9010 IOC Blade
Input Output Controller

**NEW INTEL ATOM PC104+**

A cost effective, flexible Input Output Controller in a small self contained unit with signal conditioning and isolated I/O options

- Flexible
- All-in-One
- Compact
- Cost Effective
- Alternative to VME Crate
- Industry Packs
- Mix and Match I/O

- Mini Signal Conditioning Boards
- Ethernet 10/100/1000 Mbps (Dual optional)
- EPICS; Linux; OPC; RTEMS
- PMC PCI Mezzanine Slot (for EVR)
- Intel Atom PC104+ Processor
- Fan Speed and CPU Temperature Monitoring
- Generous Cooling for Reliability
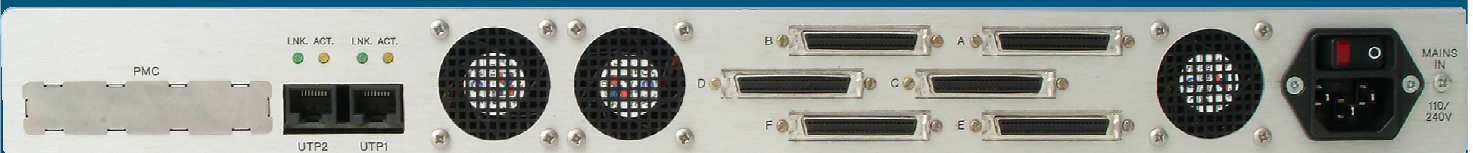
Instrumentation, Software and Systems
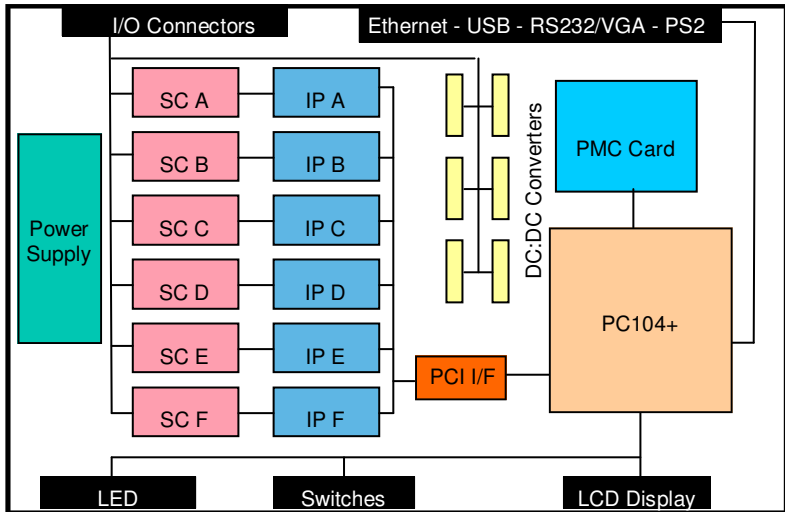
The IOC 9010 is a 1U high rack mounting Input Output Controller. The IOC has 6 industry pack slots each with a mini signal conditioning cards, one PMC slot and a PC104+ processor, with network (10/100/1000 Mbps), USB 2.0, 120GB hard disc and 1GB RAM (other options possible). As a system component it is available as an EPICS IOC running either RTEMS or LINUX, or as an OPC server. The functionality of the IOC is determined by industry packs fitted, these include ADC, DAC, I/O, Isolated I/O, RS232, RS485, Stepper Motor Controller and Scaler. In addition a PMC card slot provides access to the wide range of specialist cards.

Six sites are provided for *Industry Packs (IP)* providing a wide range of I/O functions. An open specification defines the key characteristics ensuring compatibility between suppliers.

Auto configuration scans the IP and PMC slots to determine the current I/O for rapid configuration. Drivers for Hytec IP cards will allow systems to be operational quickly.

Each industry pack has a *Signal Conditioning Board* which allows signal conditioning and plant isolation to be added. We have chosen the 50-way SCSI II connector so that inexpensive, commercially available cables can be used with Hytec's range of DIN Rail *Terminal Boards* for connection to plant wiring.

Five *cooling fans* are fitted, with automatic speed control from five temperature sensors located in the IOC. Status of fan and temperature can be monitored.

One *PMC slot* for general use. Can be used as a timing system event receiver for data acquisition triggers. The PMC slot has its own fan.
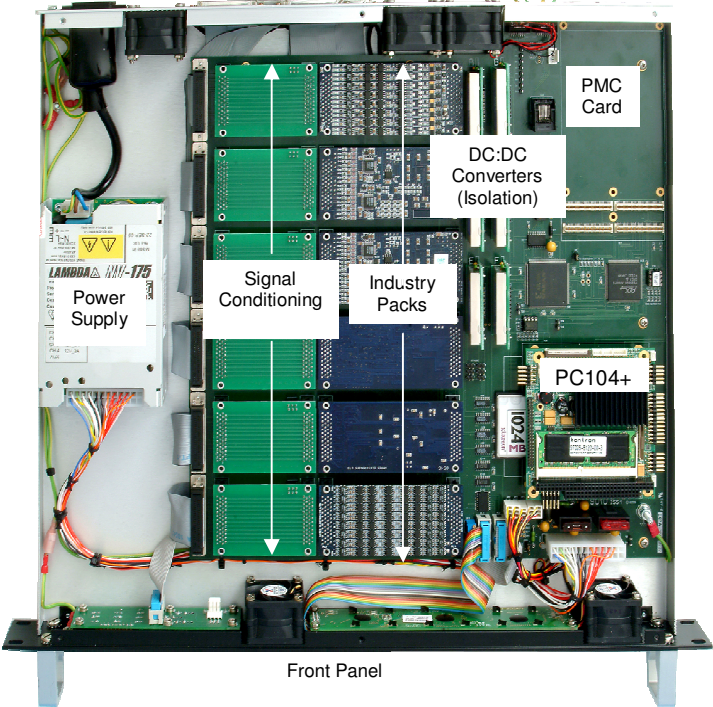
Front Panel

Software

The 9010 IOC Blade will support the following software / protocols to access hardware input/output.

Linux / EPICS

We currently supply Scientific Linux 4 or 5 with EPICS 3.14. The Linux / EPICS version of the 9010 IOC Blade on booting up, will scan all the Industry Pack (IP) slots and using the 'VITA4' standard it will identify the cards fitted. From this scan it will set up a default start up script, which will configure the cards and set up a default EPICS database. This will allow EPICS users via straight CA (Channel Access), EDM, MEDM and other EPICS utilities to immediately access the IOC's interfaces, without the need to configure.

RTEMS / EPICS

The IOC9010 blade has now been fully ported with the latest RTEMS, EPICS and Hytec IP modules device drivers. The IOC boots up by the grub bootloader and connects to a tftp server and runs off the start-up script. After this, it runs the same way as normal VxWorks IOC. Hytec implemented a PCI based carrier driver that goes with ipac module such that all of the IP device drivers are exactly the same as the VxWorks (and other OS) version.

Windows / OPC Server
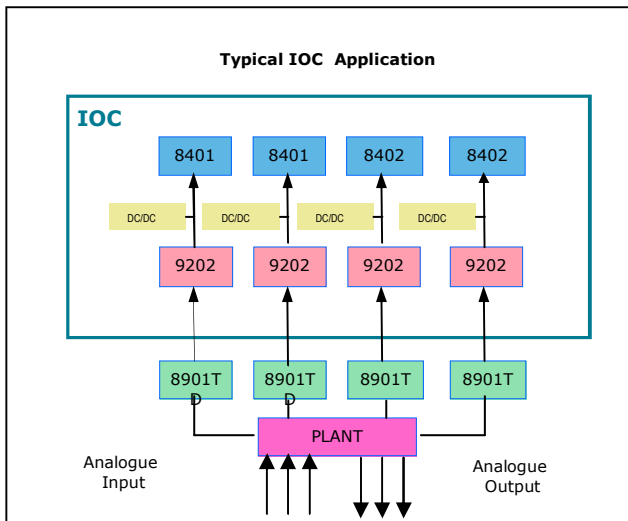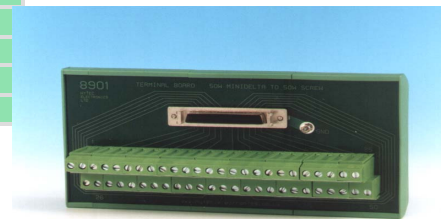
The 9010 IOC Blade will also support OPC server running on the Windows CE operating system, and the Industry Pack (IP) cards will appear as OPC devices. Any industry SCADA systems or applications with OPC client integrated would be able to easily read/write data from/to the devices. This OPC server will be fully compliant with the most current version of the OPC specification. A configuration tool (a Windows application) will be provided to aid configuration of Industry Pack cards.

Industry Packs

Industry Packs are plug-in cards based on an industry standard format and are designed to have wide application. They are very compact, 1.8 inches by 3.9 inches in size and they include an ID PROM which aids auto-configuration. They have connectors that are keyed for ease of installation. There is a broad range of products already available from a wide selection of suppliers all over the world. EPICS, Linux and Windows component device drivers are available from Hytec.

Hytec's Range of Industry Packs Cards

Cat No	Name	Iso	Description
8401.1	IP-ADC-8401	✓	8 channel 16 bit Simultaneous ADC with transient recorder memory(+/-10V)
8401.2	IP-ADC-8401-L	✓	8 channel 16 bit Simultaneous ADC with transient recorder memory (+/-5V)
8402.1	IP-DAC-8402	✓	16 channel 16 bit DAC (+/-10V) O/P with function generator memory
8402.2	IP-DAC-8402-L	✓	16 channel 16 bit DAC (+/-5V) O/P with function generator memory
8403.1	IP-MUXADC-8403.1	✓	16 channel (multiplexed) ADC 24 bit resolution with 1MB RAM
8403.2	IP-MUXADC-8403.2	✓	16 channel (multiplexed) ADC 20 bit resolution with 2MB RAM
8411	IP-ADC-8411	✓	16 channel (simultaneous) ADC 16 bit resolution
8413	IP-ADC-8413		16 channel ADC 16 bit resolution
8414	IP-ADC-8414		16 channel 16 bit ADC with Programmable Gain Ranges
8415	IP-DAC-8415		16 channel 18 bit DAC with Programmable Gain Ranges
8417	IP-SSA-8417		16 channel Simultaneous Sampling 24 bit ADC
8505	IP-DIO-8505	✓	16 channel Buffered Intelligent Digital I/O Board
8506	IP-IO-8506	✓	48-bit Digital I/O
8512	IP-SCALER-8512		16 channel Scaler 32-bit 18MHz Industry Pack
8513	IP-ENCODER-8513		4 channel Quadrature Encoder Industry Pack
8515	IP-SI-8515		8 channel RS-232 UART Industry Pack
8516	IP-SI-8516		8 channel RS-485 UART Industry Pack
8601	IP-STEPPER-8601		4 channel Stepper Motor Controller Industry Pack
		✓	= Per Card Isolation Option

Signal Conditioning Boards

The IOC has a range of mini plug-in I/O Signal Conditioning Boards, they route all I/O signals via rear panel mounted high density 50-way SCSI-2 sockets to the industry packs. Some boards include sites with the option of fitting R-C low-pass filters which can be selected by jumpers to be in or out of circuit. Additionally, optional plug-in 5V to +/-12V DC-DC converters can be used with some boards to facilitate powering the plant side of isolated analogue circuits.

Module	Type	Inputs	Outputs	I/O	DC-DC Converter	Isolated	Input Strobes	Output Strobes	Ext Clock	External Trigger	Filtering Option
9202	Analogue I/O			16	1				1	1	16
9212	Analogue Input	16			1				1	1	16
9301	Digital Input	16			1	Yes	1	1			
9303	Digital Output		16		1	Yes	1	1			
9304	Routes all signals directly to and from the I/O connectors of the IP sites.										
9305	Digital I/O	8	8		1	Yes	1	1			
9307	Digital Input	32			1	Yes					
9308	Digital Ouput		32		1	Yes					
9912	DC:DC Converter										

IOC Compatibility Chart

IP Cards	Signal Conditioning Boards						Terminal Boards						
	9202	9212	9301	9303	9304	9305	8901TD	8904	8906	8910	8911	8912	8913
8401 In	✓				✓		✓					✓	
8402 Out	✓				✓		✓				✓	✓	
8403 In		✓								✓			✓
8411 In	✓				✓		✓						
8413	✓				✓								
8414	✓				✓								
8415	✓				✓								
8417	✓				✓								
8505 In			✓		✓		✓						
8505 Out				✓	✓		✓						
8505 I/O					✓	✓	✓						
8512 In			✓		✓		✓						
8513 In					✓				✓				
8515 I/O					✓			✓					
8516 I/O					✓			✓					
8601 Out					✓				✓				

Terminal Boards

Designed to mount on standard DIN EN 50035 or OMEGA-DIN 50022-50045 DIN rail, the terminal boards offer a simple solution to the problem of connecting plant wiring to the IOC.

Wiring is terminated neatly at the terminal boards and low cost, high density SCSI-2 twisted pair cables connect to the IOC.

Some boards are available with transient protection, current sources and visual data state indication (Bi-colour LEDs). PT100 and Thermocouple blocks with cold junction compensation available. Screw terminals, LEMO sockets, Common D-type and BNC available.

Typical IOC Application

```
IOC
  8401   8401   8402   8402
  DC/DC  DC/DC  DC/DC  DC/DC
  9202   9202   9202   9202

  8901TD 8901TD 8901TD 8901TD

Analogue              Analogue
Input       PLANT     Output
```

Represented by:

Enclosure –	1U Standard 19" Rack Unit. Depth: 450mm
Supply –	100v / 260v AC Mains – 50/60Hz Fused 3A (180W Max) Switched 20W DC Cooling Fan Min. PSU O/P – +5V 20A; +12V 4A; -12V 2A; +3.3V 15A
Hardware Interfaces Supplied –	10/100/1000 Mbps (Dual 10/100 option); Real Time Clock; PMC Slot 6 x IP Slot; Temperature / Self Diagnostics / Monitoring; 2 x 2.0Mb USB; RS232
Protocols Supported –	Interactive HTML Page; Linux; EPICS; Channel Access
EPICS Records Supported –	Analog In Record; Analog Out Record; MBBI Record; MBB0 Record; Waveform Record; Scaler Record, Asyn Driver, (Others to follow)
Options -	A range of PC104+ processors, RAM and Flash memory sizes, 2.5 inch hard drive and dual-redundant power supplies can be provided.

Hytec Electronics Ltd, 5 Cradock Road, Reading, Berkshire, RG2 0JT, UK.
Phone : +44 (0)118 9757770   Fax : +44 (0)118 9757566

Email: sales@hytec-electronics.co.uk   Web: www.hytec-electronics.co.uk