UTC820D Controller – Instruction Manual

204CH/UTC820D

Key Features:

- Universal Power Supply enables operation at 24-265V AC, 50-60 Hz
- IP66-Rated waterproof, suitable for outdoor use
- Daisy Chaining Support enables running one pattern across multiple controllers. You can also mirror the same outputs across multiple controllers.
- 8 Isolated output channels can supply up to 20 amps of current and run at different voltages
- User Replaceable TRIACs, no soldering required
- Fade control can slow down transitions to make LED lighting look more incandescent
- 59 Selectable patterns including:
    - Chases – Forwards, Back/Forth, Progressive, Wipe, Spell
    - Candle Flame (Effect Per Channel) and Fire (Multi Channel Fire)
    - Random Pattern – Changes itself automatically
    - Manual Dimmer and Crossfade functions
    - 2 User Programmable Custom Patterns
- No reboot required unlike competing controllers – Switch changes take effect immediately
- Custom Pattern Support: 2 User-Programmable custom patterns of up to 200 steps
- Digital Timing Control from Mains: Multiple controllers that have the same speed setting and are powered on together will stay synchronized.
    - With custom patterns you can gang controllers together to control installations *of any size.*

Applications:

- Chasing Belt Light
- Signs and Displays
- Amusement and Carnival
- Custom Channel Jobs and Fixtures
- Outdoor and Weatherproof installations

Installation and Wiring Instructions

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Installation Guidelines:

- To maintain weather resistance in outdoor installations, the ends of the cables exiting the controller must be protected from moisture. Otherwise, water can wick into the cables and damage the controller.
- The controllers' outputs will be damaged if overloaded or short circuited. A fast-acting fuse in series with each output is highly recommended. Choose the smallest fuse suitable for your application. The outputs are rated at 20 amps each.
- Test your lights for short circuits before connecting them to the controller. Shorted bulbs or sockets will damage the controller.
- The controller will get hot under heavy and sustained loads. If the average combined current will exceed 120 amps, we recommend installing a fan to cool the controller. If the controller overheats, it will shut down until it cools off.

Powering The Controller:

- The controller is powered by a 3-prong grounded mains plug and draws a maximum of 2 watts to run itself.

Connecting The Outputs:

- Each of the 4 output cables has 2 outputs (Black/Red and Purple/Yellow). Connect one wire of the pair to HOT incoming power and the other wire to your lights.
- Example channel 1 wiring:
  - Mains HOT -> Black wire
  - Red wire -> Fuse -> Load (Lights) -> Neutral

Wiring Diagram

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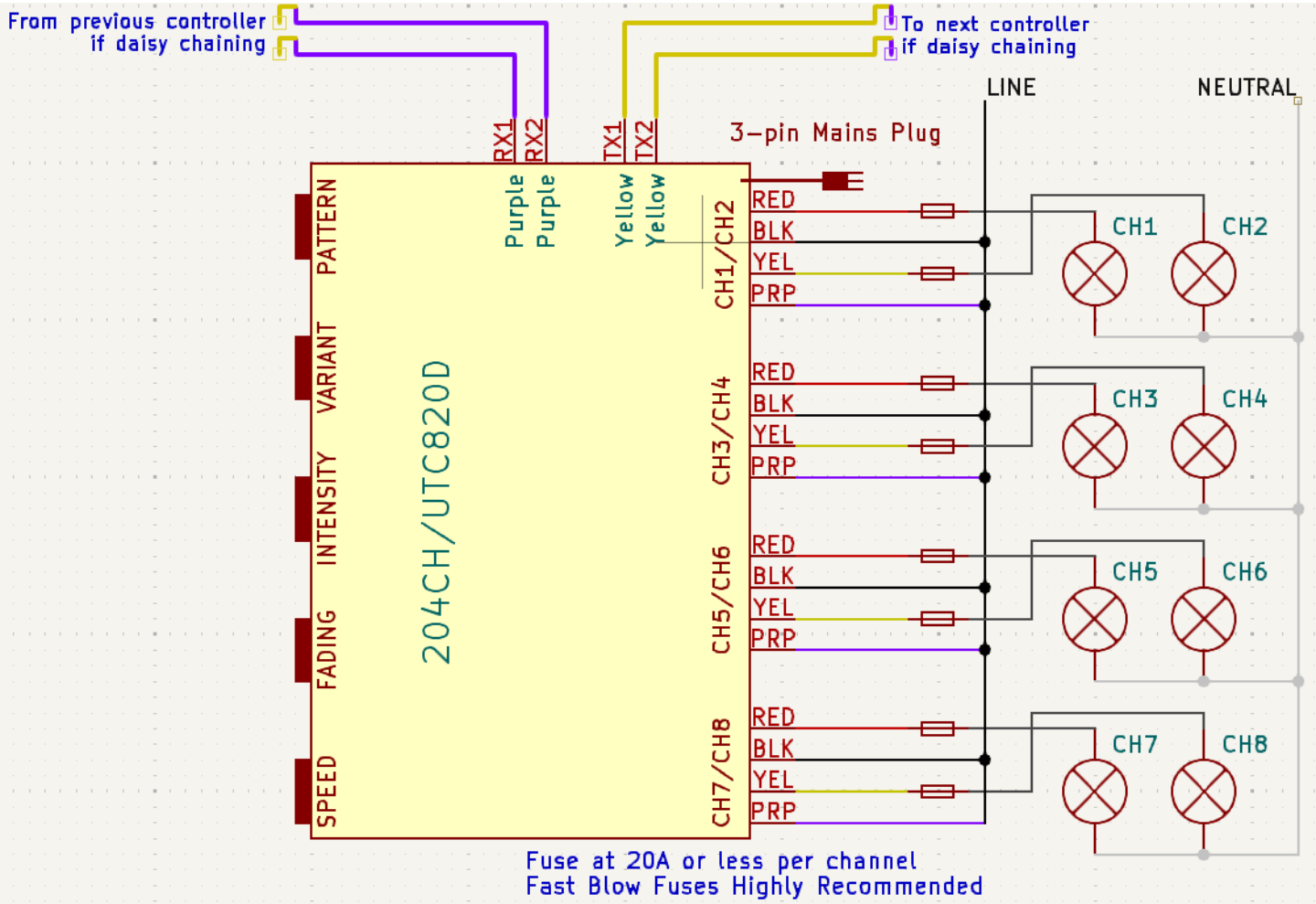

The controller must be installed in compliance with all applicable electrical codes.

Pattern Table

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Switch Positions		
Pattern	Variant	Pattern Description
Forward Chase	1-7	Forwards Chase Variant selects the number of outputs lit simultaneously
	8	Steady Burn
Back/ Forth	1-8	Back-N-Forth Chase Variant selects the number of channels lit simultaneously
Alt Chase	1-3	Steady Burn
	4-6	Back-N-Forth chase with longer period of all 8 channels lit
	7	Progressive Forwards Chase 1 channel lit, then 2, then 3... until all channels lit, then repeats
	8	Progressive Back-N-Forth Chase 1 channel lit, then 2, then 3... until all channels lit, then repeats
Scroll	1	Scrolling pattern with 1 on, 2 off
	2	Scrolling pattern with 2 on, 1 off
	3	Scrolling pattern with 1 on, 3 off
	4	Scrolling pattern with 2 on, 2 off
	5	Scrolling pattern with 3 on, 1 off
	6	Scrolling pattern with 1 on, 4 off
	7	Scrolling pattern with 2 on, 3 off
	8	Scintillating Pattern
Wipe	1	Fill Up: Each channel turns on, then they all turn off
	2	Fill Up, then flash 1x
	3	Spell Up, then flash 1x (think “open” sign)
	4	Spell Up, then flash 2x
	5	Alternate odd and even
	6	Alternate odd, off, even, off
	7	Wipe On, Wipe off: Each channel turns on, then each channel turns off
	8	Wipe On, Reverse off: Each channel turns on, then each turns off in reverse order

Switch Positions		*Continued from Previous Page*
Pattern	Variant	Pattern Description
Special FX	1	Twinkle: Each channel turns on randomly, then fades out.
	2	Candle Flames: Each channel flickers with a realistic flame effect.
	3	Sequential Fire: A fire effect across all channels. The base of the flame is channel 1
	4	Sequential Fire, Coarse: Flame pulses are larger but less frequent
	5	Sequential Fire, Half and Half: Two independent sequential fire effects, each on half the channels
	6	Sequential Fire, Half and Half, Coarse
	7	Random Point Fill/Empty: One channel randomly turns on, followed by its neighbors, until all channels are on. Then one channel randomly turns off, followed by its neighbors, until all channels are off.
	8	Random Point Fill/Empty, Circular: Same as above but the first and last channel are considered neighbors.
Dim/ Custom	1	Single Channel Dimmer, All channels together
	2	Every Other Crossfade
	3	Every Two Crossfade
	4	Every Three Crossfade
	5	First Half / Second Half Crossfade
	6	Strobe all channels
	7	User Programmable Custom Pattern #1
	8	User Programmable Custom Pattern #2
Random	1	Repeat each pattern once
	2	Repeat each pattern twice
	3	Repeat each pattern three times
	4	New pattern every 1 minute
	5	New pattern every 2 minutes
	6	New pattern every 5 minutes
	7	New pattern every 10 minutes
	8	Slave Mode (for Daisy Chaining and DMX using 204CH/UTCDMX)

Pattern Selection

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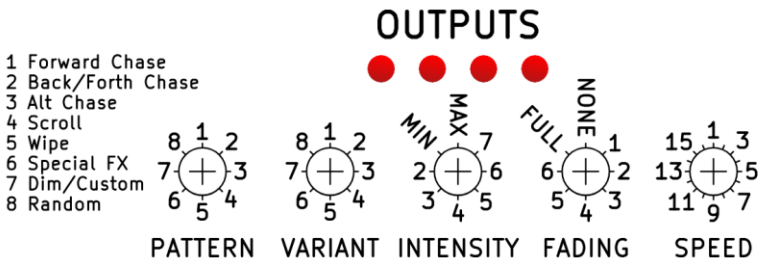

The Output Indicators show the states of the controller's output channels.

The 5 switches (*Pattern, Variant, Intensity, Fading,* and *Speed*) are used to configure the controller for various modes of operation.

- *Pattern*
  - *Forward Chase*: Forward pattern with 1-8 channels lit at once. Selecting 8 channels will produce an all-on "steady burn" effect.
  - *Back/Forth Chase*: Chasing pattern that alternates forwards and backwards
  - *Alt Chase*: Forwards/Alternating chasing patterns for 9-11 outputs, plus a forward and alternating progressive chase (1, then 2, then 3...)
  - *Scroll*: Various scrolling patterns that scroll across the outputs
  - *Wipe*: Various fills and wipes
  - *Special FX*: Special effects such as twinkle, candle flames, and chasing fire
  - *Dim/Custom*: 5 dimmer effects and 2 user-programmable patterns
  - *Random*: Changes the pattern randomly at a user-selectable interval
- *Variant*
  - The *variant* switch is used to configure the selected pattern.
  - For example, with the *Forward Chase* pattern, the *variant* switch selects the number of channels lit at once.
- *Intensity*
  - This switch controls the brightness of the outputs.
  - For special effects patterns, this switch controls the intensity of the special effect.
- *Fading*
  - This switch controls how much to fade between steps of the pattern.
  - This switch is often used to make dimmable LED lighting turn on and off more slowly, giving it more of an incandescent vibe.

- When set to “None”, the controller abruptly switches the channels on and off.
- When set to “Full”, the controller crossfades smoothly between different steps of the pattern.

- *Speed*
  - This switch controls how fast the pattern runs.
  - There are 16 different speeds, ranging from 4.25 seconds per step to 60 steps per second.
  - The controller controls the timing of the pattern by counting pulses from the AC mains. It does not use an internal timer.
  - If two controllers have the same speed setting and are powered on together, *they will stay in sync forever until powered off*.

Programming the Channel Count

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The front panel switches can be used to set the number of channels and program custom patterns. To prevent accidentally entering programming mode, the switches must be set in the proper sequence.

- Set all 5 switches to the straight up position.
- Set the *intensity* switch to the value you want to program
  - *Max: Channel Count (Number of Outputs)*
  - *7:* Custom Pattern 1
  - *6:* Custom Pattern 2
- Set the *pattern* switch to *Random* (one click counterclockwise)
- Set the *variant* switch to *8* (one click counterclockwise)
- Set the *intensity* switch to *MIN*. The controller will flash all channels once and enter programming mode.

Programming the Channel Count:

- Use the *Speed* switch to set the number of output channels. The UTC820D controller can control 2 to 8 circuits.
- The enabled output channels will turn on and the corresponding indicators will light.
- To save and exit, change the value of any other switch.

Programming Custom Patterns

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To program a custom pattern:

- Instructions for entering the custom pattern programming mode are on the previous page.
- Use the *Speed* switch to navigate through the pattern. The pattern starts at the first step. Clockwise goes forwards, counterclockwise goes backwards.
- Rotate the pattern, variant, and intensity switches to change the lit channels in the current step.
    - *Pattern* switch = Channels 1-3
    - *Variant* switch = Channels 4-6
    - *Intensity* switch = Channels 7-8
- You can use the *speed* switch to preview what the pattern will look like, going back and forth and fixing any mistakes.
- The custom pattern allows you to set up to 200 steps.
- Saving the custom pattern
    - Navigate to the last step of the custom pattern using the *speed* switch.
    - Move the *speed* switch *back one click, then forwards one click.* Repeat the back-forwards action two more times.
    - The controller will save the custom pattern to its internal memory, flash all channels twice, then exit programming mode.
- Exiting without saving
    - Navigate to the first step of the custom pattern using the *speed* switch.
    - Keep turning the speed switch counterclockwise. 16 steps backwards (1 full turn) will exit programming mode.
    - If the controller loses power or is unplugged during programming, the pattern will not be saved.

To use your newly programmed custom pattern, set the *Pattern* switch to *Dim/Custom* and the *Variant* switch to *7* or *8*.

Daisy Chaining

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The 204CH/UTC820D supports daisy chaining. The modem cable on the back of the controller has two yellow wires (transmit) and two purple wires (receive). Daisy chaining can be used in two modes: Mirror and Extend.

Connecting the controllers:

- Connect the transmit output on the master controller to the receive inputs on one or more slave controllers. The polarity of the connection doesn't matter.
- *DO NOT* connect external circuits to transmit or receive. This may damage the controller and will not be covered under warranty.
- If the length of the connection is more than 50 feet, run a separate cable to each slave controller and connect all cables together at the master controller's transmit output. Do not run one wire from the master and split it.
- Slave controllers will be in Mirror mode when the number of channels they receive is less than or equal to their programmed channel count. Otherwise, they will be in Extend mode.

Mirror Mode:

- The master controller is in mirror mode when its channel count (see *Programming the Channel Count*) is less than or equal to the number of physical outputs on the controller.
- In Mirror Mode, the controller will transmit the same channels (to the slave) as it outputs (to its own outputs)

Extend Mode:

- The master controller is in extend mode when its channel count (see *Programming the Channel Count*) greater than the number of physical outputs on the controller.
- In Extend Mode, the controller will output as many channels as it has physical outputs. The rest of the channels will be transmitted to the slave controllers.
- Example: You have a UTC8 controller (8 outputs) with the channel count set to 12. Channels 1-8 will be output on the controller's physical outputs. Channels 9-12 will be transmitted to connected slave controllers.
- A Slave controller will be in Extend mode when it receives more channels than its programmed channel count. Extra channels will be transmitted to the next slave down the line.

Daisy Chaining Transmit Distance

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- The modem in daisy-chainable UTC controllers outputs an isolated differential signal to increase immunity against electrical interference. The isolation also decreases the chance of the controller getting damaged during an electrical storm.
- For optimum performance, we recommend using SPT-1 cable for making connections. SPT-2 will also work with slightly reduced performance. If you use your own cable, it should have a characteristic impedance of 100-140Ω if it's more than 50 feet long.
- You can use any method (Wire nuts, Wagos, Quick Connects, etc.) for connecting to the input and output wires. For maximum performance, keep the wires close together at the connection (1-2 inches of separation maximum).
- Diagnosing short circuits
    - If there is a short circuit at or near the transmitter, all connected slave controllers will stop working (all outputs off).
    - If the run is thousands of feet and there is a short circuit at or near a receiver, other receivers on the circuit may possibly still work. Transmission lines are weird.
    - The transmit output of the controller is current-limited. If you accidentally create a short circuit, the controller will not be damaged.
    - The transmitters and receivers in the controller use small transformers internally for isolation. Even if there is no short circuit, the transformers will read as short circuits on a multimeter.
    - To use a multimeter to find short circuits in daisy chaining connections, you must first disconnect all controllers (both transmit and receive).

Maximum Transmit Distance (3db headroom) with Action Lighting wire		
Number of receivers	*Max run (SPT1)*	*Max run (SPT2)*
1	5800 feet	4700 feet
2	5100 feet	4200 feet
5	3200 feet	2600 feet
10	1600 feet	1300 feet
>10	Not Recommended	

Troubleshooting

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Problem	Cause	Solution
Controller does not power on	Outlet not powered or wired incorrectly	Try plugging the controller into a known working outlet
	Controller defective or damaged from power surge	Contact Action Lighting
Indicator light illuminates, output channel stuck off	Controller wired incorrectly	Ensure that one wire of the output channel is connected to HOT and the other wire to your lights. Ensure the lights also have NEUTRAL connected.
	Output Triac socket screws loose (UTC4 or UTC6)	Remove controller from case and tighten Triac screw terminals, or contact Action Lighting
	Output Triac failed due to a short circuit	Replace failed Triac (BTA41-800B Recommended) or contact Action Lighting
Output channel stuck on regardless of indicator light status	Output Triac failed due to an overload or short circuit	Replace failed Triac (BTA41-800B Recommended) or contact Action Lighting
Output channel still malfunctions after replacing Triac	Triac drive circuit blown	Contact Action Lighting

Warranty Notice: These controllers come with a one-year warranty against manufacturing defects. If your controller is still under warranty, please note that damage to the controller due to user disassembly is not covered under warranty. To maintain your warranty, we recommend returning your controller to Action Lighting if it fails during the warranty period.