# Utilities

*The OEM and Installers Guide to Control Components for Electrical Utilities*

c3controls.com

c3controls®
Everything under control.

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# 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 Terms

**Circuit Breaker:**
A device that protects electrical circuits by automatically interrupting current in the event of an overload or short circuit.

**Control Panel:**
An enclosure with an assembly of switches, indicators, and other devices used to operate and monitor electrical equipment.

**Cooperative Utilities (Co-ops):**
Non-profit organizations owned and operated by their user-members who own and govern the utility.

**Data Center:**
A facility equipped with computing and telecommunications equipment to process, store, and manage large amounts of data.

**Distribution:**
The final stage of delivering electricity to end-users, involving the lower-voltage movement of power through local networks, substations, and transformers to homes and businesses.

**Electrical Utilities:**
Companies or entities that generate, transmit and distribute electricity to residential, commercial and industrial consumers.

**Energy Storage System:**
Technology that captures and stores energy for later use to help balance supply and demand.

**Federal Energy Regulatory Commission (FERC):**
A U.S. government agency responsible for regulating the interstate transmission of electricity.

**Fuse:**
A device used for overcurrent protection that contains a wire or filament that melts when current exceeds a certain level to break the circuit and protect the equipment.

**Generation:**
The process of producing electricity through the conversion of an energy source into electrical power.

**High Density Terminal Block:**
A compact device designed to facilitate the organization and connection of numerous electrical wires or cables.

**Investor-Owned Utilities (IOUs):**
Utility companies that are privately owned by shareholders or investors, operating for profit.

**Load:**
The amount of electricity consumed by all devices and systems connected to a power grid. Base load represents minimum demand and peak load refers to maximum demand.

**Microgrid:**
A localized, smaller-scale electrical grid that can operate independently or in conjunction with the main power grid.

**Pilot Devices:**
Devices such as lights, buttons and switches that are used in control systems to initiate or indicate specific functions.

**Power Grid:**
A large-scale network of interconnected electrical components that facilitates the generation, transmission and distribution of electricity across a region.

**Public Utility Districts (PUDs):**
Government-owned entities that provide utility services to members of a certain area for community benefit.

**Relay:**
A device used to control larger electrical loads by detecting abnormal conditions in a circuit and initiating proper control actions.

**Renewable Energy:**
Energy derived from naturally replenishing sources, such as solar or wind, for minimal environmental impact.

**Smart Grid:**
A digitally enhanced electrical grid that utilizes modern communication and control technologies to optimize utility processes.

**Substation:**
A facility with a transformer and switchgear combination used to distribute electricity at different voltage levels.

**Switchgear:**
A set of low, medium, or high voltage electrical equipment that is used to control, protect, and isolate electrical circuits.

**Transformer:**
A device that changes voltage levels and transfers electricity from one circuit to another.

**Transmission:**
The movement of electricity over long distances through power lines and infrastructure from generation sources to distribution networks or directly to consumers.

# Utilities Overview

The electrical utilities industry is the backbone of modern society, delivering power for everything from smartphones to factories. It encompasses a complex web of activities, from generating electricity at power plants to transmitting it across vast distances and distributing it to individual consumers. This electrical ecosystem faces the constant challenge of delivering reliable, affordable power to homes and businesses.

The industry has embarked on a dramatic transformation. The rise of renewable energy sources is disrupting traditional fossil fuel-based generation, driven by concerns over costs and sustainability. This, coupled with rapidly increasing demand for electricity due to electric vehicles and smart technologies, is pushing utilities to innovate. As electrical utility infrastructure is designed, manufactured and installed, there must be a focus on trends and challenges such as:

- **Grid Modernization:** In conjunction with new developments, aging infrastructure must be replaced for a more resilient and adaptable electrical grid as demand is projected to triple by 2050.
- **Decentralization:** Solar panels, energy storage and microgrids are blurring the lines between consumer and producer, changing the traditional utility model and necessitating smart grid technologies.
- **Cybersecurity:** As utilities become more reliant on automation and digital systems, they become targets for cyberattacks and must have proactive risk management to avoid power outages.

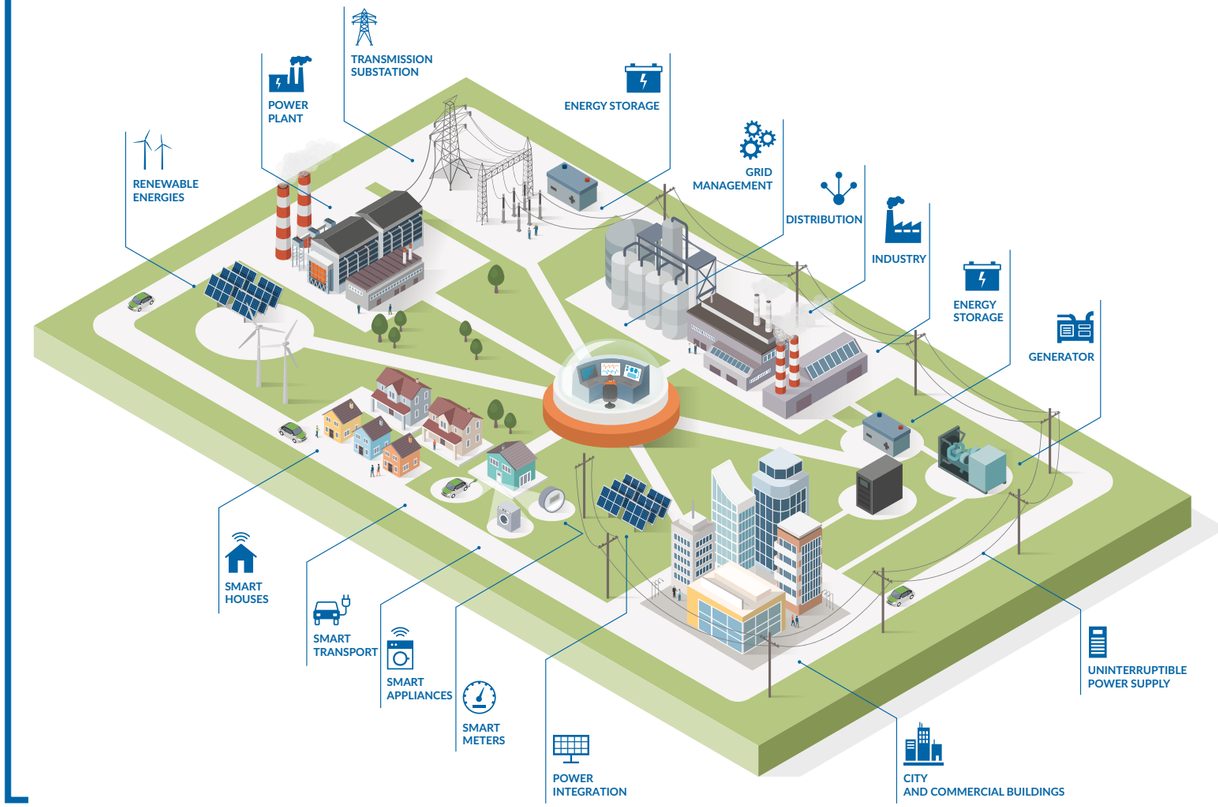
The future of the electrical utilities industry lies in embracing these trends and challenges head-on. This will require collaboration between utilities, governments and original equipment manufacturers. Moving forward, OEMs must specify robust control components that provide the necessary long term reliability.

c3controls has been a leading manufacturer of electrical controls for utilities for almost 50 years. Vertical integration allows us to operate more efficiently, respond to market conditions quicker and provide fast delivery. Now is the ideal time to upgrade your electrical utility and supporting systems, and c3controls has over fifteen million product configurations, and a complete UL508A panel shop to help you succeed!



# Smart Grid Isometric

*Here's a layout of an advanced and modernized electricity generation, transmission and distribution system:*



# Electrical Utility Products

*c3controls can support all key function areas in your electrical utility application:*

## Power & Actuation

*Disconnect, control, and/or protect a circuit from a ground fault, short-circuit, or overload current.*

1

AC & DC Miniature Circuit Breakers (+ Bus Bars)

2

Disconnect Switches

3

IEC Contactors

4

Control Relays

## Human Machine Interface

*Actuated by a person to direct the operation of another device and/or indicate the status of an operating system.*

5

Pilot Devices

- 13mm
- 16mm
- 22mm IEC & NEMA
- 30mm Industrial & Hazardous Location

***Check out our industry leading 16mm lights!***

## Control Logic

*Devices that control other products in a control circuit in a logical sequence or based on a defined period of time.*

6

High Density Terminal Blocks (+ Shorting Block)

7

IEC Terminal Blocks

8

General Purpose Relays

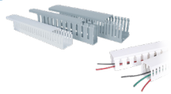
9

Industrial Power Supplies

## Panel Solutions

*Support and protect electrical components that control and monitor a number of mechanical processes.*

10



Wire Duct

11

DIN Rail

Enclosures

Electrical Panels

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

| | | | | | | |
|---|---|---|---|---|---|---|
| 1  | **AC & DC Miniature Circuit Breakers (+ Bus Bars)** | UL489 & UL1077 in 1, 2, and 3 pole configurations. Rated 60Vdc single pole and 125Vdc two pole | UL489B (DC) in 1, 2, 3 and 4 pole configurations. Rated 250Vdc per pole for up to 1000Vdc | Compact 17.5mm per pole construction with both thermal and magnetic trip elements | Operating current configurations from 0.5 to 63 Amps | 10kA SCCR on all constructions |
| 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  | **IEC Contactors** | 9 to 105 Amps | 100kA SCCR @ 480V and 600V with Class J fuses | AC and DC - electronic coil control on DC devices | Integral auxiliary | Up to 75 HP @ 400V (55kW @ 400V) |
| 4  | **IEC Control Relays (Miniature)** | Bifurcated contacts | Rated 16A AC-1, A600, and Q600 for applications up to 600V | 4 pole with NO and NC contact configurations | Printed circuit board mounting with an accessory link module | Universal ratings and markings |
| 5  | **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 |
| 6  | **High Density Terminal Blocks** | 4, 6, and 12 point in a single molded housing. 6-point shorting block available. | Rated for 600V, 30A continuous service | Replacement for GE CR151 and EB27B06S terminal blocks | Integrated 35mm DIN rail snap and panel mounting construction | Captive screws with spring-return open terminals |
| 7  | **IEC Terminal 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 |
| 8  | **General Purpose Relays** | 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 |
| 9  | **Industrial Power Supplies** | Leading 93% efficiency | Adjustable voltage options in 12, 24, and 48V | Output power range from 60W to 480W | DC OK relay contacts are standard on 240W and 480W | Compact design - 43mm wide, up to 60mm |
| 10  | **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 | |
| 11  | **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 | |

# 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** (series DS)
- **ENCLOSED DISCONNECT SWITCHES** (series DS)
- **MINIATURE CIRCUIT BREAKERS** (series 1100, series 1110)
- **CONTACTORS & CONTROL RELAYS** (series 300 non-reversing, series 310 reversing)
- **OVERLOAD RELAYS** (series 320)
- **DIRECT-ON-LINE STARTERS** CONTACTOR + OVERLOAD RELAY (series 620)
- **ENCLOSED DIRECT-ON-LINE STARTERS** CONTACTOR + OVERLOAD RELAY (series E620)
- **MOTOR PROTECTION CIRCUIT BREAKERS** (series 330)
- **ENCLOSED MOTOR PROTECTION CIRCUIT BREAKERS** (series E330)
- **DIRECT-ON-LINE STARTERS** MOTOR PROTECTION CIRCUIT BREAKER + CONTACTOR (series 630)
- **ENCLOSED DIRECT-ON-LINE STARTERS** MOTOR PROTECTION CIRCUIT BREAKER + CONTACTOR (series E630)
- **30MM INDUSTRIAL PILOT DEVICES** (series 30 industrial)
- **30MM PILOT DEVICES FOR HAZARDOUS LOCATION** (series 30 hazardous)
- **22MM IEC PILOT DEVICES** (series 22 iec)
- **WORLD TOWER LIGHTS** (series WTL)
- **CAM SWITCHES** (series CS)
- **22MM NEMA PILOT DEVICES** (series 22 nema)
- **16MM PILOT LIGHTS** (series 16)
- **13MM PILOT LIGHTS** (series 13)
- **CONTROL STATION ENCLOSURES** (series EC)
- **ENCLOSED UL508A COMBINATION MOTOR STARTERS** (series ECP 300)
- **ENCLOSED POWER SUPPLIES** (series EPS)
- **INDUSTRIAL POWER SUPPLIES** (series IPS)
- **TERMINAL BLOCKS** (series TB)
- **TERMINAL BLOCK RELAYS** (series TBR)
- **ELECTRONIC TIMING RELAYS** (series ETR)
- **GENERAL PURPOSE RELAYS** (series GR)
- **WIRING DUCT** (series WD)



# White Papers

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


### The Smart Grid & Grid Modernization - New Trends in Technology

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


### Pilot Devices for Indication and Actuation: Pilot Devices Indicator Lights

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.

READ WHITEPAPER


### AC vs DC MCBs: The Difference is More Than a Letter!

Discover the critical distinctions between AC and DC Miniature Circuit Breakers (MCBs) in our in-depth whitepaper. Explore their workings, applications, and crucial considerations for optimal electrical safety and system integrity. Learn how to choose the right MCB for your specific needs.

READ WHITEPAPER


### Are Fuses *Actually* Cheaper Than Circuit Breakers in Control Applications?

Discover the differences between MCBs (Miniature Circuit Breakers) and fuses and Arm yourself with knowledge for a secure and efficient electrical system. Make informed decisions for electrical safety.

READ WHITEPAPER


### Panel Essentials Series 3: UL508A Control Panel Design Considerations

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

READ WHITEPAPER


### Utility-Scale Energy Storage

Delve into the whitepaper that explores the future of utility-scale energy storage technologies. Discover how we are addressing the limitations of lithium-ion batteries, from energy density to cost-effectiveness and safety, to usher in a new era of sustainable energy storage solutions.

READ WHITEPAPER

# Why choose c3controls

## Integrated Manufacturing

*Vertical integration is the cornerstone of c3controls as it places innovation, development, design, manufacturing, testing, and shipping all within our control. With Everything Under Control, we can ensure the highest quality and customer satisfaction.*

## Innovation

*Product innovation is in our DNA. We approach our products as solutions. Unlike our competition, our business model allows us to provide customers with premium controls without the premium price.*


## Same-Day Shipping

*Reduce inventory. Improve cash-flow. Save money. Our customers enjoy peace of mind knowing they'll get what they need, when they need it. Our promise, guaranteed!*

## Limited Lifetime Warranty

*With total control over engineering and manufacturing, we are able to guarantee the highest quality products on the market—products free of defects in material, workmanship, and design.*

## Advantage Pricing

*Total control means lower overhead and direct sales. For our customers, this translates to savings of up to 40+% on c3controls premium products.*

## Customer First

*Commitment to the success of our customers is a core value and the driving force behind all we do. We promise concierge style service that makes doing business easy, personalized, and responsive.*



# Notes

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c3controls®
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