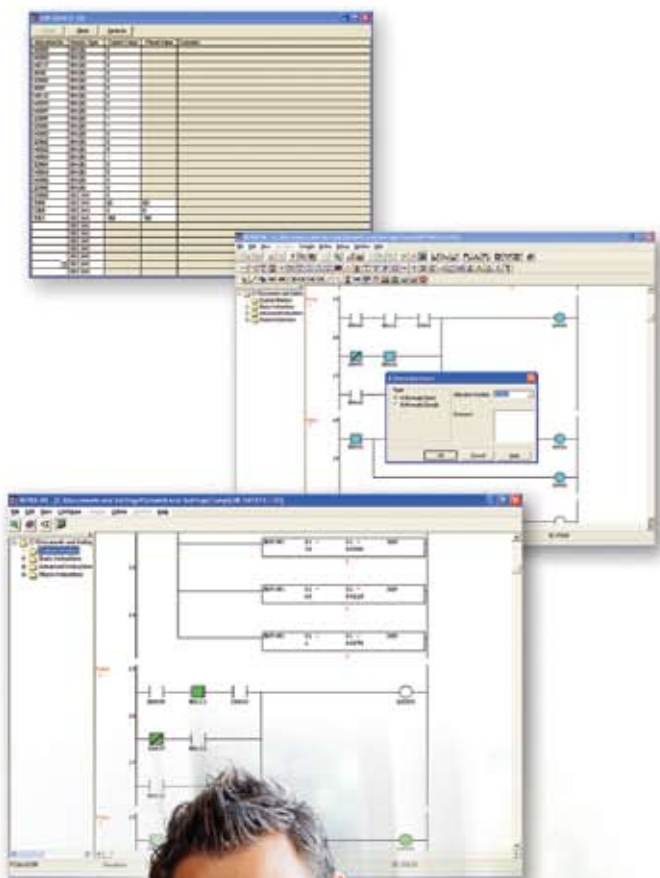
Simulation mode

Test your program in WindLDR to guarantee that it works the way you expected, rather than downloading it to your PLC for a test run.

Custom monitor dialog box

Compile and enter a list of parameters you want to monitor, then save it and access it again and again, instead of re-entering your data every time.

Simple-to-use editors

Use the tag editor to access and edit coil data. Edit comments and rung comments.

Comment download

When you transfer your program to the PLC, you have the option to include any accompanying comments too. User programs can be downloaded with the comments attached to operands and rungs; the documentation is stored in the processor. With comment data, you can review programming codes for clarification and streamlined maintenance.

Verify Program

This great debugging tool allows you to run a comparison without uploading the whole program from the PLC back to your PC. If there's a chance your program has been corrupted or tampered with, that's a chance you don't want to take.

User-friendly interfaces

Icon-based toolbars and drag-and-drop functionality make basic ladder programming accessible to anyone. But WindLDR also shows you how to display parameters and settings and how to input your parameters, and the built-in shortcuts and tutorials will keep you on the right track.

Part Number	Description
FC9Y-LP2CDW	WindLDR PLC Programming Software

"Building an entirely new production line from the ground up is challenging, especially on a budget. I like IDEC controllers because I know they'll work and I know I'll be able to program them myself."

*Electrical Engineering Manager
Material Handling Equipment*

Get the whole picture with an IDEC HMI. Now available in special package deals with the MicroSmart Pentra!

Operator Interfaces

In today's market, effective monitoring and control of your manufacturing environment is critical to your bottom line. In order to stay ahead of the competition, you need to constantly look for new ways to increase productivity and lower your costs, while maintaining quality control and safety. A typical manufacturing control panel has an overwhelming array of buttons, switches, relays and other devices that make it cumbersome and hard to manage. Change all that with a simple solution: connect an operator interface to your MicroSmart PLC.

Full color, monochrome, text-only, high-resolution, large, small... there's an interface that can help you control your production and let your workers manage any situation quickly and safely.

- HG4F 12" TFT touchscreens
- HG3F 10" TFT touchscreens
- HG2F 5.7" STN color or monochrome touchscreens
- HG1F 4.6" monochrome touchscreen
- HG1X text message displays

More information online at:
www.idec.com/usa/smarttouch

IDEC touchscreens are programmable with WindO/I-NV2 software, which helps you create the right graphic interfaces to visualize operating conditions. Use the intuitive drag and drop programming with built-in set-up wizards, or script your processes in "C" to reduce the amount of time spent programming connected controllers.

Starter Kits

Get your MicroSmart Pentra today, and take your applications to the next level with this fantastic micro controller. We'll send you everything that's necessary to integrate a new PLC into your systems: the MicroSmart Pentra, a programming cable and WindLDR software.

Starter Kit Packages

Part Numbers	Controller Type	Software	Cable
MM-PENTRA-16	16 I/Os Slim CPU FC5A-D16RS1	WindLDR	Programming
MM-PENTRA-24	24 I/Os All-in-One CPU FC5A-C24R2	WindLDR	Programming

Solution Packages

Whether you're new to IDEC or looking for a quick way to put together a new system, you'll find a great deal in our solution packages. Each package includes an IDEC operator interface, a MicroSmart Pentra slim CPU, a 24VDC slim power supply, cables and software. It's all you need in just one step!

Solution Packages

Part Numbers	Controller Type	O/I Touchscreen	Software	Power Supply	Cables
MM-PENTRA-16-HG1F	16 I/Os Slim CPU FC5A-D16RS1	4.6" Monochrome HG1F	WindLDR & WindO/I-NV2	30W PS5R Slim	Programming & Interface
MM-PENTRA-16-HG2F-C	16 I/Os Slim CPU FC5A-D16RS1	5.7" STN Color HG2F	WindLDR & WindO/I-NV2	30W PS5R Slim	Programming & Interface
MM-PENTRA-16-HG3F	16 I/Os Slim CPU FC5A-D16RS1	10.2" TFT Color HG3F	WindLDR & WindO/I-NV2	30W PS5R Slim	Programming & Interface
MM-PENTRA-16-HG4F	16 I/Os Slim CPU FC5A-D16RS1	12.1" TFT Color HG4F	WindLDR & WindO/I-NV2	30W PS5R Slim	Programming & Interface
MM-PENTRA-24-HG1F	24 I/Os Brick CPU FC5A-C24R2	4.6" Monochrome HG1F	WindLDR & WindO/I-NV2	30W PS5R Slim	Programming & Interface
MM-PENTRA-24-HG2F-C	24 I/Os Brick CPU FC5A-C24R2	5.7" STN Color HG2F	WindLDR & WindO/I-NV2	30W PS5R Slim	Programming & Interface
MM-PENTRA-24-HG3F	24 I/Os Brick CPU FC5A-C24R2	10.2" TFT Color HG3F	WindLDR & WindO/I-NV2	30W PS5R Slim	Programming & Interface
MM-PENTRA-24-HG4F	24 I/Os Brick CPU FC5A-C24R2	12.1" TFT Color HG4F	WindLDR & WindO/I-NV2	30W PS5R Slim	Programming & Interface

Product Information

IDEC MicroSmart family:
www.idec.com/usa/microsmart

WindLDR software:
www.idec.com/software

Software demos, upgrades, manuals and documentation:
www.idec.com/manuals

Touchscreens/Operator Interfaces:
www.idec.com/oi

IDEC has made a commitment to provide you with top-notch customer service at every step of your experience. This means you can get the support you need from installation and setup to programming your system. Get help or extra documentation online, on the phone or by email. Whatever you need, just ask and IDEC can help!

Product Support

Technical support:
support@idec.com

Sales support:
sales@idec.com

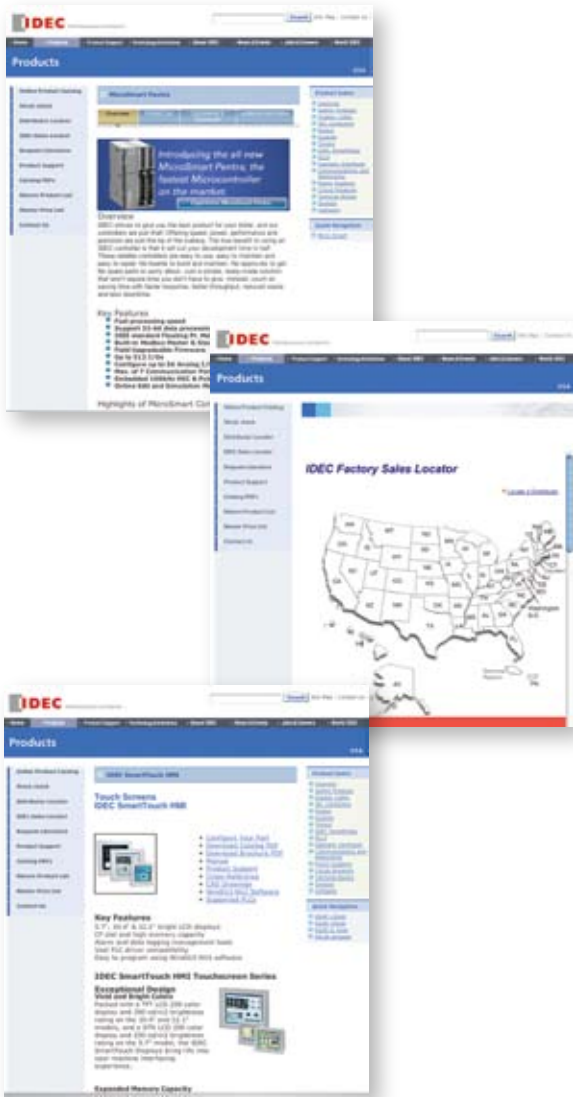### PLC Training:
www.idec.com/usa/training

Want more MicroSmart and WindLDR experience? Get hands-on guidance from IDEC's expert technical staff. These intensive, two-day sessions cover PLC and touchscreen programming, setup, troubleshooting and more. Classes are held throughout the year at various locations in the US and Canada. For the latest schedule of upcoming classes, visit our web site.

Find your local IDEC Representative or Distributor
www.idec.com/usa/locator

800-262-IDEC

IDEC *Think Automation and beyond...*

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