Motion & Machine Control

ACR Series Programmable Automation Controllers

ACR Series Controllers offer a powerful combination of motion and machine control in multiple hardware configurations.

Many industry standards, such as IEC61131-3 for programming and EtherNet/IP for communications, make the controller suitable for a wide array for users and applications.

Options for ETHERNET Powerlink and CANopen present flexibility to create numerous machine architectures.

Motion and Programming Capabilities

- **IEC61131-3 programming: structured text, ladder logic and CFC**
- **Up to 16 PLC tasks: timer, cyclic or interrupt configurable task priority**
- **Additional 16 AcroBasic tasks available**

PLCopen Function Blocks

- **Absolute, incremental and continuous moves**
- **Power, reset and status**
- **Home, stop and halt**
- **Axis parameter read and write**

Parker Function Blocks

- **Electronic gearing**
- **Electronic cam**
- **Touchprobe**
- **Controller parameter read and write**
- **Linear interpolation**
- **Circular interpolation**

Hardware Features

- **ETHERNET Powerlink digital motion bus**
- **EPL versions support up to 16 axes of coordinated motion**
- **Available support for traditional analog drives**
- **Analog versions are available in 2-, 4-, 6- or 8-axis models**
- **Equipped with 2MB of user memory standard**
- **Robust connectors hold up in harsh environments**
- **EtherNet/IP, CANopen, USB2.0, RS232 and RS485 communications are supported, with multiple channels available simultaneously**
- **Industry-standard Ethernet/IP communications**
- **CANopen I/O support for over 1000 points of I/O**

EtherNet/IP™

ETHERNET POWERLINK Standardization Group

Model	ACR9600	ACR9630	ACR9640
Input Power	120 – 240 VAC	120 – 240 VAC	24 VDC
ETHERNET Powerlink	No	Up to 16 axes	Up to 16 axes
Servo/Stepper	2, 4,6, or 8 axes	2, 4,6, or 8 axes	No
On-board I/O	Up to 40 in/8 out	Up to 40 in/8 out	No
Expanded I/O	CANopen	CANopen	CANopen

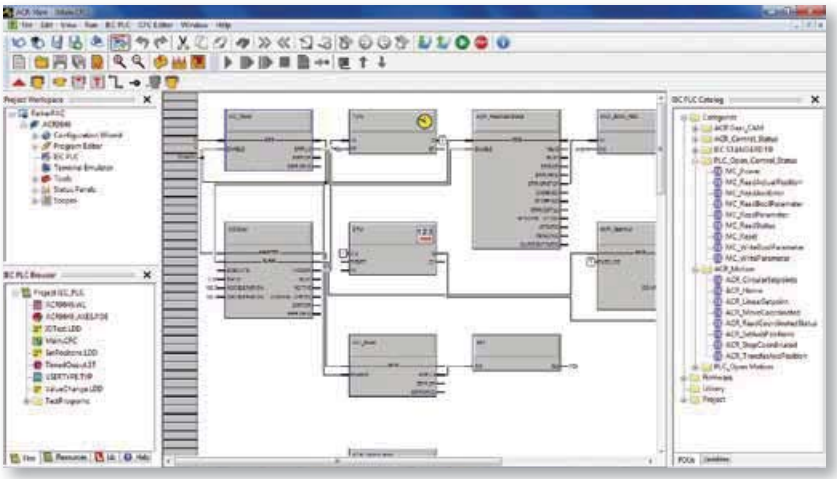
ACR-View Software Development Kit

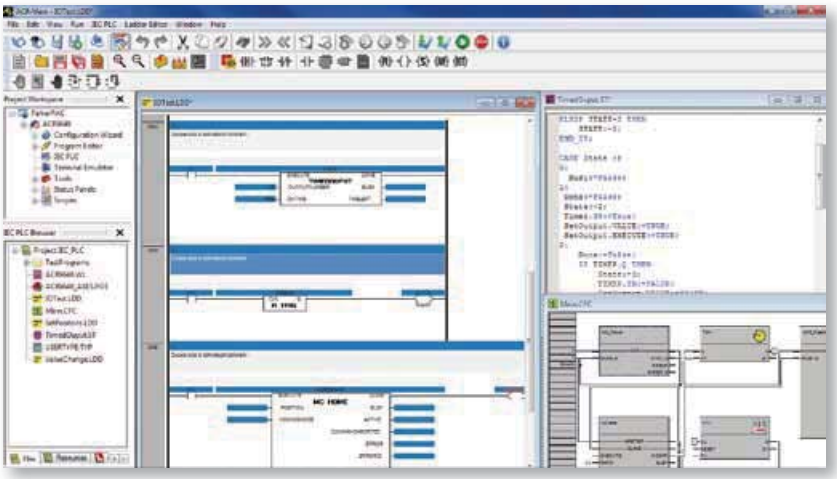
ACR-View is a powerful project development suite that assists the ACR user with programming, debugging and commissioning their application. Many features are incorporated to assist both the novice and expert user in developing code. Project set-up is streamlined through the use of the Configuration Wizard.

The ACR-9xxx can be configured in a matter of minutes as the user is guided through a series of simple steps. ACR-View will set the necessary parameters to have the controller ready for motion and code development.

ACR-View's configurable environment allows you to create a development system that works the way you do. Elements of the environment can be docked, floated or moved to where they work best for you. Additional information is available from tool tips and a context sensitive help system. ACR-View automatically generates a suite of common tags for each project you define. These tags can be automatically used in your Xpress HMI application.

All the tools needed to build and maintain a motion project are included.





- **Ethernet, USB, CANopen and serial connection support**
- **Project Configuration Wizard**
- **Servo tuning tools**
- **Built-in oscilloscope, strip chart and XY plot**
- **IEC 61131-3 editor (structured text, ladder diagram and continuous function chart)**
- **On-line PLC program monitoring and editing**
- **User-created watch window**
- **Real-time terminal interface**
- **Servo loop diagnostic tool**
- **Comprehensive status panels**
- **Integrated help files**
- **Libraries for PC application development in .NET, C++ and LabVIEW**

Motion & Machine Control

ETHERNET Powerlink (EPL)

ETHERNET Powerlink (EPL) expands the ACR family by enabling real-time motion control via Ethernet. The high-bandwidth digital communications network enhances machine performance and configuration possibilities while reducing set-up time and installation complexity.

ETHERNET Powerlink is a deterministic, real-time Ethernet motion bus solution connecting motion controller to servo drives and I/O points using standard Ethernet hardware. EPL is an open standard communication protocol, developed to achieve the timing and synchronization required in high-performance automation and motion control applications.

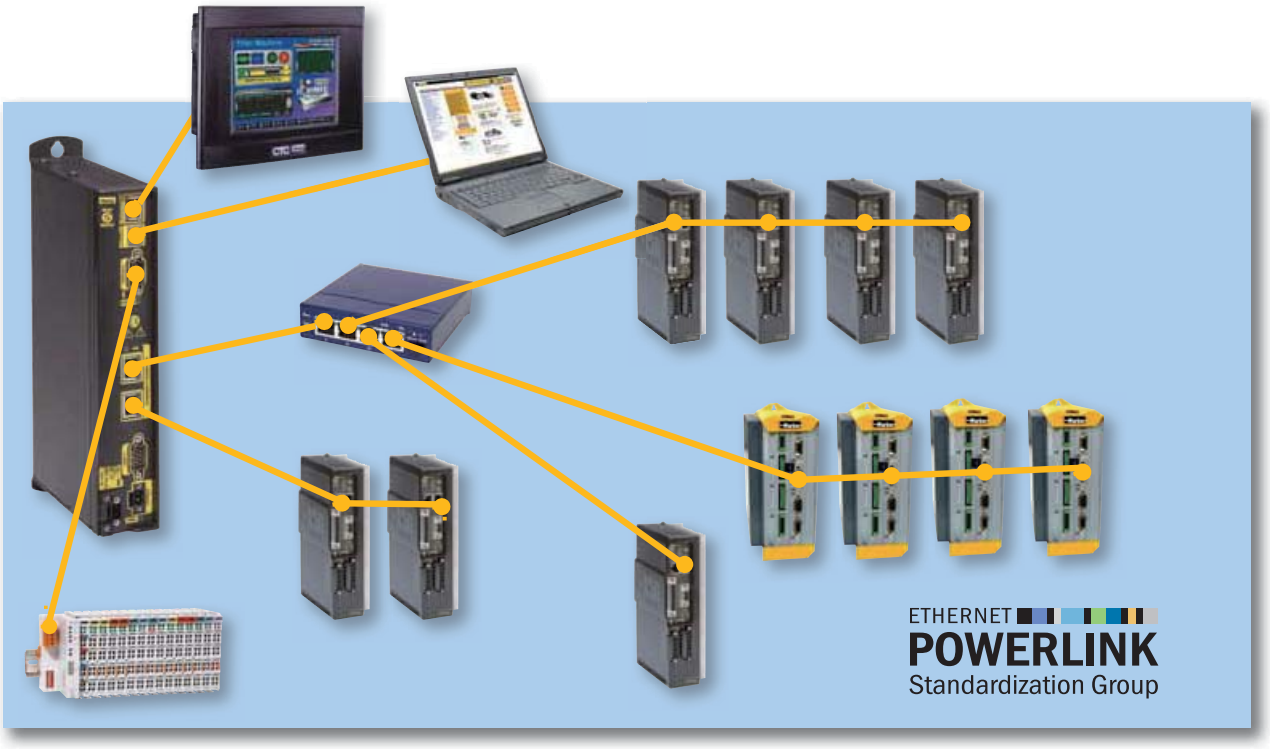
Parker's EPL solution includes all the motion and communication features of the ACR family for complete motion and machine control solutions. A full range of servo drives is available with Aries and Compax3 Series drives, supporting a wide variety of motors and feedback devices. All drive and motor configuration, programming and system troubleshooting can be accomplished through the ACR controllers.

EPL Highlights

- **Open industry standard communication protocol**
- **Standard Ethernet hardware**
- **No proprietary ASICs required**
- **Based on CANopen device profiles**
- **Simplified system design**
- **Reduced installation time**
- **Enhanced diagnostics**

Parker EPL Solutions

- **Up to 16 axes with ACR controllers**
- **Aries and Compax3 servo drives**
- **Built-in repeating hubs for flexible connection options**
- **Drive and controller on-board I/O**
- **Single point of communication for entire motion system**
- **Auto-tuning and motor configuration via ACR-View**



Aries EPL Servo Drive

Aries EPL servo drives combine Parker's high-performance digital servo control technology with the real-time performance benefits of ETHERNET Powerlink motionbus technology.

The Aries EPL servo drives deliver all the performance benefits that digital drive technology has to offer, including fast update rates and ease of installation. The Aries EPL can run rotary or linear servomotors with a wide range of feedback devices, making it the ideal drive choice to solve a variety of machine applications.

- **ETHERNET Powerlink-enabled servo drive**
- **Integrated 2-port Ethernet hub**
- **Rotary or linear servo motor control**
- **3, 4.5 and 6.3 A RMS continuous current**
- **120/240 VAC power input**
- **Multiple feedback options – Smart encoder, quadrature encoder, Heidenhain EnDat absolute encoder**
- **Auto-tuning**
- **CE (EMC & LVD), UL recognized**

Compax3 EPL Servo Drive

The Compax3 servo drives combine a high-performance, digital design with industrial ruggedness and expansive power capabilities. Compax3 servo drives are designed for industrial applications with heavy duty features such as built-in regeneration capabilities and AC input line filtering. The wide variety of power levels, up to 155 A RMS, ensures that no application is too large for the Compax3 servo drive.

- **ETHERNET Powerlink-enabled servo drive**
- **Integrated 2-port Ethernet hub**
- **Rotary or linear servo motor control**
- **From 2.5 to 155 A RMS continuous current**
- **Built-in regeneration and line filtering**
- **120/240/480 VAC single- and three-phase power input**
- **Quadrature encoder, absolute encoder and resolver feedback**
- **CE (EMC & LVD), UL and cUL recognized**

IEC61131-3 Controller with Powerlink - ACR9640

Overview

Description

The ACR EPL family is Parker's premier standalone motion controller family, capable of controlling up to 16 axes of motion. Connectivity and communication features give the ACR EPL flexibility for use in a wide variety of machine architectures. The ACR EPL excels as a standalone machine and motion controller, interfacing with a PC or working alongside a PLC.
A powerful DSP makes the ACR EPL an outstanding multitasking servo controller. The ACR EPL includes easy-to-use project-development tools that enable fast, efficient application creation and maintenance.
The ACR EPL is the solution for standalone applications requiring industry-leading performance in an affordable and easy-to-use package.
The ACR9640 is a compact, cost-effective, EPL-only controller including Ethernet, USB and an integrated 2-port hub for ETHERNET Powerlink connections. I/O can be added using CANopen or by utilizing the inputs and outputs on the EPL drives.
ETHERNET Powerlink expands the ACR EPL family by adding a real-time motion controller over standard Ethernet hardware. The high speed digital communications network enhances machine performance and configuration possibilities while reducing set-up time and installation complexity.

Features

- **Control of 16 ETHERNET Powerlink drives**
- **10/100 Base-T Ethernet**
- **USB 2.0**
- **EtherNet/IP compatibility**
- **CANopen expansion I/O**
- **CE (EMC & LVD), UL and cUL Recognized**
- **Multitasking of up to 24 simultaneous programs**
- **Interpolation of 8 axes in any combination**
- **IEC61131-3 programming with structured text, continuous function chart and ladder diagram**

Technical Characteristics - Overview

	ACR9640
Power supply	24 VDC, 1A
Processor	32 bit DSP @150 MFLOPS/75 Hz
User memory	2 MB flash-based
Motion bus	ETHERNET Powerlink: 16 axes
Operating system	Multi-tasking RTOS
Ethernet	TCP/UDP, ETHERNET/IP
CANopen	DS401 protocol

Proven Control Engine with IEC61131-3 Programming

The ACR-9640 Controller provides multitasking of up to 16 simultaneous programs with multiple coordinate systems.

Motion and programming capabilities:

- IEC61131 programming
  - Structured text, ladder logic and CFC
  - PLCopen motion function blocks
  - Parker function blocks
- Linear interpolation up to 8 axes
- Up to 16 PLC tasks: timer, cyclic or interrupt configurable task priority
- Additional 16 AcroBasic tasks available
- Segmented electronic camming
- Electronic gearing with real-time phase advance
- Linear, circular, helical and spline interpolation
- Gantry lock
- Backlash and ballscrew compensation

Hardware features:

- EPL versions support up to 16 axes of coordinated motion
- Equipped with 2 MB of user memory standard
- Robust connectors hold up in harsh environments
- EtherNet/IP, CANopen, USB2.0, RS232 and RS485 communications are supported, with multiple channels available simultaneously
- Industry-standard Ethernet/IP communications
- ETHERNET Powerlink digital motion bus
- CANopen I/O support for over 1000 points of I/O
- Indicator LED's improve your troubleshooting capability

ACR-9640 supports standard PLCopen function blocks, and adds Parker custom multi-axis functions

PLCOpen Function Blocks:		Parker Function Blocks:		
Administrative	**Motion**	**Gear**	**Cam**	**Other Custom Functions**
MC_Power	MC_MoveAbsolute	ACR_GearIn	ACR_Camin	ACR_ReadFlag
MC_ReadStatus	MC_MoveRelative	ACR_GearIn_Ihpos	ACR_Camin_Ihpos	ACR_ReadDintParameter
MC_ReadAxisError	MC_MoveAdditive	ACR_GearIn_Trg	ACR_Camin_Trg	ACR_ReadRealParameter
MC_ReadParameter	MC_MoveVelocity	ACR_GearIn_Trgp	ACR_Camin_Trgp	ACR_WriteFlag
MC_ReadBoolParameter	MC_Home	ACR_GearOut		ACR_WriteDintParameter
MC_WriteParameter	MC_Stop	ACR_GearOut_Trg		ACR_WriteRealParameter
MC_WriteBoolParameter		ACR_GearOut_Trgp		ACR_MoveCoordinated
MC_ReadActualPostion				ACR_TouchProbe

Industry-standard programming in a proven platform

The ACR9640 offers the best of IEC61131-3 standard programming. With structured text, continuous function chart and ladder diagram programming, we offer the right language for your application.

Multiple fieldbus options

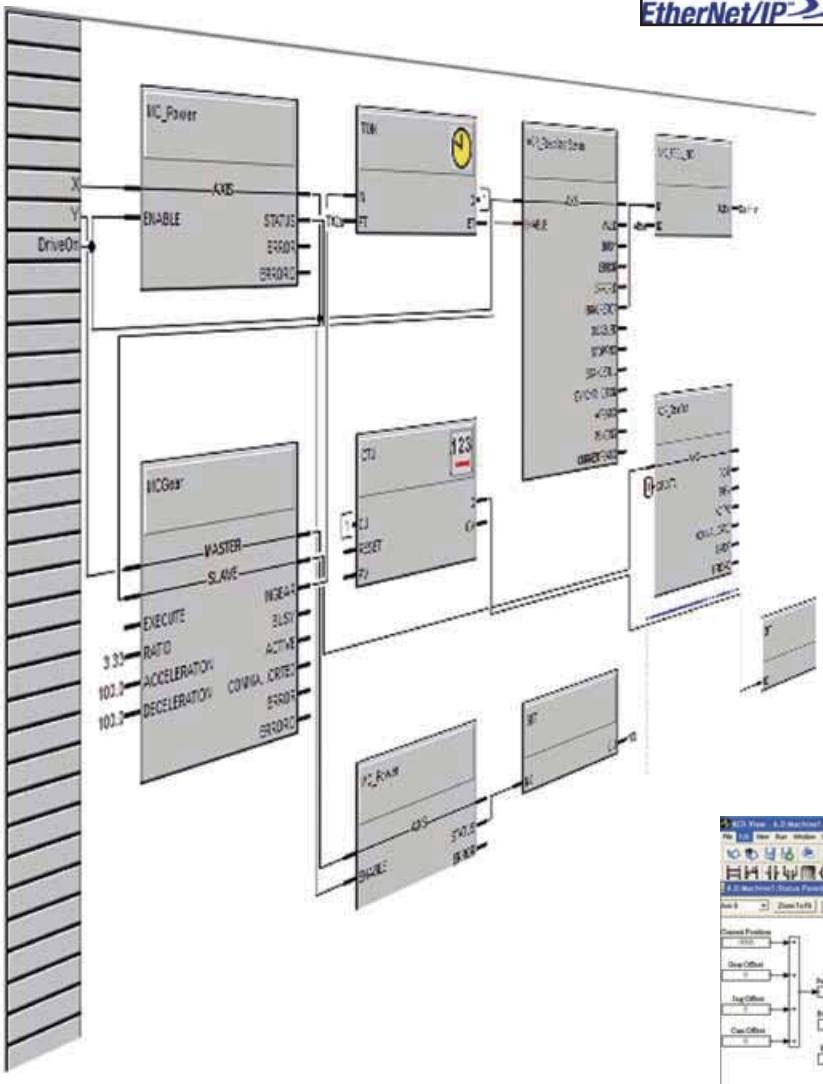
The ACR9640 supports EPL for high-speed motion and CANopen for analog and discrete I/O. EtherNet/IP is also supported for integration with other PLC's and HMI's. EtherNet/IP, CANopen, USB2.0, RS232 and RS485 communications are supported, with multiple channels available simultaneously.

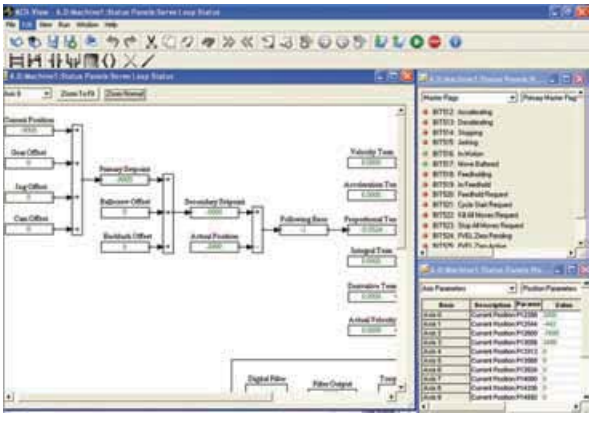
Connectivity

The ACR EPL controllers include a separate Ethernet port for TCP/IP and EtherNet/IP™ traffic. The ACR controller acts as a gateway between the real-time EPL domain and other communications, allowing the EPL network to remain focused on time-critical motion and I/O functions. The controller can service multiple communications channels at once, giving users many options for PC and PLC connectivity in development and normal operation.
The EtherNet/IP™ network is designed to use standard Ethernet and TCP/IP equipment for the industrial environment. The application layer protocol is an open standard - CIP™ (Control and Information Protocol).
CIP is the same upper layer protocol used by DeviceNet™ and ControlNet™ networks, allowing interoperability between various industrial devices.

ACR-View

ACR-View automatically generates a suite of common tags for each project you define. These tags can be automatically used in your Xpress HMI application.



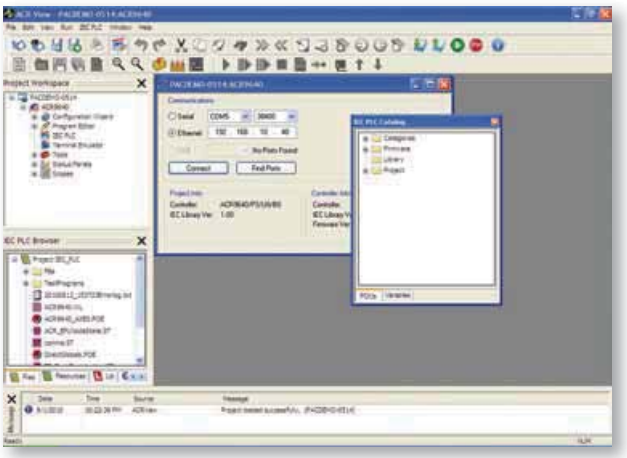


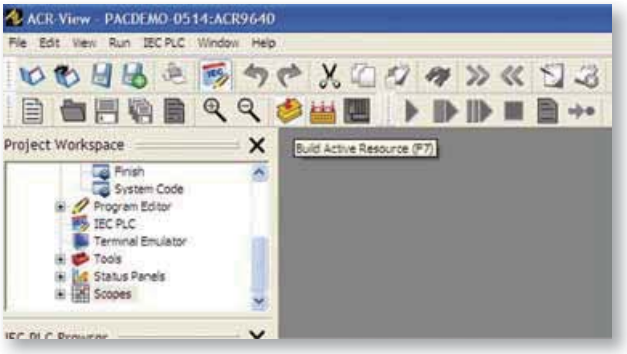
ACR-View Software Development Kit

ACR-View is a powerful project-development suite that assists the user of the ACR family products in programming, debugging and commissioning their application. Many features are incorporated to assist both the novice and expert users in developing code. All the tools needed to build and maintain a motion project are included:

- Ethernet, USB, CANopen and serial connection support
- Project Configuration Wizard
- Servo tuning tools
- Built-in oscilloscope, strip chart and XY plot
- IEC61131-3 editor (structured text, ladder diagram and continuous function chart)
- Real-time terminal interface
- Servo loop diagnostic tool
- Comprehensive status panels
- Integrated help files

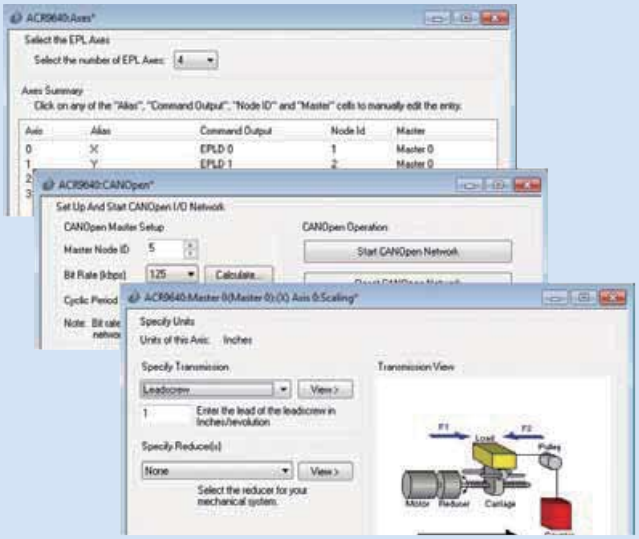
Development Overview





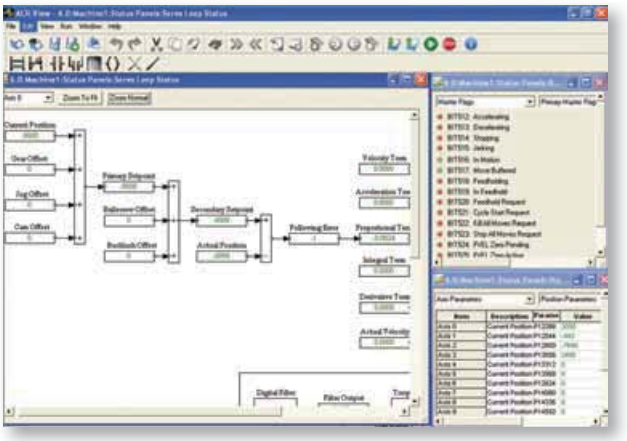
ACR-View's configurable environment allows you to create a development system that works the way you do. Elements of the environment can be docked, floated or moved to where they work best for you. Additional information is available from tool tips and a context sensitive help system.

Configuration Wizard



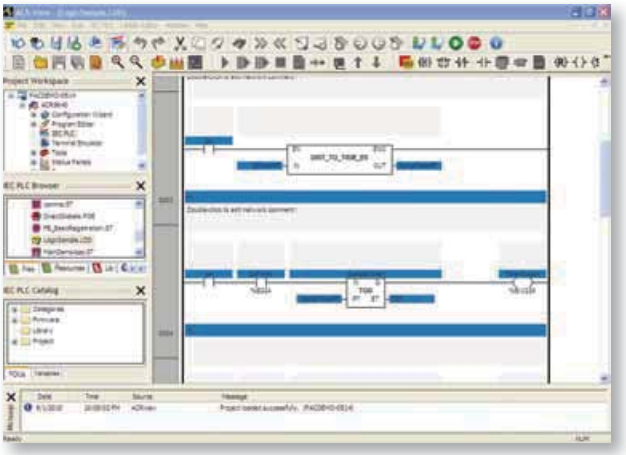
Project set-up is streamlined through the use of the Configuration Wizard. The ACR9640 can be configured in a matter of minutes as the user is guided through a series of simple steps. ACR-View will set the necessary parameters to have the controller ready for motion and code development.

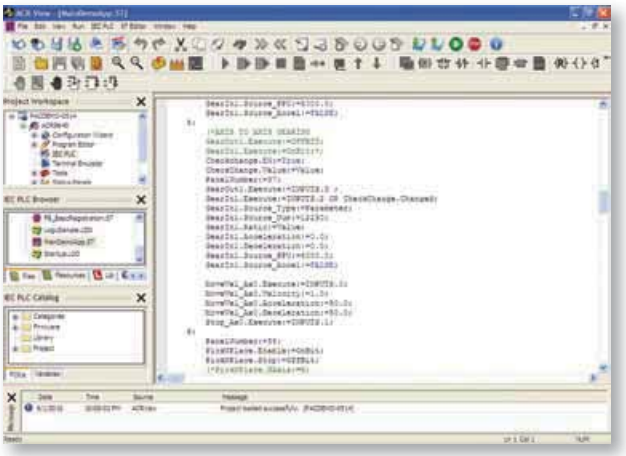
Status Panels

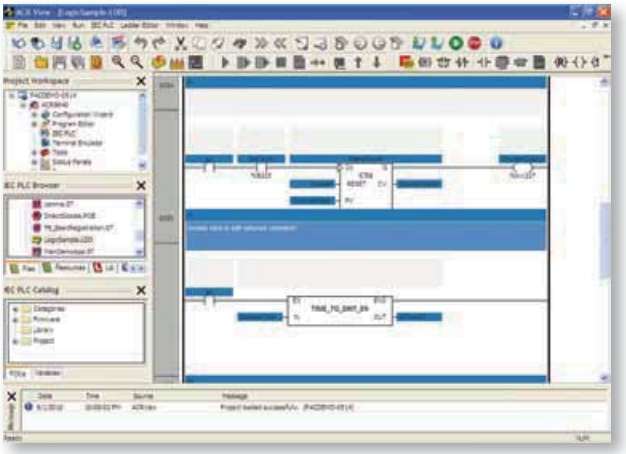


View virtually any parameter or flag within the controller using the Bit and Numeric Status panels. The Servo Loop Status panel allows in-depth analysis of servo operation.

Editors

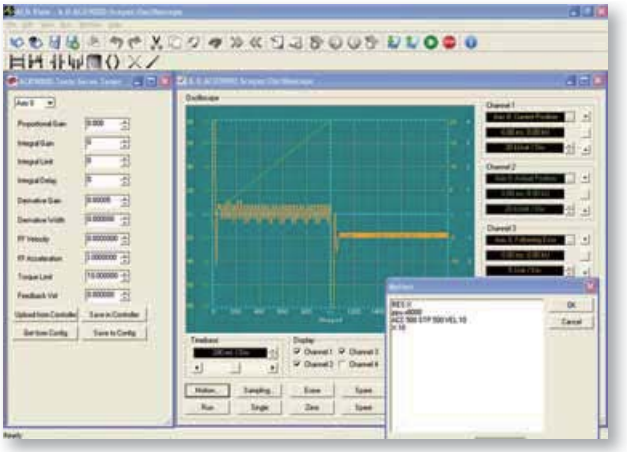






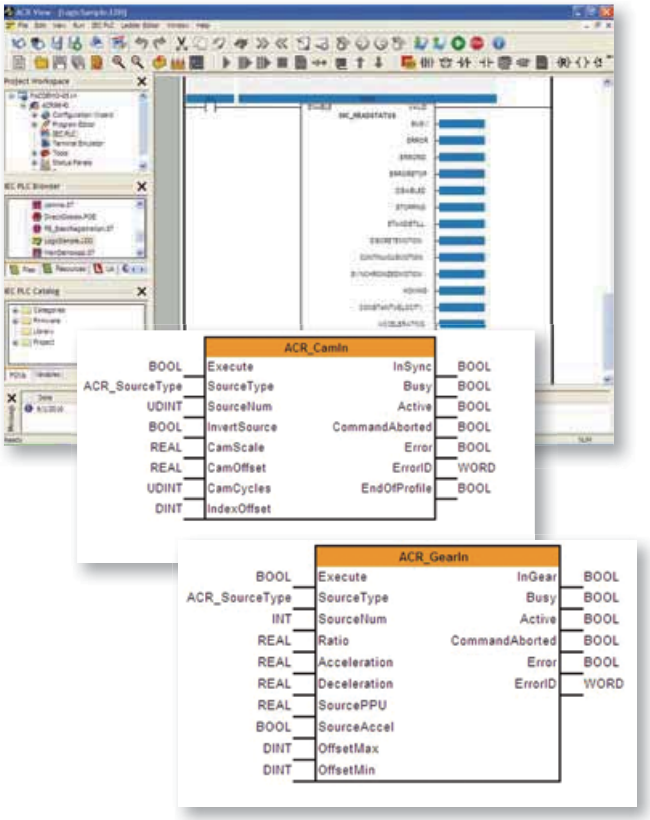
IEC61131-3 editors support complete project development in one or several supported languages. Motion and I/O logic are supported in all languages.

Tuning



Servo tuning can be optimized with ACR-View's powerful oscilloscope feature. Up to four channels of data can be observed and stored. Tuning gains are updated immediately and move profiles can be tailored to best fit the application's needs.

Motion Control Function Blocks



ACR-View not only incorporates the industry-standard PLCopen function blocks for motion, but goes beyond with proprietary multi-axis and coordinated function blocks.

ETHERNET Powerlink

EPL Controller Managing Node (MN)

- Stores and runs the motion program
- Supervises and controls local drive I/O and system expansion I/O
- Generates motion trajectories for all axes
- Sends position set points to drives
- Synchronizes positions of multiple axes for tightly coordinated motion

Compax3 EPL I30 Controlled Node (CN)

- Closing servo loops including torque, velocity and position loops
- Local I/O (8 in, 4 out)
- High-speed inputs for registration
- Encoder feedback from motor, Resolver ...
- STO

ACR9640 Multi-axis EPL Controller

Compax3 EPL Servo Drive

ETHERNET Powerlink Communications

- Replace the traditional ±10 V analog control and feedback cables with an all-digital Ethernet network
- Real-time, deterministic data to and from nodes is guaranteed each cycle with the slot communications network protocol, illustrated in the diagram below
- Proven, robust CANopen profiles are sent over proven, robust Ethernet hardware
- Standard TCP/IP communications does not interrupt determinism, as it takes place during the asynchronous slot at the end of the cycle
- Excellent performance with timing jitter <1 µs

Technical Characteristics

Technical Data

ACR9640 EPL Controller

Hardware	Axes/controller	16 EPL axes
	Power requirement	24 VDC, 1 A
	Processor	32 bit floating-point DSP @150 MFLOPS / 75 MHz
	User memory	2 MB flash-based. Retains user programs and system configuration parameters
	Firmware	Flash-based
	Operating system	Multi-tasking RTOS
	Battery backup	Non-volatile memory retains all system and user variables (5 years @25 °C)
Performance	Multi-tasking	8 coordinated systems/16 text programs/8 ladder programs
	Trajectory update	64 bit precision, 500 µs (axes dependent)
	Interpolation	Linear, circular, sinusoidal, helical, elliptical, spline, 3D arcs
Communications	ETHERNET Powerlink	ETHERNET Powerlink V2. Integrated 2-port hub, RJ-45 connectors Supports EPL DS402 drives in interpolated position mode
	Serial interface	1 serial port (RS232 and/or RS422)
	Ethernet	10/100 Base-T, RJ-45 connector. Supports IP protocols TCP/UDP, EtherNet/IP
	USB	USB 2.0, type B connection
	CANopen	Standard 9-pin D-sub connector Supports DS401 protocol for I/O devices
Provided software	Development software	ACR-View software development kit
	Language support	Libraries for C++, VB6, C#, VB.NET, LabVIEW

Environmental Characteristics

Ambient conditions

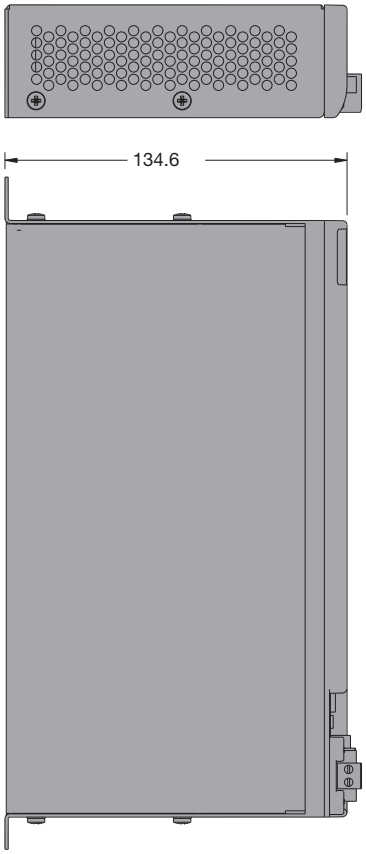
Temperature range	
	• Operating temperature: 0…+50 °C • Storage temperature: -40…+75 °C
Humidity	
	Operating humidity: 0...95 % non-condensing
Pollution degree	
	2 (per IEC61010)
Shock	
	15 g, 11 ms half-sine
Vibration	
	10...2000 Hz @2 g

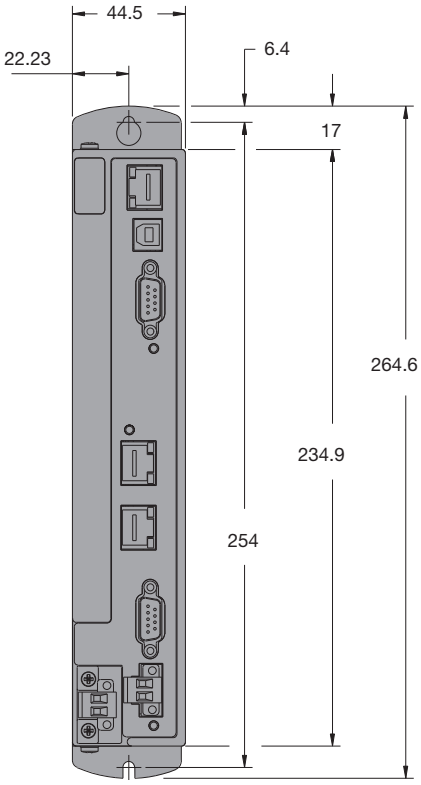
Standards and Conformance

CE compliance	
	CE (EMC) CE (LVD)
UL certification	
	UL Recognized
RoHS compliance	
	Complies with European Union Directive 2002/95/EC - Restriction of Hazardous Substances (RoHS)

Dimensions

Dimensions [mm]





Order Code

ACR9640 EPL

	1	2	3	4
Order example	**9640**	**P1**	**U0**	**B0**

1	**Controller version**[1]	
	9640	24 VDC input
2	**Communication**	
	P3	Ethernet, USB, serial and CANopen
3	**Number of axes, encoder inputs**	
	U0	16 EPL axes
4	**Memory**	
	B0	Battery backed RAM

[1] All models include ACR-View Software Development Kit CD

Accessories

Cables

	1		2		3
Order example	**71**	**-**	**016939**	**-**	**10**

1	**Type number of accessory**	
	71	Cable
2	**Communication**	
	016939	RS232 communication cable PC-ACR
3	**Cable length**	
	10	3 m

EPL accessory ACR-Compax3

	1		2
Order example	**SSK28**	**/**	**01**

1	**Type number of accessory**	
	SSK28	RJ45 crossover cable (Powerlink)
2	**Cable length**	
	20	0.25 m
	21	0.5 m
	01	1.00 m

CANopen accessory ACR-PIO

	1
Order example	**BUS10/01**

1	**Type number of accessory**	
	SSL02	CANopen cable (length per 1 m)[1]
	BUS10/01	Bus terminator

[1] Example: 2 pieces of SSL02 = 1 SSL02 with 2 m cable length

Parker I/O System - PIO

	1		2
Order example	**PIO**	**-**	**337**

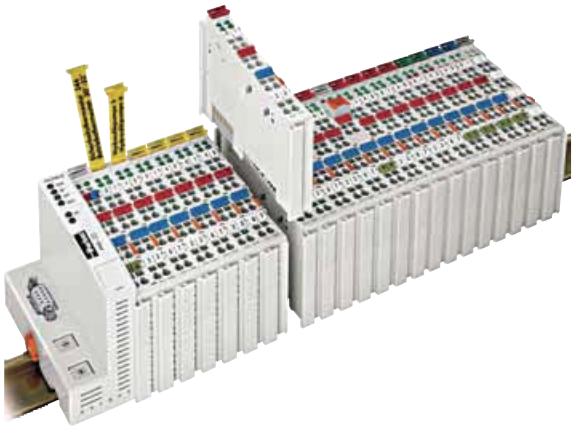
1	**Series**	
	PIO	Parker I/O system
2	**Fieldbus coupler**	
	337	CANopen coupler
	347	CANopen coupler ECO
	Bus terminals	
		Digital inputs
	400	2DI 24 VDC 3.0 ms
	402	4DI 24 VDC 3.0 ms
	430	8DI 24 VDC 3.0 ms
		Analog inputs
	456	2AI ±10 VDC differential input
	468	4AI 0-10 VDC S.E.
	480	2AI 0-20 mA differential input
		Digital outputs
	501	2DO 24 VDC 0.5 A
	504	4DO 24 VDC 0.5 A
	530	8DO 24 VDC 0.5 A
		Analog outputs
	550	2AO 0-10 VDC
	552	2AO 0-20 mA
	556	2AO ±10 VDC
	System terminals	
	600	Bus terminal (required as terminal for each fieldbus node)
	602	Power supply terminal 24 VDC
	Accessories	
		PIO quick designation system (designation indicators for manual labeling)
	501-WEISS	**white**
	501-GELB	**yellow**
	501-ROT	**red**
	501-BLAU	**blue**
	501-GRAU	**grey**
	501- ORANGE	**orange**
	501- HELLGRUEN	**light green**

Modular I/O - System - PIO

Overview

Description

Parker Hannifin's modular expandable bus terminal system uses electronic devices to capture a wide variety of control signals from field devices. Connections to the field level can be implemented quickly and reliably with PIO.
PIO offers the convenience of exceptionally simple installation. The individual modules can be installed and removed without any tools.
Different modules can be combined with each other within the bus terminal system.
Gold-plated contacts guarantee reliable connections between the individual modules. A conducting ground contact adds additional safety.



Features

- **Fieldbus independent layout**
- **Easy to extend with additional modules**
- **Exceptionally compact design**
- **Intrinsically-safe contacts**
- **Maintenance free**
- **Mixed voltages can be combined**
- **Great flexibility ensures optimal adaptability in different applications**
- **Integrated input filter**
- **Opto-isolation**
- **Suitable for copper cables from 0.08 mm² to 2.5 mm²**
- **Error and status display (LED)**
- **Access options for simple signal test**
- **Short-circuit proof inputs**
- **Options for clear, unambiguous identification**

Technical Characteristics - Overview

PIO - Parker I/O-System	
Bus terminals	Digital and analog input and output terminals
Fieldbus coupler (Standard and ECO version)	• CANopen • PROFIBUS • DeviceNet • ETHERNET TCP/IP
Current via power contacts	max. 10 A
Voltage isolation	500V System / Supply
Operating temperature	0...55 °C
Enclosure rating	IP20
Resistance to vibrations	in accordance with IEC 60068-2-6
Resistance to impact	in accordance with IEC 60068-2-27
EMC Interference immunity Interference emission	in accordance with EN 50082-2 (96) in accordance with EN 50081-2 (94)
International Standards	CE, UL 508

Technical Data

Fieldbus Coupler

CANopen

	PIO-337 Standard	PIO-347 ECO
Signals	digital and analog	digital and analog
max. number of couplers in the system	110	110
Transfer medium	screened copper cable 3 x 0.25 mm²	screened copper cable 3 x 0.25 mm²
max. bus length	40...1000 m depending on cable and baud rate	40...1000 m depending on cable and baud rate
Transfer rate	10 kBaud...1 MBaud	10 kBaud...1 MBaud
max. number of bus terminals	64	64
Fieldbus input process image	max. 512 bytes	max. 32 bytes
Fieldbus output process image	max. 512 bytes	max. 32 bytes
Supply voltage	24 VDC (-15 %...+20 %)	24 VDC (-15 %...+20 %)
Input current	max. 500 mA at 24 V	260 mA at 24 V typ. at nominal load
Internal current drain	350 mA at 5 V	350 mA at 5 V
max. vectorial sum current for bus terminals	1650 mA at 5 V	650 mA at 5V
Power contacts	3; 24 VDC (-15 %...+20 %)	none
Current via power contacts	max. 10 A	-

PROFIBUS DP

	PIO-333 Standard	PIO-343 ECO
Signals	digital and analog	digital and analog
max. number of couplers in the system	96 with repeater	125 with repeater
Number of I/O points	Approx. 6000 (depending on the master)	Approx. 6000 (depending on the master)
Transfer medium	Copper cable as per EN 50170	Copper cable as per EN 50170
max. bus length	100...1200 m depending on cable and baud rate	100...1200 m depending on cable and baud rate
Transfer rate	9.6 kBauds...12 MBauds	9.6 kBauds...12 MBauds
Transmission time	typ. 1 ms, max. 3.3 ms	typ. 1 ms, max. 3.3 ms
max. number of bus terminals	63	63
Fieldbus input process image	max. 128 bytes	max. 32 bytes
Fieldbus output process image	max. 128 bytes	max. 32 bytes
Supply voltage	24 VDC (-15 %...+20 %)	24 VDC (-15 %...+20 %)
Input current	max. 500 mA at 24 V	260 mA at 24 V typ. at nominal load
Internal current drain	200 mA at 5V	350 mA at 5 V
max. vectorial sum current for bus terminals	1800 mA at 5 V	650 mA at 5V
Power contacts	3; 24 VDC (-15 %...+20 %)	none
Current via power contacts	max. 10 A	-

DeviceNet™

	PIO-306 Standard	PIO-346 ECO
Signals	digital and analog	digital and analog
max. number of couplers in the system	64 with scanner	64 with scanner
Number of I/O points	Approx. 6000 (depending on the master)	Approx. 6000 (depending on the master)
Transfer medium	screened copper cable trunk line: 2x0.82 mm² + 2x1.7 mm² drop line: 2x0.2 mm² + 2x0.32 mm²	screened copper cable trunk line: 2x0.82 mm² + 2x1.7 mm² drop line: 2x0.2 mm² + 2x0.32 mm²
max. bus length	100...500 m depending on cable and baud rate	100...500 m depending on cable and baud rate
Transfer rate	125 - 250 - 500 kBauds	125 - 250 - 500 kBauds
max. number of bus terminals	64	63
Fieldbus input process image	max. 512 bytes	max. 32 bytes
Fieldbus output process image	max. 512 bytes	max. 32 bytes
Supply voltage	24 VDC (-15 %...+20 %)	24 VDC (-15 %...+20 %)
Input current	<500 mA at 24 V	260 mA at 24 V typ. at nominal load
DeviceNet Interface	<120 mA at 11 V	<120 mA at 11 V
Internal current drain	350 mA at 5 V	350 mA at 5 V
max. vectorial sum current for bus terminals	1650 mA at 5 V	650 mA at 5V
Power contacts	3; 24 VDC (-15 %...+20 %)	none
Current via power contacts	max. 10 A	-

ETHERNET TCP/IP

	PIO-341 Standard
Signals	digital and analog
max. number of socket connections	3 HTTP, 5 MODBUS/TCP, 128 for ETHERNET/IP
Number of I/O modules	limited by ETHERNET specification
Transfer medium	Twisted Pair S-UTP 100 Ω CAT 5
max. bus length	100 m between hub and PIO-341; max. network length is limited by the ETHERNET specification
Transfer rate	10/100 MBits/s
max. number of bus terminals	64
Fieldbus input process image	max. 2 kBytes
Fieldbus output process image	max. 2 kBytes
Supply voltage	24 VDC (-15 %...+20 %)
Input current	500 mA at 24 V
Internal current drain	300 mA at 5 V
max. vectorial sum current for bus terminals	1700 mA at 5 V
Power contacts	3; 24 VDC (-15 %...+20 %)
Current via power contacts	max. 10 A

ECO fieldbus couplers are used in situations where mainly digital inputs and outputs are to be connected and the number of analogue inputs and outputs is small.
The system is supplied directly via the coupler. The field supply is connected via a separate input terminal (PIO-602).

Bus Terminals

Digital inputs



	PIO-400 2DI 24 VDC 3.0 ms 2-channel digital input terminal	PIO-402 4DI 24 VDC 3.0 ms 4-channel digital input terminal	PIO-430 8DI 24 VDC 3.0 ms 8-channel digital input terminal
Number of inputs	2	4	8
Data width of the process image	2 Bits	4 Bits	8 Bits
Connection	2 - 4 wires, positive switching	2 - 3 wires, positive switching	single-wire, positive switching
Power contacts	3; 24 VDC (-15 %...+20 %)	2; 24 VDC (-15 %...+20 %)	2; 24 VDC (-15 %...+20 %)
Internal current drain	3.7 mA at 5 V	7.5 mA at 5 V	17 mA at 5 V
Signal voltage (0)	-3...+5 VDC	-3...+5 VDC	-3...+5 VDC
Signal voltage (1)	15...30 VDC	15...30 VDC	15...30 VDC
Input current (typ.)	4.5 mA	4.5 mA	2.8 mA
Dimensions (mm) WxHxD	12x64x100	12x64x100	12x64x100

Analog inputs



	PIO-456 2AI ±10 VDC differential input 2-channel analog input terminal	PIO-468 4AI 0-10 VDC S.E. 4-channel analog input terminal	PIO-480 2AI 0-20 mA differential input 2-channel analog input terminal
Number of inputs	2	4	2 (opto-isolated)
Data width of the process image	2*2 bytes	4*2 bytes	2*2 bytes
Connection	differential input	Single-ended	differential input
Power contacts	none	none	none
Internal current drain	80 mA at 5 V	60 mA at 5 V	<100 mA at 5 V
Signal input	±10 V	0...10 V	0...20 mA
Resolution	12 bits	12 bits	14 bits (A/D converter) 13 bits (measurement value)
Dimensions (mm) WxHxD	12x64x100	12x64x100	12x64x100

Digital outputs



	PIO-501 2DO 24 VDC 0.5 A 2-channel digital output terminal	PIO-504 4DO 24 VDC 0.5 A 4-channel digital output terminal	PIO-530 8DO 24 VDC 0.5 A 8-channel digital output terminal
Number of outputs	2	2	4
Data width of the process image	2 bits	4 bits	8 bits
Connection	short-circuit proof, positive switching	short-circuit proof, positive switching	short-circuit proof, positive switching
Power contacts	3; 24 VDC (-15 %...+20 %)	2; 24 VDC (-15 %...+20 %)	2; 24 VDC (-15 %...+20 %)
Internal current drain	3.5 mA at 5 V	7 mA at 5 V	25 mA at 5 V
Type of load	resistive, inductive, lamp load	resistive, inductive, lamp load	resistive, inductive, lamp load
Output current	0.5 A	0.5 A	0.5 A
Switching frequency (max.)	5 kHz	5 kHz	1 kHz
Dimensions (mm) WxHxD	12x64x100	12x64x100	12x64x100

Analog outputs



	PIO-550 2AO 0-10 VDC 2-channel analog output terminal	PIO-552 2AO 0-20 mA 2-channel analog output terminal	PIO-556 2AO ±10 VDC 2-channel analog output terminal
Number of outputs	2	2	2
Data width of the process image	2*2 bytes	2*2 bytes	2*2 bytes
Power contacts	none	2; 24 VDC (-15 %...+20 %)	none
Signal input	0...10 V	0...20 mA	±10 V
Internal current drain	65 mA at 5 V	60 mA at 5 V	65 mA at 5 V
Resolution	12 bits	12 bits	12 bits
Conversion time	Approx. 2ms	Approx. 2ms	Approx. 2ms
Load impedance	> 5 kOhm	< 500 Ohm	> 5 kOhm
Dimensions (mm) WxHxD	12x64x100	12x64x100	12x64x100

Power Supply Terminal

The power supply terminal is used to supply the field level when ECO couplers are used or if the supply is interrupted by bus terminals with no or only a single power contact.

Passive power supply terminal

	PIO-602
Voltage via power contacts	24 VDC (-15 %...+20 %)
Current via power contacts	max. 10 A

Bus Terminal

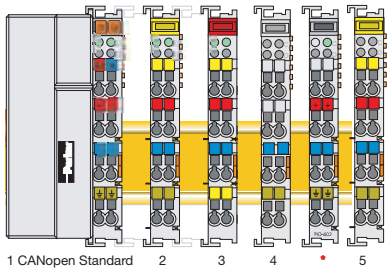
PIO-600: A terminal must be set at the end of each fieldbus node. The terminal closes the internal terminal bus and ensures correct data transmission.

Layout and Configuration Setup

Example of a layout sequence (from left to right):

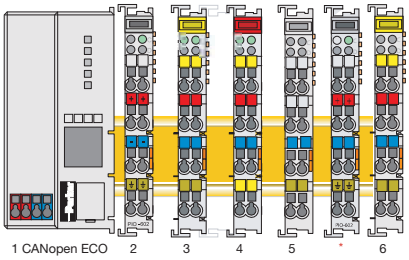
with standard coupler

1. Fieldbus coupler
2. Bus terminals with 3 power contacts
3. Bus terminals with 2 power contacts
4. Bus terminals without power contacts
5. *



with ECO coupler

1. ECO fieldbus coupler
2. PIO-602
3. Bus terminals with 3 power contacts
4. Bus terminals with 2 power contacts
5. Bus terminals without power contacts
6. *



* Expansion on the right side using bus terminals with power contacts requires the use of a PIO-602 potential voltage feed terminal.

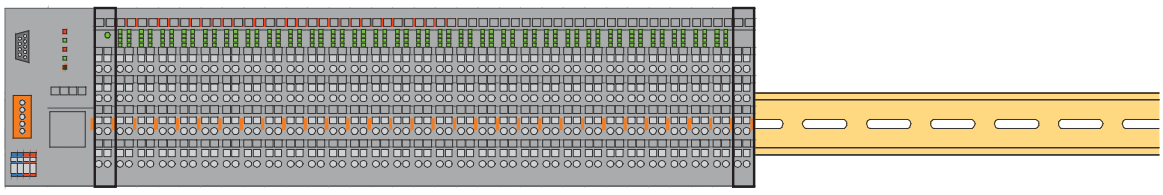
Worked examples

The data for the input currents must be available to calculate the vectorial sum!
The internal current drain of the bus terminals is specified in the technical data. The values of all PIOs in the node are added together to determine the total requirement.

Example 1
The following components are to be used in a node:

- 1 CANopen ECO coupler (PIO-347)
- 16 digital output terminals (PIO-530)
- 14 digital input terminals (PIO-430)

PIO-347 internal current drain	350 mA at 5 V
PIO-347 max. vectorial sum current for bus terminals	650 mA at 5V
Grand total I (5 V):	**1000 mA at 5 V**
PIO-347 fieldbus input process image	max. 32 bytes
PIO-347 fieldbus output process image	max. 32 bytes
PIO-530 internal current drain	16*25 mA = 400 mA
PIO-430 internal current drain	14*17 mA = 238 mA
Total:	**638 mA**
PIO-530 data width of the output process image	16*8 bits = 128 bits (16 bytes)
PIO-430 data width of the input process image	14*8 bits = 112 bits (14 bytes)



PIO-602 **PIO-600**

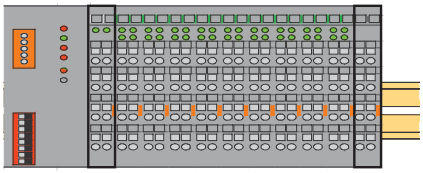
The **CANopen ECO coupler** (PIO-347) is capable of providing the required 638 mA (max. 650 mA) for the bus terminals. It is capable of administering a data width of 14 bytes for the input process image (max. 32 bytes) and a data width of 16 bytes for the output process image (max. 32 bytes).
(A PIO-602 power supply terminal is required).

Example 2
The following components are to be used in a node:

- 1 CANopen ECO coupler (PIO-347)
- 9 analog input terminals (PIO-468)

PIO-347 internal current drain		350 mA at 5 V
PIO-347 max. vectorial sum current for bus terminals		650 mA at 5V
	Grand total I (5 V):	**1000 mA at 5 V**
PIO-347 fieldbus input process image		max. 32 bytes
PIO-347 fieldbus output process image		max. 32 bytes
PIO-468 internal current drain		9*60 mA = 540 mA
	Total:	**540 mA**
PIO-468 data width of the output process image		9*8 bytes = 72 bytes

The **CANopen ECO coupler** (PIO-347) is capable of providing the required 540 mA (max. 650 mA) for the bus terminals.
However, this version requires the use of a **CANopen Standard coupler** (PIO-337), since the required data width of 72 bytes for the input process image cannot be administered by the CANopen ECO coupler (max. 32 bytes).
The CANopen standard coupler (PIO-337) is capable of administering an input process image of 512 bytes.
(No PIO-602 power supply terminal is required).

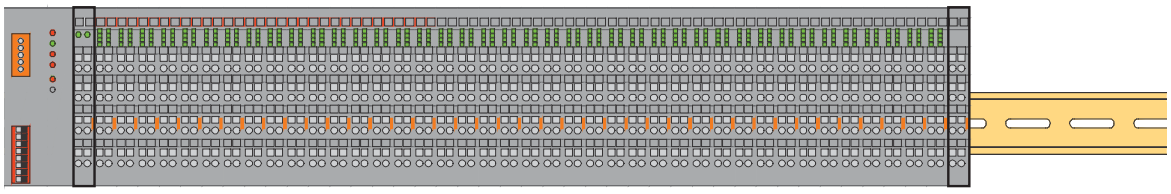


PIO-602 **PIO-600**

Example 3:
The following components are to be used in a node:

- 1 CANopen ECO coupler (PIO-347)
- 16 digital output terminals (PIO-530)
- 24 digital input terminals (PIO-430)

PIO-347 internal current drain		350 mA at 5 V
PIO-347 max. vectorial sum current for bus terminals		650 mA at 5V
	Grand total I (5 V):	**1000 mA at 5 V**
PIO-347 fieldbus input process image		max. 32 bytes
PIO-347 fieldbus output process image		max. 32 bytes
PIO-530 internal current drain		16*25 mA = 400 mA
PIO-430 internal current drain		24*17 mA = 408 mA
	Total:	**808 mA**
PIO-530 data width of the output process image		16*8 bits = 128 bits (16 bytes)
PIO-430 data width of the input process image		14*8 bits = 112 bits (14 bytes)



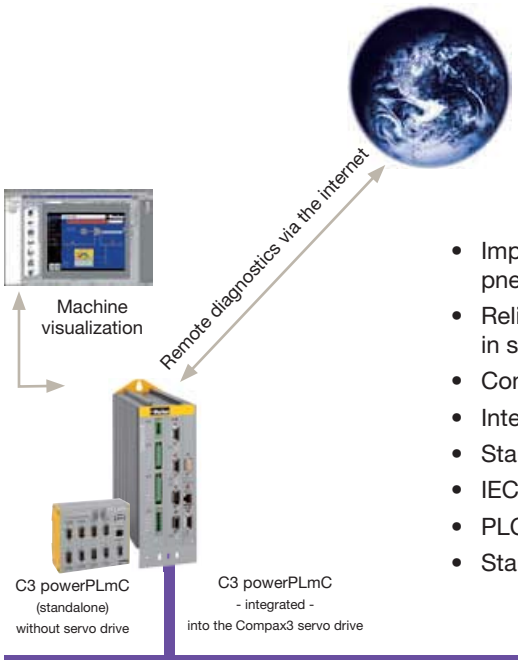
PIO-602 **PIO-600**

The **CANopen ECO coupler** (PIO-347) is capable of administering a data width of 14 bytes for the input process image (max. 32 bytes) and a data width of 16 bytes for the output process image (max. 32 bytes).
This version requires the use of the **CANopen standard coupler** (PIO-337) since the total of currents is exceeded. The CANopen standard coupler (PIO-337) is capable of providing 1650 mA for bus terminals and can administer an input and output process image of 512 bytes each.
(No PIO-602 power supply terminal is required).

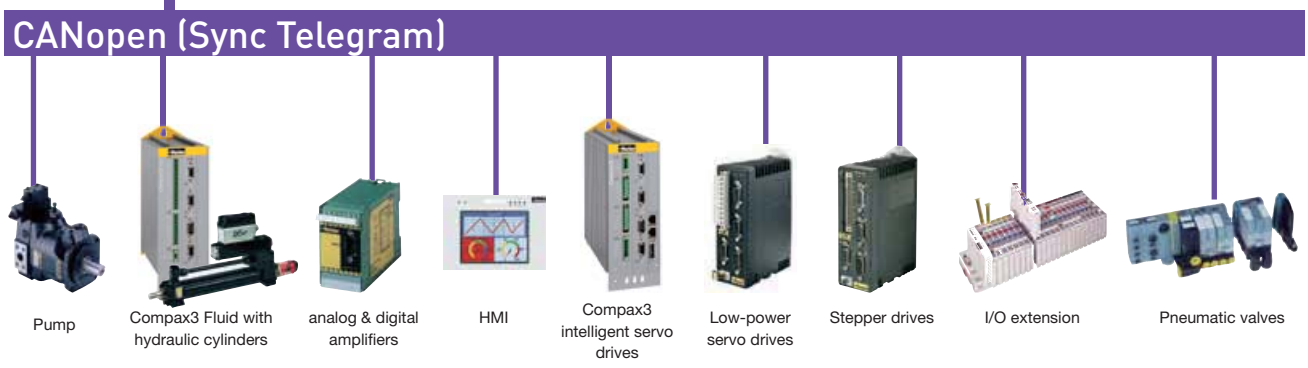
System Solutions from Parker Hannifin

Integrating Drive Technology into the Automation Environment

- High-performance control systems
- Pneumatic and hydraulic drives
- Sensor systems
- Input/output modules
- Operator panels for control and monitoring
- Technology functions (winders, cams, etc.)
- Vertical integration (connection to company networks, remote maintenance, etc.)
- Handling and precision mechanics



- Implementation of modular machine concepts with electromechanics, pneumatics and hydraulics
- Relieves the logic and motion function load on the main control system (can in some instances remove the need for the main control system)
- Control, NC functionality and monitoring in a single device
- Integration into control systems and remote maintenance via the Internet
- Standard components make it easy to expand the system
- IEC 61131-3
- PLCopen motion components
- Standard fieldbusses



Features

- 5 programming languages
  - SFC (Sequential function chart)
  - IL (Instruction List)
  - ST (Structured Text)
  - LD (Ladder diagram)
  - FBD (Function block diagram)
  - CFC (Continuous function chart editor)
- Compax3 library
  - IEC - standard components
  - Compax3 - specific components
  - PLCopen Motion control components
  - Technology components

Order Code

Parker I/O System - PIO

	1		2
Order example	**PIO**	**-**	**337**

1	**Series**	
	PIO	Parker I/O system
2	**Fieldbus coupler**	
	337	CANopen coupler
	347	CANopen coupler ECO
	306	DeviceNet coupler
	346	DeviceNet coupler ECO
	333	PROFIBUS coupler (DP/V1 12 MBd)
	343	PROFIBUS coupler ECO (DP 12 MBd)
	341	ETHERNET coupler (TCP/IP)
	Bus terminals	
	Digital inputs	
	400	2DI 24 VDC 3.0 ms
	402	4DI 24 VDC 3.0 ms
	430	8DI 24 VDC 3.0 ms
	Analog inputs	
	456	2AI ±10 VDC differential input
	468	4AI 0-10 VDC S.E.
	480	2AI 0-20 mA differential input
	Digital outputs	
	501	2DO 24 VDC 0.5 A
	504	4DO 24 VDC 0.5 A
	530	8DO 24 VDC 0.5 A
	Analog outputs	
	550	2AO 0-10 VDC
	552	2AO 0-20 mA
	556	2AO ±10 VDC
	System terminals	
	600	Bus terminal (required as terminal for each fieldbus node)
	602	Power supply terminal 24 VDC
	Accessories	
	PIO quick designation system (designation indicators for manual labeling)	
	501-WEISS	**white**
	501-GELB	**yellow**
	501-ROT	**red**
	501-BLAU	**blue**
	501-GRAU	**grey**
	501-ORANGE	**orange**
	501-HELLGRUEN	**light green**