

Water/ Wastewater

*The OEM and Installers Guide to Control
Components for Water/Wastewater Treatment*



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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 36-month 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

Water

Pump Stations:
Devices used to move water from a collection system to and/or through treatment. Common types include booster, centrifugal, stormwater, and submersible pumping stations.

Water Treatment:
The process of taking water, typically from the environment, and improving its quality for a desired end use. Common steps include coagulation, flocculation, sedimentation, filtration, and disinfection.

Coagulation & Flocculation:
Chemicals are added to water to neutralize the charge of dirt (coagulation) and bind particles together so they can be more easily removed (flocculation).

Sedimentation:
Using the effect of gravity to allow particles suspended in water to settle to the bottom of a tank prior to removal.

Filtration:
Passing water through a medium in order to remove any remaining small particles.

Disinfection:
Treating water with chemicals to eliminate any microorganisms and prepare for distribution and consumption.

Wastewater

Lift Stations:
A type of pump station designed to move wastewater, or sewage, to higher elevation using a collection system.

Wastewater Treatment:
The process of taking wastewater from a community, removing and eliminating contaminants, and releasing back into the environment. Common steps include primary, secondary, and tertiary treatment.

Primary Treatment:
Filtering out large solids from wastewater and then performing coagulation, flocculation, and sedimentation to separate 'sludge' and lighter substances.

Secondary Treatment:
Utilizing aerobic bacteria to biologically remove contaminants from wastewater, also known as 'activated sludge.'

Tertiary Treatment:
Filtration and disinfection processes increase the final quality of water and prepare it for discharge back into the environment.

Water/Wastewater

Department of Environmental Quality (DEQ):
Administers state and federal laws and regulations for water quality, water supply, and land protection.

Environmental Protection Agency (EPA):
Responsible for standards and the inspection of collection and treatment systems. The EPA OW (Office of Water) includes divisions such as the OWM (Office of Wastewater Management).

Pump Control Panels:
Also known as pump controllers, these panels manage the power components that control a pump motor, permitting easy and automatic pump operation and monitoring.

Treatment Plant:
A facility which takes water/wastewater from a collection system and performs a series of processes to prepare water/wastewater for a desired end use.

Industry Outlook

Essential for life, clean water is one of the most important resources on the planet. Treatment of water and wastewater has a critical impact on our health, ecosystem, economy, and so much more. This treatment comes at a premium as water and wastewater services utilize almost 50% of the energy in a municipality, of which 90% is used by pumps. As factors such as population growth strain aging infrastructure, an industry focus is finding new solutions that offer energy efficiency without sacrificing reliability.

For 50 years, c3controls has been a leading manufacturer of electrical controls for water and wastewater treatment equipment. Our experience serving the industry has provided a deep understanding of challenges such as:

- **Supply chain issues** that bring long lead times for critical system components and subsequent delays.
- **Workforce shortages** that limit productivity and increase the need for automation.
- **High regulations** that ensure that processes, machines, and their components are up to code.
- **Complex controls** that call for the technological advancement of electronics.
- **Calls for sustainability and efficiency** that demand innovation in the form of flexible, multi-purpose equipment.

With these challenges come opportunities to improve the efficiency, reliability, and performance of water and wastewater treatment systems. As the industry continues to evolve, having the right products, people, and processes can help utilities and equipment manufacturers address changing requirements, modernize aging infrastructure, and incorporate new technologies.

c3controls can help you succeed. Our vertically integrated approach allows us to operate efficiently, respond quickly to changing market conditions, and provide reliable electrical control products with fast delivery. Our solutions support a wide range of water and wastewater applications, including:

- **Pump Control Panels**
- **Pump Stations**
- **Lift Stations**
- **& more!**

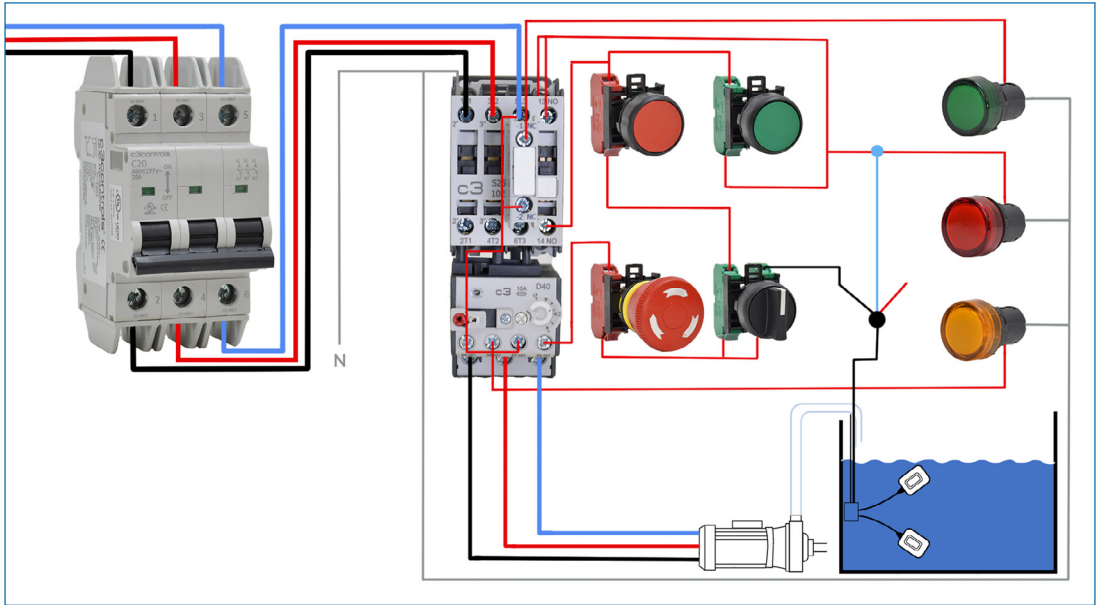
With over seventeen million product configurations from c3controls and custom UL 508A-certified panel solutions from Covenant Panelworks (CPW), you have a trusted source for complete electrical control solutions. Contact us today and discover how our expertise can help you improve the reliability, efficiency, and performance of your water and wastewater operations.

Treatment Plant Isometrics

Here is an example layout of a treatment facility with a look inside at some common processes:



Wiring a 3-Phase Starter to a Pump Motor



Products for Water/Wastewater Applications

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

Pilot Devices



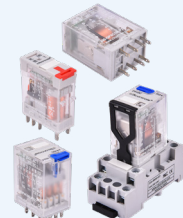
- Modular range of 30mm, 22mm, 16mm, 13mm, and cam-operated rotary switches
- Maintained and momentary operations in both non-illuminated, illuminated, and keyed versions
- Type 1, 2, 3, 3R, 4/4X, 12, and 13
- Color-coded, snap-on contact blocks
- Full voltage, multi-voltage, resistor, and dual input light units in a wide range of voltages up to 600VAC/VDC
- Cam switch operators are certified as Manual Motor Controllers per UL

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

General Purpose Relays



- Octal Base with pin terminals and Square Base with blade-style terminals
- Various pole combinations and coil voltages
- Color-coded push buttons for distinguishing AC and DC
- Built-in retainer clips in relay sockets
- Marking plates on relays and sockets

Electronic Timing Relays



- Compact design, sizes in 17.5mm, 22.5mm, and 45mm wide
- Single, dual and multi-functions
- Timing ranges from 0.01 seconds to 9,999 hours
- DIN Rail, Panel, Socket, and enclosure door mountings
- Voltage inputs 20-240 VAC and 12-240 VDC

Industrial Power Supplies



- Designed to deliver the power with up to 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

Tower Lights



- Stackable design for up to 5 modules in a single assembly
- Mounting options in three styles: 50mm direct mount, 50mm panel-mount short base, and 50mm panel-mount tall base
- Voltage options available in 24V AC/DC, 120V AC, and 240V AC
- Three styles of illumination: continuous, flashing and rotary
- Continuous or intermittent sound modules with 80dB or 100dB sound output

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

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

Control Power Transformers



- Open-type control transformers ranging from 50 to 5000VA
- Integrated terminal blocks and a finger-safe terminal guard, with IP20 protection on primary and secondary sides
- Each transformer variant features a Class H insulation system
- Capable of handling dynamic loads effectively, suitable for applications with fluctuating power demands
- Ability to provide multiple voltage outputs from a single unit

VFD Bypass Panels



- Can be installed as either a temporary replacement to a VFD or as a system backup
- Each assembly includes: fused disconnect switch, contactors, control transformer, a variety of 22mm IEC pilot devices, and power and control terminal blocks
- Optimized width to save wall space

Electrical Panels



- Custom electrical panel solutions are available through [Covenant Panelworks \(CPW\)](#), a UL 508A-certified panel shop specializing in complete finished assemblies and value-added projects.

Contactors and Control Relays



- Contactors: 9 to 105 Amps
- Contactors: 100kA SCCR @ 480V and 600V with Class J fuses
- Contactors: AC and DC - electronic coil control on DC devices
- Control Relays: Bifurcated contacts
- Control Relays: Rated 16A AC-1, A600, and Q600 for applications up to 600V

Overload Relays



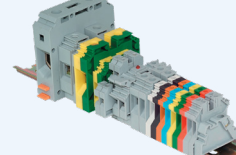
- Available in five frame sizes with a current adjustment range of 0.28 - 112A
- High fault SCCR of 100kA @ 480V and 600V with Class J fuses
- Full load current adjustment ratio of approx. 1:1.5 enables relay to be set to exact FLA of motor
- Single phase sensitivity to protect motors against damaging phase loss conditions
- Manual or automatic reset and test modes, and stop button all in a single device

Direct-On-Line Starters (+enclosed)



- Open-style starters consist of either a Contactor & Overload Relay, or a Motor Protection Circuit Breaker & Contactor
- Enclosed starters come pre-wired with a variety of pilot device options
- Factory assemblies provide the convenience of a single catalog number and shorter control panel bill of material

IEC Terminal Blocks



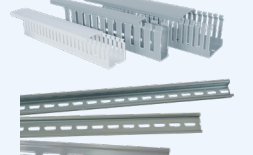
- Screw Clamp, Spring Clamp, and Miniature
- 5mm - 25mm widths
- 25 - 230 Amps
- Feed Through, Ground, Multi-Conductor, Double & Triple Level, Fuse Holder, Power Distribution, and more
- DIN Rail mounting; snap-on, snap-off assembly

High Density & CT Shorting Terminal Blocks



- 2, 4, 6, and 12-point in a single molded housing
- 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

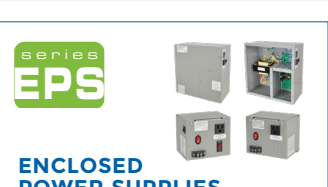
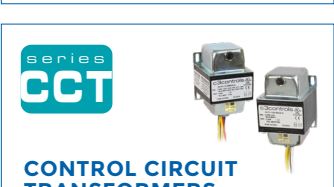
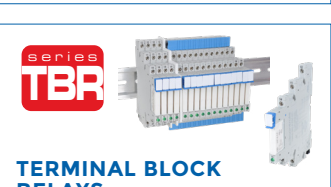
Wire Duct & DIN Rail



- Wire Duct: 13 dimensions from 25mm wide up to 80mm, and up to 2m in length
- Wire Duct: Narrow and Wide Slot
- DIN Rail: 35mm rails in steel and aluminum
- DIN Rail: 1m (3.28ft) or 2m (6.56ft) lengths
- DIN Rail: Standard package quantities, or pallet options available

Product Portfolio

Our 17 million+ product configurations deliver durability and reliability—even in the most punishing environments—meeting and exceeding global standards for quality and safety.

 DISCONNECT SWITCHES NON-FUSED & ENCLOSED	 MINIATURE CIRCUIT BREAKERS	 CONTACTORS & CONTROL RELAYS	 OVERLOAD RELAYS
 DIRECT-ON-LINE STARTERS CONTACTOR + OVERLOAD RELAY	 ENCLOSED DIRECT-ON-LINE STARTERS CONTACTOR + OVERLOAD RELAY	 MOTOR PROTECTION CIRCUIT BREAKERS OPEN & ENCLOSED	 DIRECT-ON-LINE STARTERS MOTOR PROTECTION CIRCUIT BREAKER + CONTACTOR
 ENCLOSED DIRECT-ON-LINE STARTERS MOTOR PROTECTION CIRCUIT BREAKER + CONTACTOR	 30MM PILOT DEVICES FOR INDUSTRIAL & HAZARDOUS LOCATION	 22MM PILOT DEVICES IEC & NEMA	 WORLD TOWER LIGHTS
 CAM SWITCHES	 16MM PILOT LIGHTS	 13MM PILOT LIGHTS	 CONTROL STATION ENCLOSURES
 ENCLOSED UL508A COMBINATION MOTOR STARTERS	 ENCLOSED POWER SUPPLIES	 VFD BYPASS PANELS	 INDUSTRIAL POWER SUPPLIES
 CONTROL CIRCUIT TRANSFORMERS	 CONTROL POWER TRANSFORMERS	 TERMINAL BLOCKS	 TERMINAL BLOCK RELAYS
 ELECTRONIC TIMING RELAYS	 GENERAL PURPOSE RELAYS	 WIRING DUCT	 DIN RAIL

White Papers

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

 Applying Motor Controls in a Water/Wastewater Pumping Application Click here to learn more about the basic understanding of pump control for water and wastewater! READ WHITEPAPER	 PANEL ESSENTIALS 3: UL508A Control Panel Design Considerations Find out the basic design considerations you need to know when building a UL 508A panel. READ WHITEPAPER
 Pilot Devices for Indication and Actuation: Pilot Devices Indicator Lights While pilot devices are seemingly quite simple control, there is more to them than the Merriam Webster definition. They have their own terminologies, color coding, functions and standards. Click to find out more. READ WHITEPAPER	 Pump Control (Water/ Wastewater/ Irrigation) Pump Control for Water, Wastewater, and Irrigation Each application to control a pump is unique. Click here for the types of control methods and what to consider when selecting pump control. READ WHITEPAPER
 Replacing VFDs with Motor Starters Unable to source variable frequency drives (VFDs) and soft starters due to the shortages of raw materials? You have a variety of choices when selecting an electric motor starter. Download our paper to see how you might be able to use standard motor control in place of a VFD. READ WHITEPAPER	 Commercial Boiler Industry New Trends in Technology Commercial Boiler Industry - New Trends in Technology Boilers are perhaps the largest unseen, unknown and therefore, underappreciated part of the lives of nearly everyone on the planet. Besides the boiler that sometimes stopped working in elementary school, few people appreciate their importance. Check out our paper to find out what trends are emerging in boilers and boiler control. READ WHITEPAPER

10.



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