

Instruction Manual

JSL-73C Multi-Event Timer for Beer Brewing

Version 1.0 (Jan, 2018)

1. Overview

This timer is designed for home brewing when the brewer needs to follow a recipe that calls for ingredients to be added at different time points during the wort boiling process. It can help the brewer keep track of time and remind the brewer to add ingredients at specific time points. The brewer can simply enter the boiling time of each ingredient specified by a beer recipe, the JSL-73C timer will automatically convert it to a multi-event timer whose alarm will go off at the moment when a new ingredient should be added, as well as when the boiling process is supposed to end. The relay output of the timer should be connected to an external flashing buzzer which is sold separately.

2. Specifications

Event timer range: 0 minute to 255 minutes.

Number of events: 1 to 9.

Timer accuracy: < 1 s/day.

Power supply: 90 - 260 V AC or DC.

Power consumption: < 2 W.

Relay output: 7 A @ 240 VAC, 10 A @ 120 VAC and 24 VDC (resistive load).

Average relay life: 100,000 times at rated current.

Operating temperature: 0 - 60°C.

Humidity: 0 - 95% RH.

Panel cutout: 44.5 x 44.5 mm.

Outer dimension: 48 x 48 x 78 mm.

3. Front Panel



Figure 1. Front panel of JSL-73C timer.

1). Top display window: In normal operation mode, it shows the remaining time to the next event. If the remaining time is longer than 99'59", the display will show minutes only. When **^/MUT** key is pressed, it will show

the number of the upcoming event (e.g., **t2**, **t3**...). When an event time is up, it will flash the event number (**t2**, **t3**, **t4**, and etc.) until the alarm is turned off. In programming mode, it shows the name of a parameter. In stopwatch mode (**nE** = 1, **tdlr** = **up**), it will display the duration of current event.

2). Bottom display window: In normal operation mode, it shows the remaining time to the end of all events. If the remaining time is longer than 99'59", the display will show minutes only. In programming mode, it shows the set value of the parameter. In stop watch mode, it will display the duration of accumulated time that has elapsed.

3). **RUN** indicator: This red indicator should be solid on when the timer is running; it flashes when the timer is paused; it should be off when the timer is stopped.

4). **OUT** indicator: This green indicator turns on when the relay is on (pull-in); turns off when the relay is off (drop-out). This indicator should be synchronized with an external flashing buzzer if it was connected to the relay.

5). **SET** key: Press it momentarily to set event timers **t1**, **t2**, **t3**, and so on; press and hold it for 1 second to enter the parameter setting mode. In parameter setting mode, press it momentarily will go to next parameter setting. This key is disabled when timer is running.

6). **V/ RST** key: Reset timer or decrease a parameter value. When the timer is running or is showing "END", press it to stop the timer and reset the timer. In the parameter setting mode, press it will decrease the value of a parameter. Each time you press and release this key, the value will decrease by one unit. When you press and hold it, the value will continuously decrease; as the holding time increases, the speed of number decreasing will accelerate.

7). **^ / MUT** key: Mute/cancel the relay, or increase a parameter value. When the timer is running, press this key to allow the coming up event number (**t2**, **t3**, and etc.) to be shown in the top display window. When an event timer is up and relay is pulled in, press this key once to release the relay. This key only affects the relay. It does not interrupt the running timer. In stopwatch mode, press it to restart the count-up timer in the top display window as the second stopwatch.

In the parameter setting mode, press it to increase the value of a parameter. Each time you press and release, the value will increase by one unit. When you press and hold it, the value will continuously increase; as the holding time increases, the speed of number increasing will accelerate.

8). **START** key: Press it to start the timer. When timer is flashing "END", press it once to stop the flashing, and get the timer ready for the next run. Press the **START** key again will restart the timer. This key is disabled when timer is running. In stopwatch mode, press it to start and stop the timer.

4. Terminal Assignment

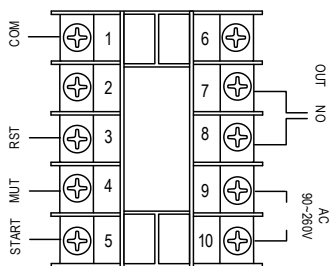


Figure 2. Terminal assignment of JSL-73C.

Details:

- 1). Power for the timer needs to be connected to terminal 9 and 10. The voltage should be in the range from 90 to 260 VAC.
- 2). Terminal 7 and 8 are for relay output. This is a pair of normally-open (NO) contacts. When the relay is energized (or when the OUT LED is on), terminal 8 connects to terminal 7; when the relay is de-energized (or when the OUT LED is off), terminal 7 disconnects terminal 8. The relay is a “dry switch” that does not provide power by itself. Please see the wiring examples in Section 9.
- 3). Terminal 5 is the start terminal that has the same function as the **START** key on the front panel. Please see a note at the end this section.
- 4). Terminal 4 is the pause/mute terminal that function the same as the “**A/MUT**” key on the front panel.
- 5). Terminal 3 is the reset terminal that function the same as the “**V/RST**” key in the front panel.
- 6). Terminal 1 is the common contact for the terminal 3/4/5. There are two ways to operate terminal 3, 4 and 5.
 - 6.a) Connecting a normally open (NO) momentary push button switch between the terminal (3, 4 or 5) to the COM (1). Please note, the function starts when you release (or open) the button of the switch, not when you press down the switch.
 - 6.b) Connecting a DC logic signal (TTL or CMOS or voltage in the range from 3 to 30 VDC) between the terminal (3, 4 or 5) to the COM (1). Please note, the function is rising-edge triggered. The logic signal should normally be at high level. The function starts when the signal goes from low to high. If you have an inverted logic signal, you need to connect a NPN transistor between terminal and COM; add 10k Ohm resistor to the gate for signal input.
- 6). Terminal 2 is reserved for customized applications.

5. Operation and Parameters

In JSL-73C timer, an event is defined as an action of adding an ingredient at a specific time point during the wort boiling process. An event timer starts from the moment that the ingredient is being added to the wort; it stops when the wort-boiling process comes to an end. There can be multiple events during the wort-boiling process. Each event should have a different starting time point, but they all end at the same time, which is when the boiling process ends.

The top display window will show the remaining time before the next event, i.e., when the next ingredient should be added to the wort. The lower window will show the remaining time to the end of the wort-boiling process. The alarm relay will pull in when a new event timer starts or when all events end.

Please see Figure 3 for a schematic diagram showing the relationship between multiple events and the alarm relay status.

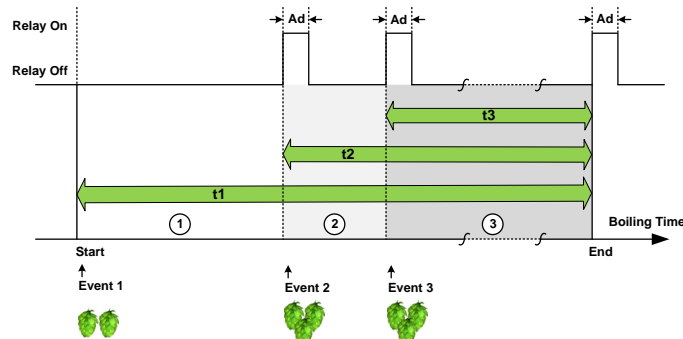


Figure 3. A schematic diagram of how the event timers and the relay work on JSL-73C timer.

A special case of the timer is to set it as a stopwatch. In this case, each window will show a count-up timer. There is no ending point and the relay won't pull in. The timer showed in the top window can be re-started while the timer in the bottom window is still running. The details can be found in section 5.2.

Table 1. Parameters of JSL-73C timer.

Code	Description	Setting Range	Initial Setting	Details
Press and hold SET key for 1 second when timer is stopped.				
nE	The total number of events	1 ~ 9	3	5.1
t d l r *	Timer direction	up, dn	dn	5.2
A d	Alarm duration	0 ~ 200 sec	10 sec	5.3
Short press SET key when timer is stopped.				
t 1	Event 1 timer	0 min to 255 min	60 min	5.4
t 2 **	Event 2 timer	0 min to t1	20 min	5.4
t 3 **	Event 3 timer	0 min to t2	1 min	5.4

Note *: The parameter **t d l r** is available only when the number of events **nE** is set to 1.

Note **: The event timer **t2**, **t3**, and so on., will appear only when the number of events **nE** is set to such a number.

5.1) **nE**, the total number of events. An event can be associated with an activity such as adding hops or special ingredients. Each event has its own timer. **nE** can be set to a number from 1 to 9. The output relay will pull in at the beginning of all events except the first event, and at the end of the entire boiling process. So **nE** is equal to the total number of times you want the buzzer to ring. For example, if you only add hops at the very beginning of the boiling process, and want the buzzer to go off when the boiling is done, you will set **nE** = 1, that is

one event. But if you want to add another hop in the middle of boiling, this is considered as the second event, the buzzer will go off when the second event starts.

5.2) **tdir**, timer direction. This parameter appears only when **nE** = 1. It can be set to “**dn**” (count-down), or “**up**” (count-up). When **nE** > 1, this parameter is not available, and the timer will only count-down.

- **dn**: count-down. The time duration is decided by **t1**. At the end this single event, the relay will pull in.
- **up**: count-up. When **tdir** is set to **up**, event timer parameter **t1** will be disabled, and so the timer will not stop automatically nor activate the relay. In this mode, the timer functions as two stopwatch timers by continuously counting up, each display window shows one stopwatch timer. Press the **START** key will start or stop the timer in both top and bottom display; press the **RST** key will reset both timers to zero; press the **MUT** key will restart the timer in the top display window from zero, but it won't affect the timer in the bottom window. This function provides a time reference for users during the mashing process if they want to take a sample or do some tests of the wort.

5.3) **Ad**, alarm duration. It is the time duration that you want the relay contacts to stay closed at the end of each event. The unit is in seconds. The alarm durations of all events are the same. **Ad** can be set from 0 to 200 seconds. The number 0 and 200 are special cases. When **Ad** = 0, the timer will pause at the end of each event and activate the relay. User need to press the **START** key to resume the timer. When **Ad** = 200, the timer will continue to the next event, while the relay contacts will close until user press the **MUT** key. When **Ad** is set to any value between 1 and 199, the timer will continue run time while the relay pulls in for a certain time duration decided by **Ad**. For example, when **Ad** = 5, the flashing buzzer connected to the output relay will be on for 5 seconds.

Table 2. Timer and relay action under different alarm duration (Ad) settings.

Ad	Timer	Relay Action	Top Display
0	Pause until pressing START key	Pulls in until cancelled by pressing MUT key	Flash “ tn ” and “0:00”
1 ~ 199	Continue to the next event	Pulls in for a time duration set by Ad	Show the remaining time before the next event
200	Continue to the next event	Pulls in until cancelled by pressing MUT key	Flash “ tn ” and the remaining time before the next event

5.4) **tx** (i.e., **t1**, **t2**, **t3**, ..., **tn**), the time duration of each event, where **x** is the event number, and **n** is decided by parameter **nE**. Time duration of an event, **tx**, is the boiling time of an ingredient to be added to the boiling wort. **t1** is the first event timer which starts from the moment that the first ingredient is added until the end of boiling, **t2** is the second event timer which starts when the second ingredient is added until the end of boiling, and so on. Please refer to Figure 3 for a schematic diagram of the event timers and the relay status. The relay will pull in at the end of the event timer **t1** and pull in at the beginning of all other event timers (**t2**, **t3**, and so on).

An event timer that starts later should be no longer than the event timers that start earlier, i.e., **t1** ≥ **t2** ≥ **t3** ≥ ... ≥ **tn**. When an event timer is equal to its prior event timer, this event timer will be ignored. For example, if you set **t1** = **t2**, timer **t2** will be ignored.

The top display window of JSL-73C will show the remaining time before the next event timer starts; the bottom display window will show the remaining time to the end of event timer **t1**, i.e., the end of all events.

6. How to Set Parameter nE and Ad

Press and hold **SET** key for 1 second, the top display will show **nE**. Use **UP** or **DOWN** key to change its value shown in the bottom window to the desired number of events. Press **SET** key again, the top display will show alarm duration **Ad**. Use **UP** or **DOWN** key to change it to the desired value, then press **SET** key again to save and exit.

7. How to Set Event Timer

Press **SET** key momentarily, display will show **t1**, use **UP** and **DOWN** key to adjust the timer to desired value and press **SET** key to confirm. Please note that the settings will not be saved until **SET** key is pressed.

8. Application Examples

We have a buzzer connected to the timer relay and we want it to ring for 10 seconds when it's time to add a new hop and when the entire boiling process ends. The beer recipe requires Columbus hop being added at three different time points for boiling:

- 1 oz. Columbus, boiling for 60 minutes.
- 2 oz. Columbus, boiling for 5 minutes.
- 2 oz. Columbus, boiling for 1 minute.

So the JSL-73C timer should be set like this:

- 1) Hold the **SET** key for 1 seconds, then set **nE** = 3, **Ad** = 10.
- 2) Short press **SET** key, then set **t1** = 60, **t2** = 5, and **t3** = 1.

When we are ready to add hops, press the **START** key to start timer; then add 1 oz. Columbus hop in the hop bag and immerse the bag in the boiling wort. After 55 min, the alarm buzzer rings, and the top window flashes “**t2**” to remind us that the second event timer has started, and it's time to add the 2 oz. Columbus hops. We press the **MUT** key to temporarily mute the alarm. Then add 2 oz. Columbus hops to the hop bag. After another 4 min, the alarm buzzer rings again, and the top window flashes “**t3**”. We add another 2 oz. hops to the hop bag. Finally, after another 1 min, the alarm rings and the top window of the timer show “**END**”. We turn off the heater and are ready to cool the wort from boiling temperature.

9. Wiring Examples

9.1) Using switches to start, mute, or reset JSL-73C timer.

Power (120 or 240 VAC) is sent to terminal 9 and 10. The external switches on terminals 2, 3, 4 and 5 should be momentary type. They are needed only if you

want to control the timer remotely. Otherwise, you can use the front keys on the timer. The buzzer used in this example is also optional. The buzzer is also powered by 120 VAC.

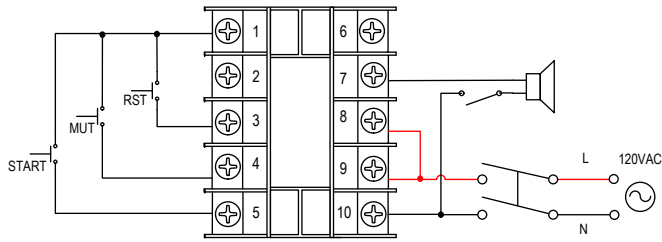


Figure 3. Wiring example of JSL-73C.

9.2) Signal controlled by DC logic signal.

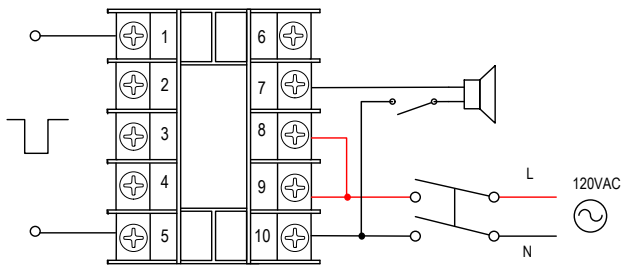


Figure 4. Rising-edge triggered signal.

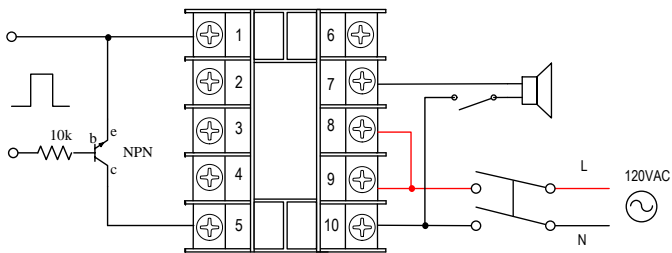


Figure 5. Inverted logic signal.

(End)

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