

Crypto Mining

*The OEM and Installers Guide to Control
Components for Cryptocurrency Mining
Operations*



Table of Contents

1

About c3controls.....

2

2

Glossary of Crypto Terms.....

3

3

Crypto Mining Basics.....

4

4

Mining Isometrics.....

5

5

Mining Application Overview.....

6

6

Crypto Mining Control Components.....

7

7

c3controls Product Portfolio.....

8

8

White Papers.....

9

9

Why choose c3controls.....

10

About c3controls

Since 1976 c3controls (c3controls.com) has provided OEMs and electrical equipment builders a comprehensive portfolio of industrial control products that meet the most demanding applications. By maintaining strict control over the development and manufacturing of all products, c3 can provide customers extraordinary value through unmatched quality, competitive pricing, same-day shipping and a lifetime product warranty. This vertically integrated approach coupled with a direct sales model brings c3 closer to the end-user, fostering a degree of innovation that leads the industry.



Glossary of CryptoTerms

Altcoin:

A term used to describe any cryptocurrency other than Bitcoin - the original and most valuable coin.

ASIC (Application-Specific Integrated Circuit):

Computerized hardware specifically designed to mine cryptocurrency more efficiently than other miners.

Blockchain:

The technology driving cryptocurrency. Sequential data blocks (transactions) form a public and permanent digital ledger.

Block Reward:

Coins created and awarded to those who successfully verify a block in the blockchain.

Cryptocurrency:

A digital, encrypted and decentralized medium of exchange.

Crypto Mining:

The competitive process of verifying transactions using a proof of work consensus mechanism. The higher the computing power the greater the chance of earning a block reward.

Hash:

A unique mix of letters and numbers used to encrypt and secure a selection of data. The computing power of a crypto network is measured in hashes per second, or hash rate.

Immersion Cooling:

The process of cooling mining hardware by submerging the equipment in a thermal, but not electrical, conductive liquid. This is an increasingly popular alternative to air cooling.

Miner:

Refers to the hardware, or hardware operator(s), attempting to contribute to the verification of the blockchain and earn a block reward. Miner options include ASICs, central/graphic processing units (CPU/GPU), field programmable gate arrays (FPGA) and cloud mining.

Mining Container:

A preassembled, portable Mining Farm where a shipping container/trailer houses multiple mining rigs within and can be moved when electricity rates change.

Mining Farm:

Often a room or warehouse with mining rigs that act as a datacenter dedicated to mining cryptocurrency.

Mining Pool:

A group of mining operators who combine their computational resources over a network to increase their chance at a block reward (which is split between the pool members).

Mining Rig:

A combination of individual miner devices GPUs arranged for maximum computing power and hash rate.

Node:

Any computer or device that is connected to the blockchain network. A node does not have to mine cryptocurrency.

Proof of Stake (PoS):

A consensus mechanism in some blockchains in which validators are chosen at random based in part on how many coins they have staked in the network. A correct verification earns a block reward but a fraudulent verification puts a validators stake at risk of being lost. Compared to PoW, PoS is more energy efficient yet less decentralized and secure.

Proof of Work (PoW):

The decentralized consensus mechanism employed by many blockchains. Miners must prove that they have computed the correct hash, out of trillions of possible combinations, needed to add a block to the blockchain and earn a block reward.

Solar + Storage Mining:

A more energy efficient form of crypto mining in which mining operators store and utilize renewable energy in order to reduce electricity costs.

Wallet:

A device or program that secures the public/private keys needed to access, send and receive cryptocurrency.



Crypto Mining Basics

The cryptocurrency industry has seen exponential growth since the original Bitcoin network was introduced in 2009 as a digital, encrypted and decentralized medium of exchange. Today, over 20% of Americans have used a cryptocurrency, more and more businesses are accepting crypto as payment and the amount of money in the blockchain is similar to that of major financial institutions. It's time to take crypto seriously and central to its adoption and growth is the process of cryptocurrency mining.

Crypto mining is the competitive process of verifying and adding to a ledger of digital transactions (the blockchain) using a proof of work consensus mechanism. Specialized computers known as ASIC miners are used to generate trillions of guesses to a cryptographic puzzle. Computing the correct answer or 'hash' allows a miner to create a block and earn newly generated coins.

This process of mining crypto requires a huge amount of electricity — just one ASIC miner draws over 3000 watts of power and there can be hundreds of thousands of these machines in a single mining operation. This is why mining operators set up in areas with low electricity rates. Furthermore, an emerging trend in the crypto mining industry is finding more efficient ways of managing electricity, such as by utilizing renewable resources.

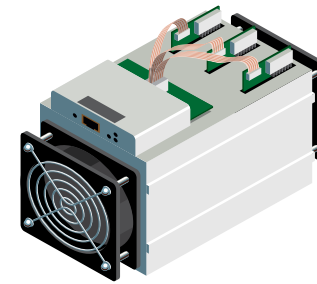
Managing electricity is where c3controls comes in — that's what we do! For over 45 years, c3controls has been a leading manufacturer of quality electrical controls. We strictly control the manufacturing process to provide world class products that you can install and forget about for years to come. By not sourcing any major components from China, we operate more efficiently and respond to market conditions quicker. That means faster delivery for electrical control products serving:

- Mining Farms (Data Centers)
- Mining Containers
- Cooling Systems
- Control Panels
- & more!

With over fifteen million available product configurations and our own UL508A panel shop, c3controls has the resources you need to capitalize on all your crypto mining opportunities!

Mining Isometrics

Here's a look at some common hardware arrangements for crypto mining:



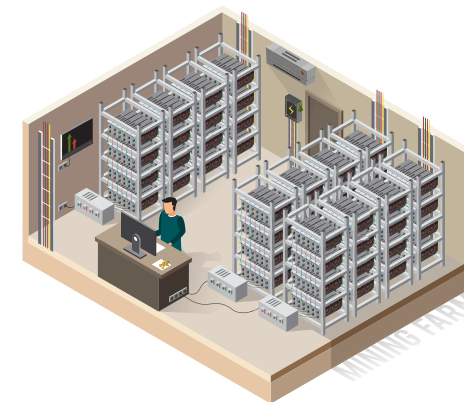
ASIC Miner

Computerized hardware specifically designed to mine cryptocurrency more efficiently than other miners.



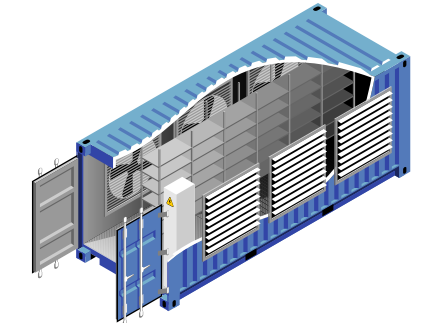
Mining Rig

A combination of individual miner devices (GPUs pictured) arranged for maximum computing power and hash rate.



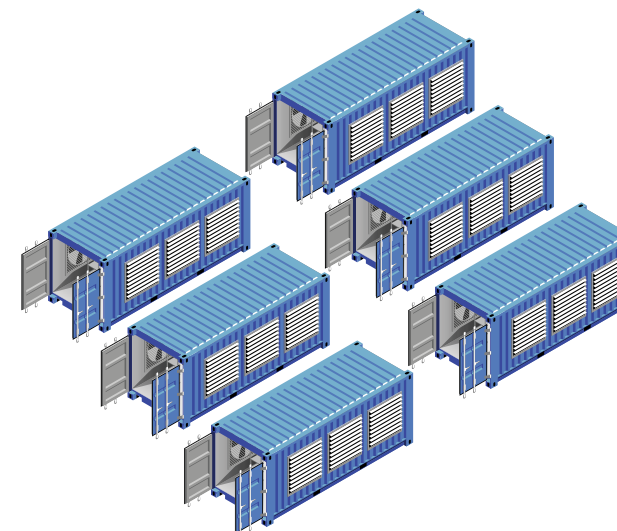
Mining Farm

Often a room or warehouse with mining rigs that act as a datacenter dedicated to mining cryptocurrency.



Mining Container

A preassembled, portable Mining Farm where a shipping container/trailer houses multiple mining rigs within and can be moved when electricity rates change.

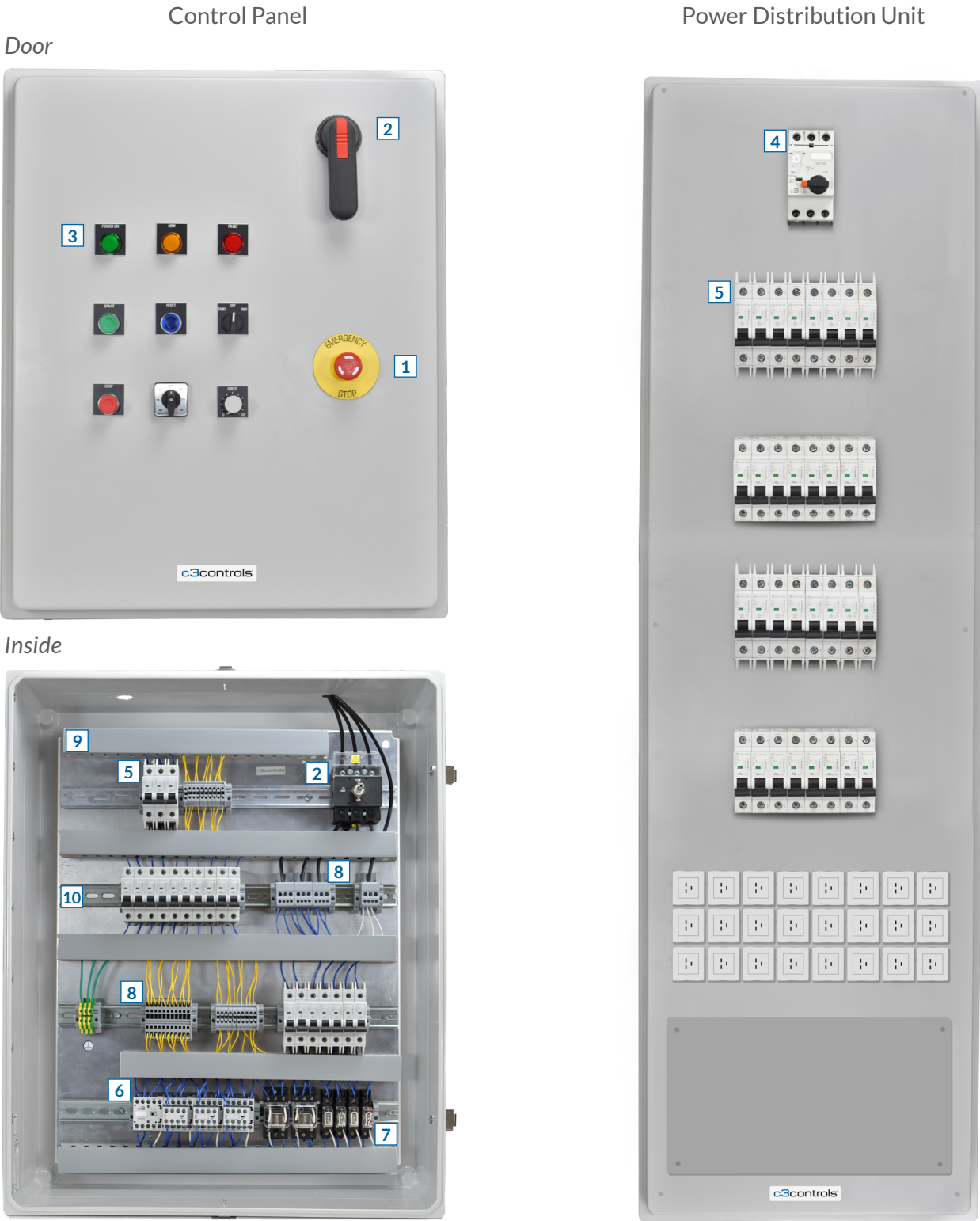


Container Farm

A group of mining containers arranged for large-scale crypto mining.

-Mining Application Examples and Control Components

c3controls has component and finished solutions for all your crypto mining needs.



1		22mm IEC E-Stops	Non-Illuminated and Illuminated versions	UL Listed Polycarbonate enclosure rated for Type 1, 2, 3, 3R, 4/4X, 12, 13, and IP66	Meets EN418 Safety of Machinery global compliance standards	Operating temperatures from -40 to +55° C (-40 to + 131° F)	UV and corrosion resistant
2		UL 508 Disconnect Switches	Door mount, panel-base mount, and panel mount with integral operator	Certified for use in Manual Motor Controller applications suitable as Motor Disconnects	16 - 125 Amps in 3-, 4-, and 5-pole configurations	Motor loads up to 40HP @ 480V (55kW @ 400V)	Operating handles rated for Type 1, 2, 3, 3R, 4/4X, 12, 13, IP55, and IP65
3		Pilot Devices	Modular range of 30mm, 22mm, 16mm, and 13mm	Type 1, 2, 3, 3R, 4/4X, 12, and 13	Non-Illuminated, Illuminated and Keyed Operators in both maintained and momentary operations	Color-coded snap-on contact blocks with angled captive screws and pressure plates	Full voltage, multi-voltage, resistor, and dual input light units in a wide range of voltages up to 600VAC/VDC
4		Motor Protection Circuit Breakers	Multi-Function: Manual Motor Controller, Motor Disconnect, Group Motor Installations	50kA SCCR @ 480V	Self-protected Type E up to 50kA @ 460V	FLC up to 32 Amps	Trip Class 10 Thermal and Magnetic Elements
5		Miniature Circuit Breakers	UL 489 & UL 1077	1, 2 and 3 Pole combinations	10kA SCCR @ 480V/277VAC	Current ratings up to 63 Amps	B, C and D curve ratings
6		Miniature Contactors and Control Relays	SCCR of 100kA @ 480V and 600V with Class J fuses	IP20 guarded terminals	Both AC and DC operating coils	28% reduction in panel area compared to standard devices	Dual IEC and NEMA terminal markings
7		General Purpose Relays	Octal base, square base, flange mounted and miniature	Only 14mm wide	Transparent housing	Pole combinations available in SPDT, DPDT, 3PDT and 4PDT	Carrying current rating 5A-25A
8		IEC Terminal/Power Blocks	Screw Clamp, Spring Clamp, and Miniature	5mm - 25mm widths	25 - 230 Amps	Feed Through, Ground, Multi-Conductor, Double & Triple Level, Fuse holder, Power Distribution, and more	DIN Rail mounting; snap-on, snap-off assembly
9		Wire / Cable Duct	13 Selectable dimensions from 25mm wide up to 80mm, and up to 2m in length	Narrow and Wide Slot	Rigid "U" shaped duct with non-slip cover in gray or white	Optional adhesive backing	
10		DIN Rail	35mm rails in steel and aluminum	1m (3.28ft) or 2m (6.56ft) lengths	Each simply fasten by screws to the mounting surface	Standard package quantities, or pallet options available	

For illustration purposes only. Other c3controls solutions may be applicable depending on your application design requirements.

Product Portfolio

Our 15 million+ product configurations deliver durability and reliability—even in the most punishing environments—meeting and exceeding global standards for quality and safety.



DISCONNECT SWITCHES




ENCLOSED DISCONNECT SWITCHES



MINIATURE CIRCUIT BREAKERS



DEFINITE PURPOSE CONTACTORS



CONTACTORS



MINIATURE CONTACTORS & CONTROL RELAYS



OVERLOAD RELAYS



DIRECT-ON-LINE STARTERS
CONTACTOR + OVERLOAD RELAY




ENCLOSED DIRECT-ON-LINE STARTERS
CONTACTOR + OVERLOAD RELAY



MOTOR PROTECTION CIRCUIT BREAKERS



ENCLOSED MOTOR PROTECTION CIRCUIT BREAKERS



DIRECT-ON-LINE STARTERS
MOTOR PROTECTION CIRCUIT BREAKER + CONTACTOR



ENCLOSED DIRECT-ON-LINE STARTERS
MOTOR PROTECTION CIRCUIT BREAKER + CONTACTOR




30MM INDUSTRIAL PILOT DEVICES



30MM PILOT DEVICES FOR HAZARDOUS LOCATION




22MM IEC PILOT DEVICES



WORLD TOWER LIGHTS



CAM SWITCHES



22MM NEMA PILOT DEVICES



16MM PILOT LIGHTS



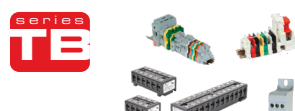
13MM PILOT LIGHTS




CONTROL STATION ENCLOSURES



ENCLOSED UL508A COMBINATION MOTOR STARTERS



TERMINAL BLOCKS



TERMINAL BLOCK RELAYS



ELECTRONIC TIMING RELAYS



GENERAL PURPOSE RELAYS



WIRING DUCT

White Papers

Product professionals AND subject experts!
Check out c3controls' extensive library of white papers:



Planning a Cryptocurrency Mining Operation

Planning a Cryptocurrency Mining Operation

Crypto mining equipment runs hot, and cooling is a major reason that utility expenses can run high. That's why some of the world's largest crypto mining operations are located in countries with temperate summers and cold winters.

[READ WHITEPAPER](#)



The Smart Grid & Grid Modernization

The Smart Grid & Grid Modernization

The increasing demand for electric power continues to accelerate. Read our paper for an overview of what is needed to strengthen the Smart Grid and ensure that the future electricity needs for the US are fulfilled.

[READ WHITEPAPER](#)




Understanding Energy Storage Systems

Understanding Energy Storage Systems

In this issue, learn how Energy Storage could help the US power grid operate more efficiently, reduce brownouts during peak demand, and allow for more renewable resources to be used, becoming net-zero carbon emissions by 2035.

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Pilot Devices for Indication and Actuation

Pilot Devices for Indication and Actuation

Pilot devices are types of selector switches, pushbuttons, pilot lights, signal beacons, and toggle switches and are used in industrial applications where human-to-machine interface is required.

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A Quick Guide: UL 489 or UL 1077 in Control Panels and Equipment

UL 489 or UL 1077 in Control Panels and Equipment – A Quick Guide

How do I know when to use UL 1077 or UL 489 breakers? The answer is seemingly simple, but like most simple questions, there is usually some confusion.

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UL508A Control Panel Design Considerations

UL508A Control Panel Design Considerations

Find out the basic design considerations you need to know when building a UL 508A panel.

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10.




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