DNA-ECAT™-series

EtherCAT based I/O Cubes

EtherCAT Conformance tested

- Fully EtherCAT compliant
- Flexible enough to match your application
- Compatible with UEI's popular DNA-series I/O boards
- Over 60 I/O boards available
- Cubes with 2, 4 or 8 I/O slots
- Standard Ethernet 100BaseT EtherCAT Interface
- >2 kHz update rates
- Compact:
  - 4" x 4.1" x 2.7" provides 2 I/O slots (DNA-ECAT-200)
  - 4" x 4.1" x 4" provides 4 I/O slots (DNA-ECAT-400)
  - 4" x 4.1" x 6.6" provides 8 I/O slots (DNA-ECAT-800)
- Rugged: -40°C to +85°C, 5g vibration, 100g shock
- 350 Vrms Isolation

10-Year Availability Guarantee

Core Module consists of EtherCAT NIC/CPU layer stacked on top of up to 8 I/O boards, packaged in rugged, light-weight aluminum Cube. (DNA-ECAT-400 shown)

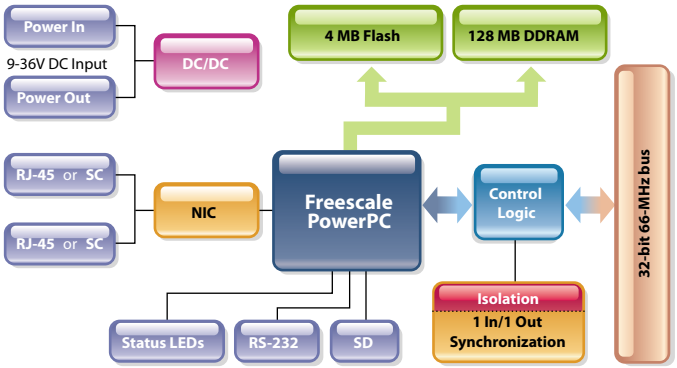
General Description:

The DNA-ECAT series of I/O chassis is based on UEI's popular DNA-series Cubes, but includes a new CPU module specifically designed to run as an EtherCAT slave. The DNA-ECAT offers all the I/O flexibility of the DNA Cubes, including compatibility with over 60 different I/O boards and also provides full EtherCAT compliance. EtherCAT developers can now harness the power and flexibility of the Cube. The EtherCAT Cube is ideally suited for a wide variety of industrial, aerospace and lab data acquisition and control applications.

In general, the Ethernet is not ideal for real-time monitoring and control response though there are a number of ways to make it real-time. The EtherCAT is a special implementation of Ethernet designed to support real-time applications. (Note: UEI's standard DNx-series Cubes and RACKs also support real-time I/O systems using our powerful DMAP/VMAP control protocols.)

The EtherCAT Cubes are 4" x 4.1" x 2.7" (2 I/O slots), 4" x 4.1" x 4" (4 I/O slots), or 4" x 4.1" x 6.6" (8 I/O slots) and are packed with power and flexibility. Each I/O Cube consists of two primary subsections: The EtherCAT CPU Module and slots for I/O boards.

Block Diagram:



EtherCAT cubes are typically configured one of two ways, with MDP or fixed configuration ESI files. MDP allows the EtherCAT master to interrogate the UEI-ECAT Cubes and automatically determine the boards installed and the functionality they provide. Alternatively, some EtherCAT masters require a single ESI file for each device. UEI supports both methods.

The CPU Module occupies the top portion of the Cube and provides the CPU, Ethernet Controller (NIC), indicator lights, configuration ports and internal power supply. It's the brains of the Cube and controls the unit's operations including the interface with the host Controller (and other Cubes) as well as supervising the activity of the I/O boards. The CPU module also includes rotary switches that set the Cube's EtherCAT explicit device identification. If the switch is set to ECAT ID 0, the unit's address is programmed by any EtherCAT master. In addition to connecting to other Cubes the DNA-ECAT series can be installed in any chain with ETG conforming devices.

The remainder of the Cube is dedicated to I/O slots. These slots are populated with the I/O modules selected to match your process or test application. With over 60 different I/O boards available we're sure to have just what your application requires. We currently offer: A/D boards to measure voltage, current, strain gages, thermocouples and more, D/A boards with outputs to ±40V or ±50 mA, Digital I/O interfaces for logic and "real-world" signal levels, counters and timers, quadrature encoder inputs, RVDT/LVDT, and Communication interfaces for RS-232, RS-422/485.

The EtherCAT master/host communicates with the cube over standard CAT5e/6/7 series cables. One selling point of EtherCAT is it does not require Ethernet switches/routers for multi-chassis connectivity. The EtherCAT network is a daisy-chain where an input cable comes from the host/master and then a output cable goes to another EtherCAT device. EtherCAT requires sub microsecond propagation for data parsing through a device so system throughput and synchronization is preserved. Other key EtherCAT specifications include: Built-in watchdog timers, Safe state default conditions and cable redundancy.

The DNA-ECAT cubes offer a wide variety of mounting options. A flange kit is available that allows the cubes to be mounted to a wall or other flat surface. Rack kits and DIN Rail kits are available to allow mounting in 19" racks or on DIN rails respectively.

Whether your application requires a few I/O channels or a few thousand, the EtherCAT cube is an ideal solution. The Cubes' unique combination of flexibility, compact size, mechanical and electrical ruggedness and ease of use is unparalleled.

Technical Specifications:

Standard Interfaces	
To Host Computer	100Base-T, standard RJ-45 connector
Daisy chain output	100Base-T, standard RJ-45 connector
Config/General	RS-232, provided on 15-pin HD Dsub
EtherCAT Schema	ESI Schema 1.14 (call for previous version support details)
I/O Slots Available	
DNA-ECAT-200	EtherCAT Cube with 2 I/O slots
DNA-ECAT-400	EtherCAT Cube with 4 I/O slots
DNA-ECAT-800	EtherCAT Cube with 8 I/O slots
Performance	
Distance from host	100 meters max, CAT5e cable
Data update rate	> 2 kHz
Environmental	
Temp (operating)	Tested to -40 °C to 85 °C
Temp (storage)	-40 °C to 100 °C
Humidity	0 to 95%, non-condensing
Vibration	
(IEC 60068-2-64)	10–500 Hz, 5 g (rms), Broad-band random
(IEC 60068-2-6)	10–500 Hz, 5 g, Sinusoidal
Shock	
(IEC 60068-2-27)	100 g, 3 ms half sine, 18 shocks at 6 orientations 30 g, 11 ms half sine, 18 shocks at 6 orientations
Altitude	70,000 feet, maximum (120,000 feet optional)
Physical Dimensions	
DNA-ECAT-200	4.1" x 4.0" x 2.7" includes two I/O slots
DNA-ECAT-400	4.1" x 4.0" x 4" includes four I/O slots
DNA-EACT-800	4.1" x 4.0" x 6.6" includes eight I/O slots
Power Requirements	
Voltage	9 - 36 VDC (AC adaptor included)
Power Dissipation	4 W at 24 VDC (not including I/O boards)
Reliability	
MTBF	>350,000 hours

DNA-ECAT Advantages:

Easy to configure and deploy

- Over 60 different I/O boards available
- Built-in signal conditioning
- Easily distributed
- Flange kit for mounting to wall/flat surface
- DIN rail and Rack Mount kits
- Standard "Off-the-shelf" products and delivery

True Real-time Performance

- 500 µsec updates guaranteed

Compact Size:

- 4" x 4.1" x 2.7" or 4" x 4.1" x 4" or 4" x 4.1" x 6.6" cubes
- up to 200 analog inputs per cube
- up to 256 analog outputs per cube
- up to 384 digital I/O bits per cube

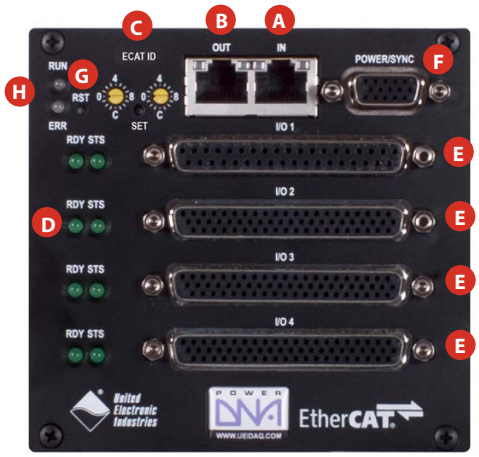
Low Power:

- Less than 15 watts per cube
- AC, 9-36 VDC or battery powered

Rugged and Industrial:

- All Aluminum construction
- Operationally tested from -40°C to 85°C
- Vibration tested to 5 g (operating)
- Shock tested to 100 g (operating)
- All I/O isolated from Cube and host PC
- Operation to 70,000 feet

DNA-ECAT Series Cube Interface:



A EtherCAT Input Connector

Ethernet in from host PC or from an earlier Cube in the EtherCAT network.

B EtherCAT Output Connector

EtherCAT output connector is connected to the next EtherCAT device in the chain (if applicable). It also serves as the input connector in a redundant EtherCAT network in case of a failure upstream.

C EtherCAT Explicit Device ID Switches

Allows the Cube to be set at an explicit ID of 1 through 65535. If ECAT ID 00 is selected, the unit is auto-enumerated by your EtherCAT master.

D I/O Board Status LEDs

These two green lights give a visual indication of the status of each I/O layer.

RDY - *Ready* • **STS** - *Status (varies per I/O board installed)*

E I/O Board Slots

Cubes provide either 2, 4 or 8 I/O slots. Boards installed in the I/O slots perform the various analog, digital and communications functions you need for your specific application. Your signals may be connected directly to the I/O boards via your custom cabling or take advantage of our wide variety of easy-to-use, external screw terminal panels. Boards ordered with your cube are factory installed. It is also a simple task to add boards or reconfigure a cube in the field

F Power Connector

Power-In, 9-36V DC from the DNA-PSU-100-EC universal AC power adaptor, (included with each Cube) or a user-supplied power source.

G Reset Button

When held in for 2 seconds or more, the reset button reboots the Cube.

H EtherCAT Status LEDs

Run: Off-Init mode, Blinking-PreOp mode, Single Flash- SafeOp Mode, On-Operating mode.

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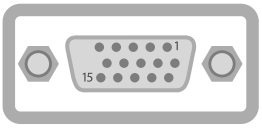
Pinout Diagrams:



1 - +Vin	6 - +Vin	11 - +Vin
2 - Gnd	7 - +Vin	12 - Gnd
3 - RS-232 RX	8 - Gnd	13 - Gnd
4 - Rsvd*	9 - RS-232 TX	14 - Rsvd*
5 - Rsvd*	10 - Rsvd*	15 - Rsvd*

* Rsvd pins should be left open/disconnected

Ordering Guide:

Part Number	Description
EtherCAT Cubes (includes universal AC power supply, serial and Ethernet cables)	
DNA-ECAT-200	EtherCAT Cube with 2 I/O slots
DNA-ECAT-400	EtherCAT Cube with 4 I/O slots
DNA-ECAT-800	EtherCAT Cube with 8 I/O slots
Accessories	
DNA-DR2	Rear-mount DIN rail clip for DNA-ECAT-200 Cube
DNA-DR5	Rear-mount DIN rail clip for DNA-ECAT-400 Cube
DNA-DR9	Rear-mount DIN rail clip for DNA-ECAT-800 Cube
DNA-FLANGE	Bottom-mount flange assembly allows Cube to be mounted to any flat surface
DNA-19RACKW	19" rackmount enclosure with DIN rail attached