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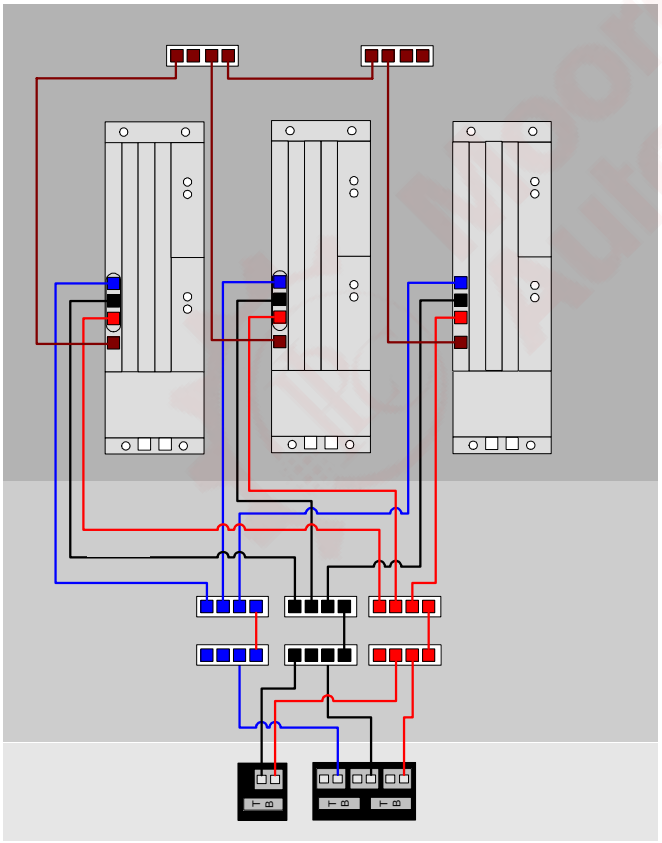
GE Energy

Mark* VIe Control

System Guide, Volume II

GEH-6721G



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CPCI

Mark* VIe Controller

The Mark* VIe UCCx controllers are a family of CPCI, 6U high, single-board computers that run the application code. The controller mounts in a CompactPCI® (CPCI) enclosure, and communicates with the I/O packs through on board I/O network interfaces. The controller operating system (OS) is QNX® Neutrino®, a real-time, multitasking OS designed for high-speed, high-reliability industrial applications. Five communication ports provide links to I/O, operator, and engineering interfaces as follows:

- Ethernet connection for the Unit Data Highway (UDH) for communication with HMIs, and other control equipment
- Ethernet connection for the R, S, and T I/O network
- RS-232C connection for setup using the COM1 port

Note The I/O networks are private special purpose Ethernet that support only the I/O packs and the controllers.

Operation

Note Application software can be modified online without requiring a restart.

The controller is loaded with software specific to its application, which includes but is not limited to steam, gas, and land-marine aeroderivative (LM), or balance of plant (BOP) products. It can run rungs or blocks. The IEEE®1588 protocol is used through the R, S, and T IONets to synchronize the clock of the I/O packs and controllers to within ±100 micro seconds.

External data is transferred to and from the control system database in the controller over the R, S, and T IONets.

In a simplex system, this includes process inputs/outputs to the I/O packs.

In a dual system:

- Process inputs/outputs to the I/O packs
- Internal state values and initialization information from the designated controller
- Status and synchronization information from both controllers

In a triple modular redundant (TMR) system:

- Process inputs/outputs to the I/O packs
- Internal state values from for voting and status and synchronization information from all three controllers
- Initialization information from the designated controller

Configuration

The controller must be configured with a TCP/IP address prior to connecting to the UDH Ethernet. This is achieved through the ToolboxST* application and the COM1 serial port. See *GEH-6700, ToolboxST Guide for Mark VIe Control* for details.

Installation

The controller module contains (at a minimum) a controller and a four-slot CPCI rack with either one or two power supplies. The primary controller must be placed in the left-most slot (slot 1). A second, third, and fourth controller can be placed in a single rack.

Note If the slot 1 controller is removed, the other controllers will stop operating.

The CMOS battery is disconnected using a processor board jumper during storage to extend the life of the battery. When installing the board, the battery jumper must be reinstalled. Refer to the specific UCCx module drawing for jumper location. The battery supplies power to the CMOS RAM settings and the internal date and real-time clock. There is no need to set CMOS settings since the settings are defaulted to the proper values through the BIOS. Only the real-time clock must be reset. The initial date and time can be set using a system NTP server or ToolboxST application.

If the board is the system board (slot 1 board) and other boards are in the rack, ejection of the system board will cause the other boards to stop operating. It is recommended that power be removed from the rack when replacing any board in the rack. Rack power can be removed by one of the following methods.

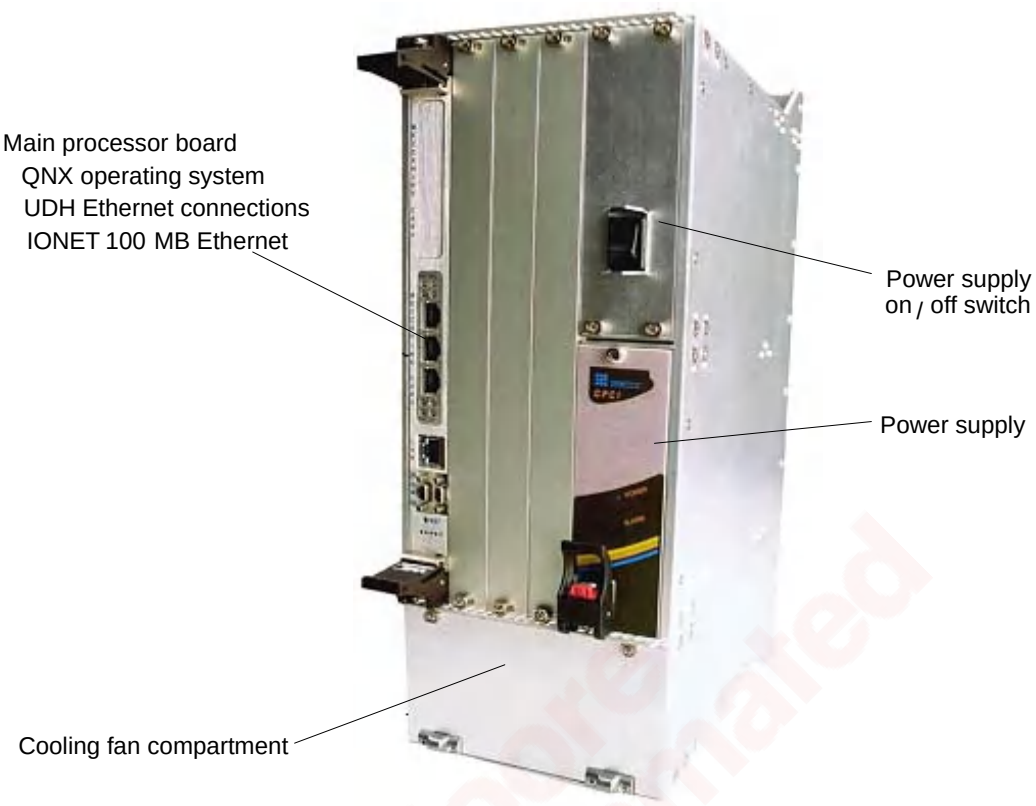
- In a single power supply unit, a switch is provided to disable the power supply outputs.
- In a dual power supply unit, both power supplies can be safely ejected to remove power.
- Unplug the bulk power input Mate-N-Lok® connector(s) on the bottom of the CPCI enclosure.
- Use a remote disconnect switch.

Unlike the Mark VI VME boards that provided only ejectors, the UCCx module has injectors/ejectors at the bottom and top of the module. Before sliding the board in the rack, the top ejector should be tilted up and the bottom ejector should be tilted down. When the connector on the backside of the board connects with the backplane connector, the injectors should be used to fully insert the board. This is done by pushing down on the top injector and pulling up on the bottom ejector. Remember to finish the installation by tightening the top and bottom injector/ejector screws. This provides mechanical security as well as a chassis ground connection.

Note Failing to lock the injectors will prevent the controller from booting. When extracting the board, perform the insertion process in reverse. See the next section on configuration before connecting the Ethernet cables. If a previous application is loaded in the module, mis-operation may occur if the Ethernet addresses collide with other operating equipment.

CPCI Component Replacement

The following sections provide replacement procedures for the CPCI control module.



CPCI Controller

➢ **To replace the CPCI controller**

1 Power down the CPCI rack. If the rack has a single power supply (version P1), turn off the power switch located on the panel above the power supply. The power can also be removed by disconnecting the bulk power plug from the bottom of the rack or by using a remote disconnect.

2 When two power supplies are used (version P2), loosen the top and bottom screw on each one. Press down the red tab in the black release lever on each power supply. Press down on the black release lever and pull out to disconnect both power supplies from the CPCI rack backplane. The power can also be removed by disconnecting the bulk power plugs from the bottom of the rack or by using a remote disconnect.

3 Loosen the screws at the top and bottom of the controller.

4 Press down on the top ejector tab and pull up on the bottom ejector tab to disconnect the controller from the backplane. Carefully pull the controller out of the CPCI rack.

5 Carefully slide the new controller module into the CPCI enclosure.

6 Press up on the top injector/ejector tab and push down on the bottom injector/ejector tab to seat the controller connectors with the receptacles on the backplane.

7 Tighten the screws at the top and bottom of the controller, securing it in the CPCI enclosure.

8. Power up the controller by turning on the power switch on CPCI enclosure with a single power supply or pushing in on both power supplies and securing them on a CPCI enclosure using dual supplies.
9. Configure controller with TCP/IP address prior to connecting the UDH Ethernet cable. This is done using the ToolboxST application and COM1 serial port.
10. Connect the UDH Ethernet cable to the LAN port. Connect the three IONet Ethernet cables to the appropriate receptacles.

Controller Battery

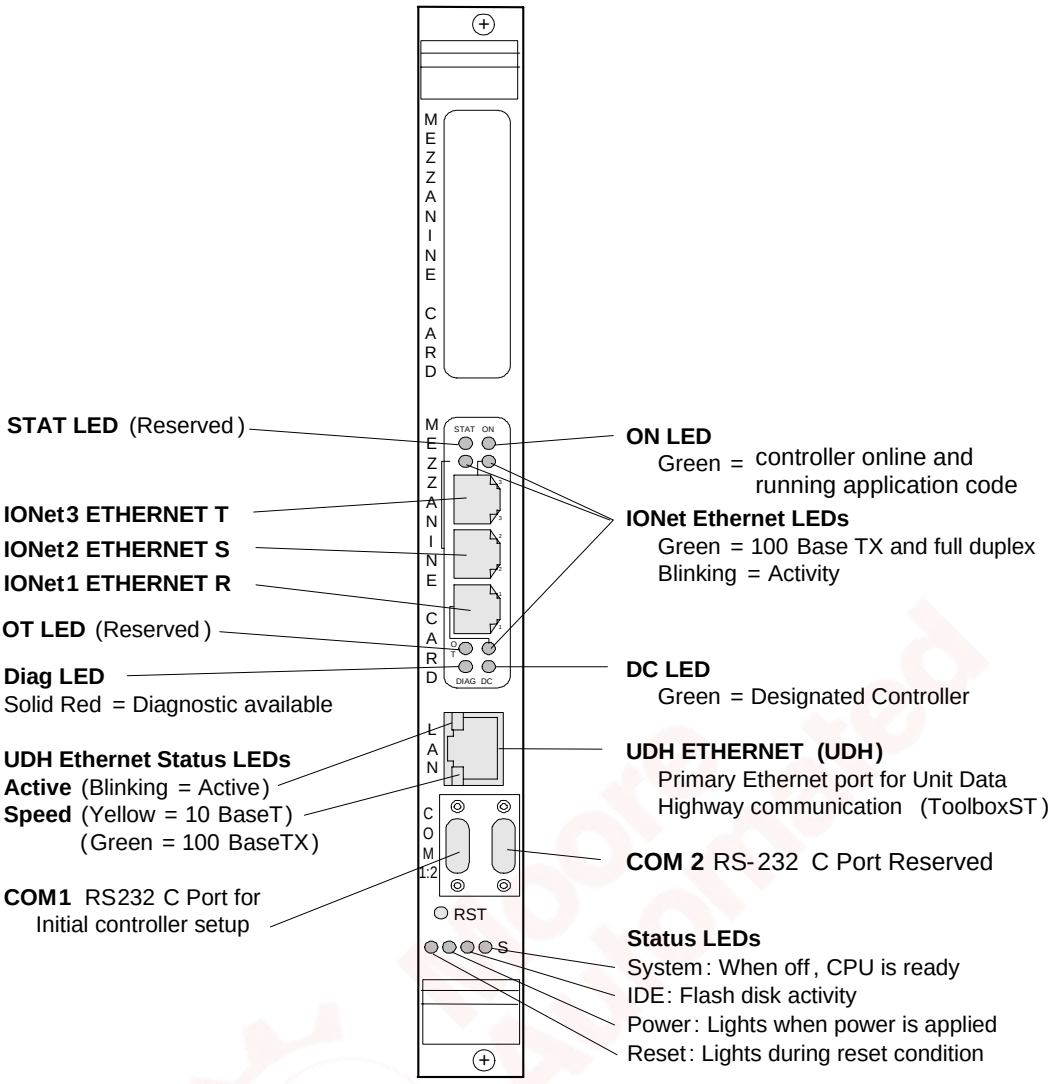
The UCCx uses a lithium battery to supply power to the CMOS (which contains the BIOS settings for the CPU board) and the real-time clock when the controller is not on. Default CMOS settings are also stored in flash memory, so when the battery reaches end-of-life, only the real-time clock functions are lost.

The lithium battery for the UCCx has a service life of 10 years. The battery is disabled in stock and can be disabled when storing a controller. If the controller is stored with the battery disabled, its life expectancy is 10 years, minus the time the controller has been in service. If the controller is stored with the battery enabled, the life expectancy drops to seven years minus the time the controller has been in service. An expired battery can be replaced on the controller board.

➢ To replace the controller battery

1. Power down the CPCI rack. If the rack has a single power supply (version P1), turn off the power switch located on the panel above the power supply.
2. Loosen the screws at the top and bottom of the controller.
3. Press down on the top ejector tab and pull up on the bottom ejector tab to disconnect the controller from the backplane. Carefully pull the controller out of the CPCI rack.
4. Locate the battery near the top, inboard side of the controller.
5. Loosen the screw on the tab holding the battery and move it out of the way.
6. Slide the expired battery out of its enclosure, making note that the positive (+) side faces away from the controller.
7. Insert the new battery. Reposition the holding tab and tighten the screw.
8. Slide the controller back into the CPCI rack and secure it in place.
9. Use the ToolboxST application to reset the real-time clock.

UCCA Front View



UCCAM03 Specifications

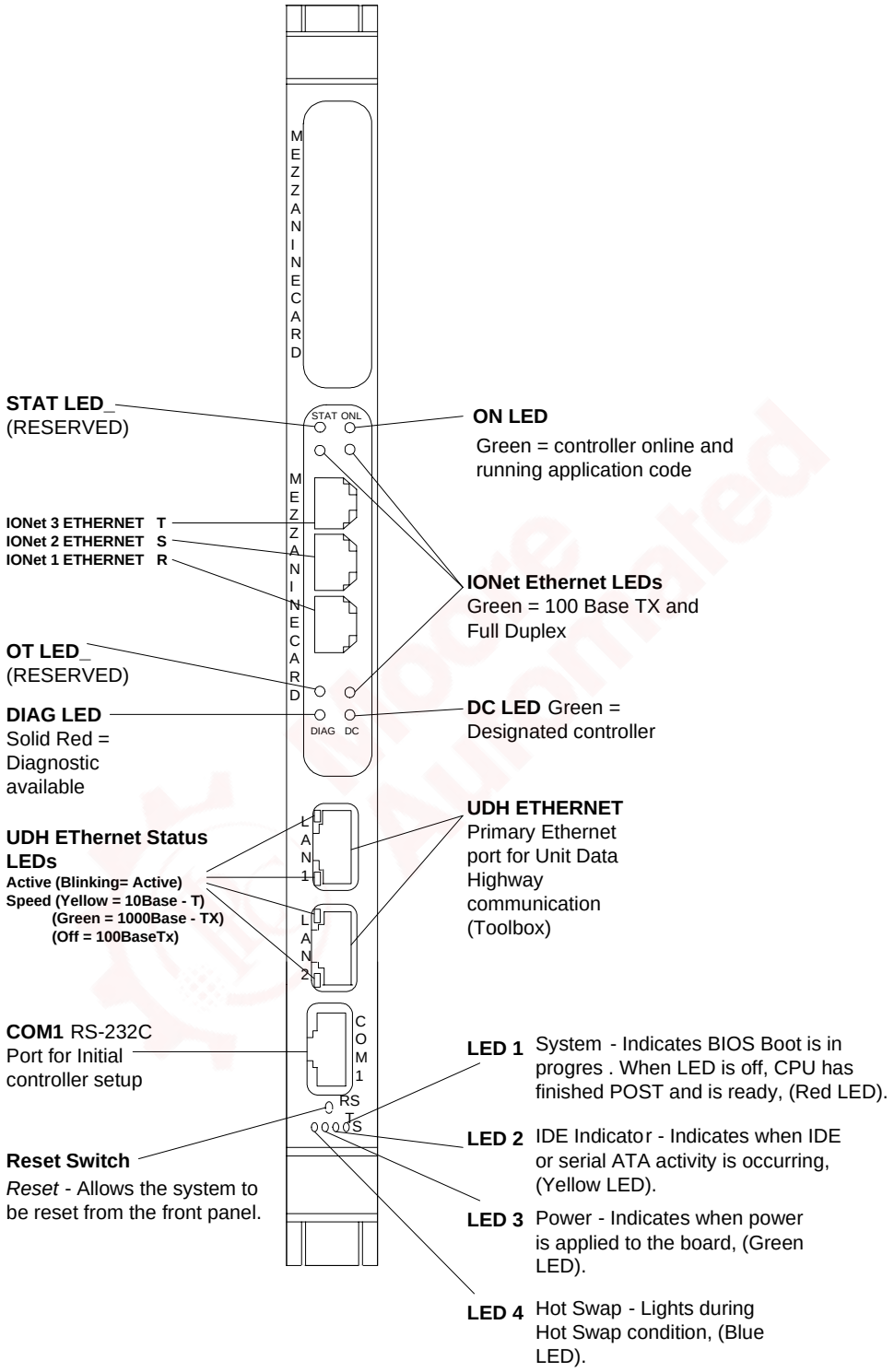
Item	Specification
Microprocessor	Intel Ultra Low Voltage Celeron 650 MHz (8.3 Watts Max.)
Memory	128 MB DDR SDRAM through one SODIMM 128 MB Compact Flash Module 256 KB L2 cache Flash-backed SRAM - 8K allocated as NVRAM for controller functions
Operating System	QNX Neutrino
Programming	Control block language with analog and discrete blocks; Boolean logic represented in relay ladder diagram format. Supported data types include: Boolean 16-bit signed integer 16-bit unsigned integer 32-bit signed integer 32-bit unsigned integer 32-bit floating point 64-bit long floating point
Primary Ethernet interface (one port)	TCP/IP protocol used for communication between controller and toolbox TCP/IP protocol used for alarm communication to HMIs EGD protocol for application variable communication with CIMPLICITY® HMI and Series 90-70 PLCs Ethernet Modbus® protocol supported for communication between controller and third-party DCS
EPMC Ethernet Interface (three ports)	Twisted pair 10BaseT/100BaseTX, RJ-45 connectors: TCP/IP protocols used to communicate between controllers and I/O packs
COM ports	Two micro-miniature 9-pin D connectors: COM1 Reserved for diagnostics, 9600 baud, 8 data bits, no parity,1 stop bit COM2 Not used For cabling use either: a standard 4 pair UTP cable (e.g. Ethernet cable) joined with a PC® null modem connector (GE part #342A4931ABP1) and a controller connector (GE part #342A4931ABP2) or a miniature D shell, null modem serial cable (GE part #336A3582P1), connected with a micro-miniature pigtail (GE part #336A4929G1)
Environmental Specifications	Temperature: Operating 0 to 60°C (32 to +140 ºF) Temperature: Storage -40 to +85°C (-40 to +185 ºF) Humidity: 5 to 95% non-condensing Altitude: Operating 0 to 10,000 ft. (3,000 m) Altitude: Storage 0 to 40,000 ft (12,000 m)
Power requirements	+3.3 V dc, 3.5 A typical, 4.25 A maximum +5 V dc, 150 mA typical, 300 mA maximum

Airflow requirements as measured at the output side of the heat sink must be greater than 400LFM to prevent overheating and potential damage to the board.

Modules

The IS215UCCCM04 is a module assembly that includes the IS215UCCCH4 combined with 128 MB of flash memory, 256 MB of DRAM, and the IS200EPMC.

UCCC Front View

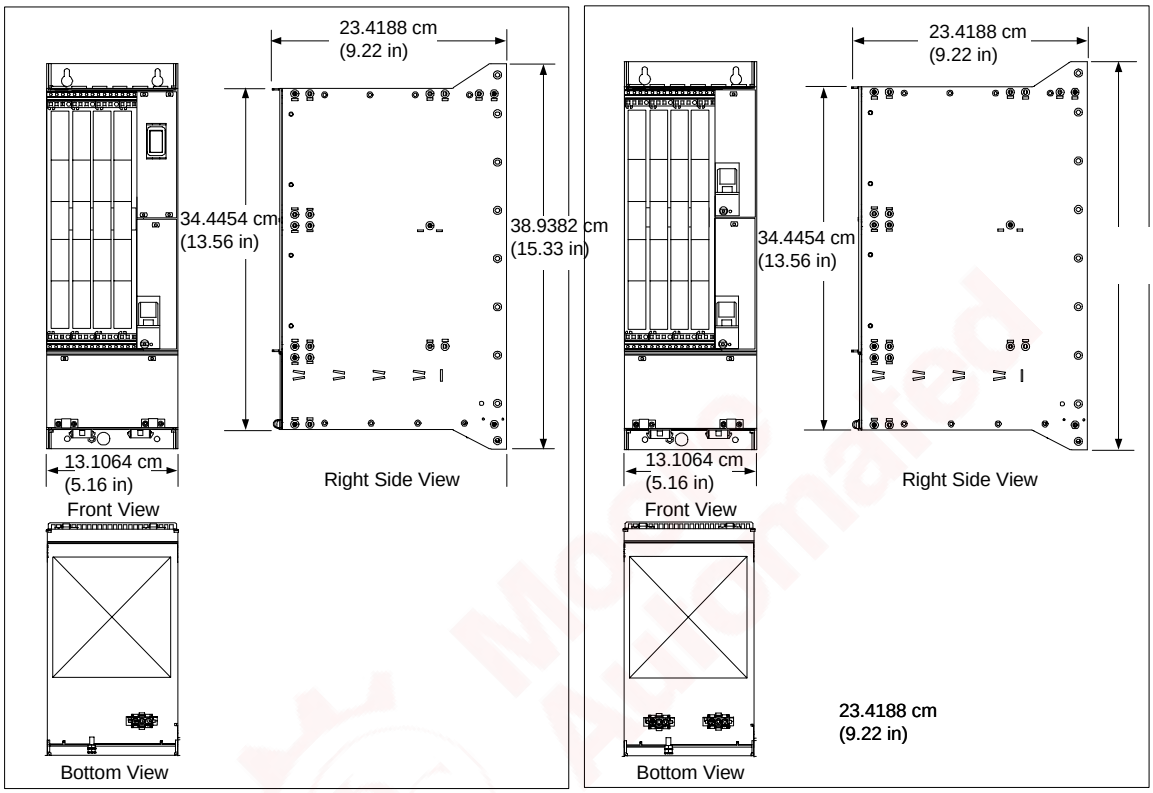


Operation

Bulk incoming power is supplied to the rack using one or two power connectors. The CPCI power supply converts the bulk input to ±12 V dc, 5 V dc, and 3.3 V dc. These voltages are distributed to the controllers and fans through the backplane.

The following rack parts are available.

Catalog #	# Power Supplies Ports	Power Inputs
336A4940CTP1	1	1
336A4940CTP2	2	2



Part 1 (Single Power Supply)

Part 2 (Dual Power Supply)

The P1 version contains a on/off switch located in the upper right panel. The switch is connected to the disable outputs pin of the power supply, which turns off power to the controllers and fans. The P2 version does not have a switch so power is removed by ejecting the power supplies, disconnecting the incoming bulk power plugs or using a remote disconnect.

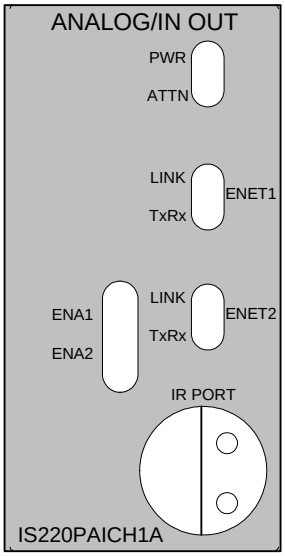
Specifications

Item	Specification
Environment	Temperature: Operating 0 to +65ºC (+32 to +149 ºF) Temperature: Storage - 40 to +85ºC (-40 to +185 ºF) Humidity: 5 to 95% non-condensing Altitude: Operating 0 to 10,000 ft. (3,000 m) Altitude: Storage 0 to 50,000 ft
Air flow provided	300 linear feet per minute
Codes and Standards	UL 508A Safety Standard Industrial Control Equipment CSA 22.2 No. 14 Industrial Control Equipment Class 1 Division 2 EN 61010-1 Safety of Electrical Equipment, Industrial Machines IEC 529 Intrusion Protection Codes/NEMA 1/IP 20

PAIC Analog Input/Output

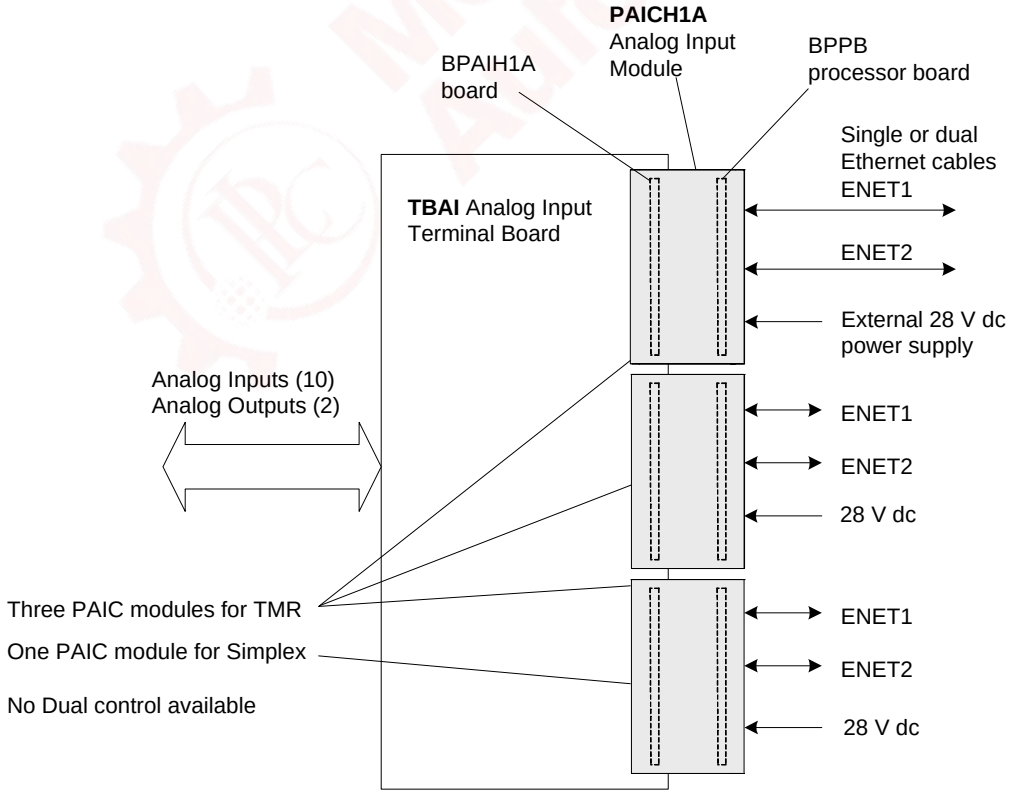
PAIC Analog Input/Output

Functional Description



The Analog Input/Output (PAIC) pack provides the electrical interface between one or two I/O Ethernet networks and an analog input terminal board. The pack contains a processor board common to all Mark* VIe distributed I/O packs and an acquisition board specific to the analog input function. The pack is capable of handling up to 10 analog inputs, the first eight of which can be configured as ±5 V or ±10 V inputs, or 0-20 mA current loop inputs. The last two inputs may be configured as ±1 mA or 0-20 mA current inputs. The load terminal resistors for current loop inputs are located on the terminal board and voltage is sensed across these resistors by the PAIC. The PAICH1 also includes support for two 0-20 mA current loop outputs. The PAICH2 includes extra hardware to support 0-200 mA current on the first output.

Input to the pack is through dual RJ45 Ethernet connectors and a three-pin power input. Output is through a DC-37 pin connector that connects directly with the associated terminal board connector. Visual diagnostics are provided through indicator LEDs, and local diagnostic serial communications are possible through an infrared port.



PAIC Block Diagram

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