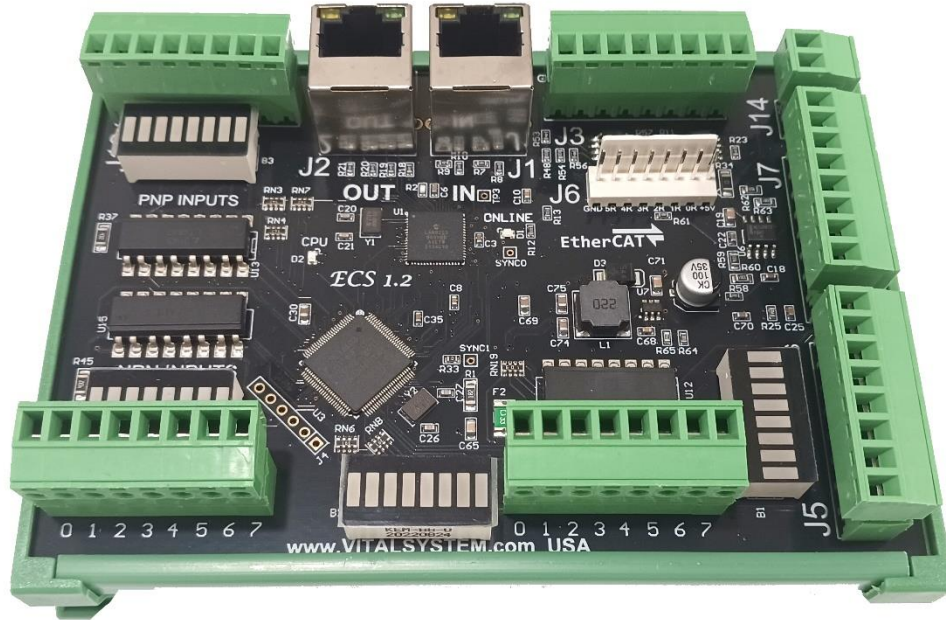


ECS1v2 EtherCAT Slave IO Device



User Guide Document Draft (Updated December 12, 2022)



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Atlanta, Georgia USA

For more information please visit the product web page:
<http://www.vitalsystem.com/ethercat>

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License Agreement

Before using the HiCON and accompanying software tools, please take a moment to go through this License agreement. Any use of this hardware and software indicate your acceptance to this agreement.

It is the nature of all machine tools that they are dangerous devices. In order to be permitted to use HiCON on any machine you must agree to the following license:

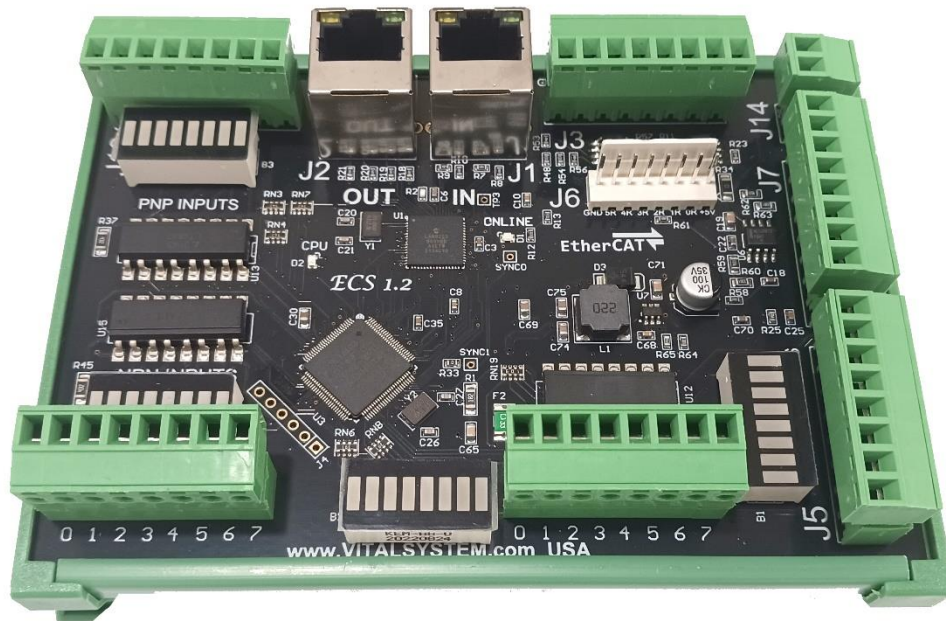
I agree that no-one other than the owner of this machine, will, under any circumstances be responsible, for the operation, safety, and use of this machine. I agree there is no situation under which I would consider Vital Systems, or any of its distributors to be responsible for any losses, damages, or other misfortunes suffered through the use of the HiCON board and its software. I understand that the HiCON board is very complex, and though the engineers make every effort to achieve a bug free environment, that I will hold no-one other than myself responsible for mistakes, errors, material loss, personal damages, secondary damages, faults or errors of any kind, caused by any circumstance, any bugs, or any undesired response by the board and its software while running my machine or device.

I fully accept all responsibility for the operation of this machine while under the control of HiCON, and for its operation by others who may use the machine. It is my responsibility to warn any others who may operate any device under the control of HiCON board of the limitations so imposed.

I fully accept the above statements, and I will comply at all times with standard operating procedures and safety requirements pertinent to my area or country, and will endeavor to ensure the safety of all operators, as well as anyone near or in the area of my machine.

WARNING: Machines in motion can be extremely dangerous! It is the responsibility of the user to design effective error handling and safety protection as part of the system. VITAL Systems shall not be liable or responsible for any incidental or consequential damages. By using the HICON motion controller, you agree to the license agreement.

1. Overview



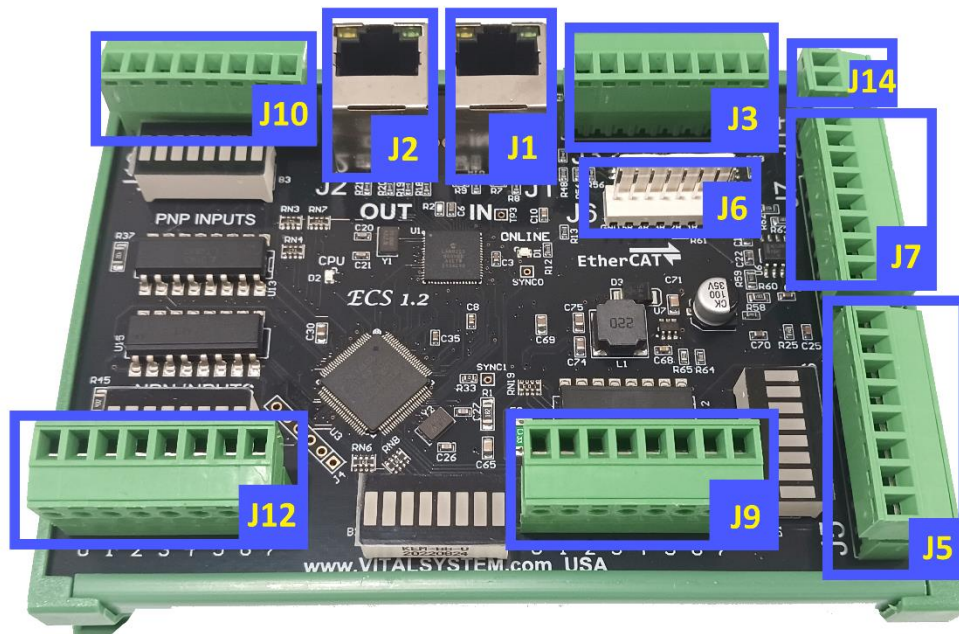
The ECS1v2 is the latest in our line of HiCON EtherCAT Devices. It is an EtherCAT slave device with a wide range of functionality such as its large amount of digital IO and Encoder capabilities, analog inputs and outputs, and a relay expansion header. The ECS1 can be paired with any EtherCAT master using the ESI configuration file. ECS1 can be used with Vital Systems ECO1 EtherCAT Master controller to create a powerful and flexible Mach4-based CNC control system.

Key Features

- Multifunction EtherCAT Slave
- 32 Optically Isolated 24V Digital IO (8 NPN In, 8 PNP In, 8 NPN Out, 8 PNP Out)
- 4 Analog Inputs (0-5V) and 2 Analog Outputs (0-10V)
- 2 Single Ended Encoder Channels
- Expansion header for 6 relay board
- ESI File Available

2. ECS1v2 Hardware Interface

The ECS1v2 has several interface ports and indicator LEDs. The figure below shows a top view of the ECS1v2 board with interface ports and other components:



J1	EtherCAT Ethernet Interface IN
J2	EtherCAT Ethernet Interface OUT
J3	2 Single-Ended Encoder Channels
J5	8 NPN Outputs (300mA max per output)
J6	Relay Expansion Header (Up to 6 relays using expansion board)
J7	4 Analog Inputs (0-5V) and 2 Analog Outputs (0-10V)
J9	8 PNP Outputs (300mA max per output)
J10	8 Optically Isolated 24V PNP Inputs
J12	8 Optically Isolated NPN Inputs
J14	Power Input, +24VDC

2.1. Power Supply (J14)

J14 Pin#	Function
+	+12 - 28VDC (Polarity Protected)
-	Ground

- Unit requires at least 5W power input.
- If more devices are connected to the unit, a bigger power supply may be required.

2.2. Ethernet Ports (J1, J2)

J1 & J2 EtherCAT Interface Ethernet Ports:

The ECS1v2 controller has Ethernet Ports for connecting to either other Slaves or an EtherCAT Master using EtherCAT protocol. The ECS1v2 supports both 10 MBit and 100 Mbit network speeds. J1 should be connected to the master side.

2.3 Encoders (J3)

J3 Single-Ended Encoder Pin Assignments:

The ECS1v2 provides two 5V single-ended Encoder channels.

J3 Pin#	Function
+5V	+5V Source
1A	A Encoder Channel0
1B	B Encoder Channel0
1Z	Z Encoder Channel0
2A	A Encoder Channel1
2B	B Encoder Channel1
2Z	Z Encoder Channel1
GND	Ground

2.4. I/O Ports (J5, J6, J7, J9, J10, J12)

J5 NPN Digital OUTPUTS Pin Assignments:

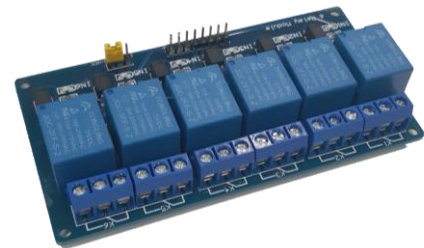
J9 Pin#	Function
1	Digital NPN Output 0
2	Digital NPN Output 1
3	Digital NPN Output 2
4	Digital NPN Output 3
5	Digital NPN Output 4
6	Digital NPN Output 5
7	Digital NPN Output 6
8	Digital NPN Output 7

NOTE: Max O/P current: 300mA.

These output pins provide 24V power on the terminals when not activated by the software.

J6 Relay Expansion Header Pin Assignments:

Pin#	Function
1	+5V
2	Relay N.O. 0
3	Relay N.O. 1
4	Relay N.O. 2
5	Relay N.O. 3
6	Relay N.O. 4
7	Relay N.O. 5
8	GND



Relay Expansion Board
(Compatible with J6)

J7 Analog Inputs (0-5V) and Analog Outputs (0-10V) Pin Assignments:

Pin#	Function
+5V	+5V
AN0	0-5V Analog In 0
1	0-5V Analog In 1
2	0-5V Analog In 2
3	0-5V Analog In 3
S0	0-10V Analog Out 0
S1	0-10V Analog Out 1
GND	GND

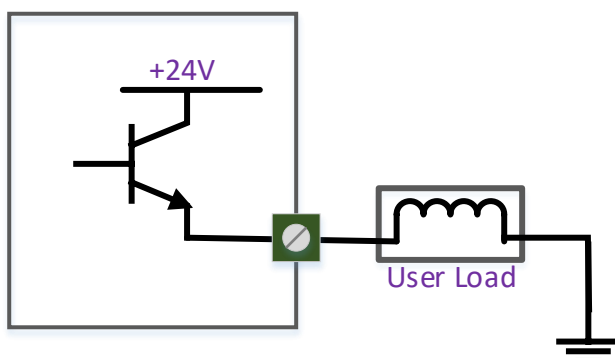
J9 (24V) Digital PNP OUTPUTS Pin Assignments:

J9 Pin#	Function
1	Digital PNP Output 0
2	Digital PNP Output 1
3	Digital PNP Output 2
4	Digital PNP Output 3
5	Digital PNP Output 4
6	Digital PNP Output 5
7	Digital PNP Output 6
8	Digital PNP Output 7

NOTE: Max O/P current: 300mA.

These output pins provide 24V power on the terminals when activated by the software.

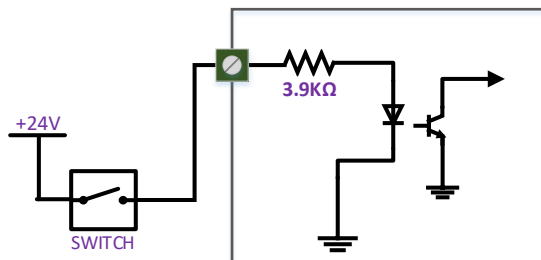
J9 PNP Output Connection Method



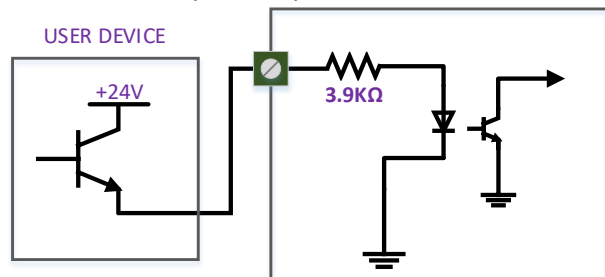
J10 (24V) PNP Optically Isolated Digital INPUTS Pin Assignments:

J10 Pin#	Function
1	Digital Input 0
2	Digital Input 1
3	Digital Input 2
4	Digital Input 3
5	Digital Input 4
6	Digital Input 5
7	Digital Input 6
8	Digital Input 7

PNP Input Setup Method 1



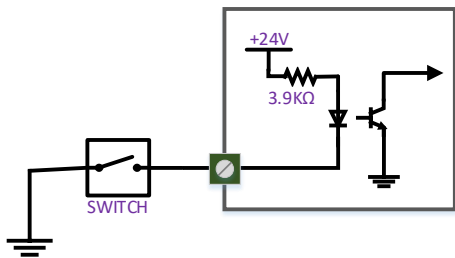
PNP Input Setup Method 2



J12 (24V) NPN Optically Isolated Digital Inputs Pin Assignments:

J12 Pin#	Function
8	Digital Input 8
9	Digital Input 9
10	Digital Input 10
11	Digital Input 11
12	Digital Input 12
13	Digital Input 13
14	Digital Input 14
15	Digital Input 15

J12 NPN Input Setup Method 1



J12 NPN Input Setup Method 2

