series ETR

What do you know about Electronic Timing Relays?

What Do You Know About Electronic Timing Relays?

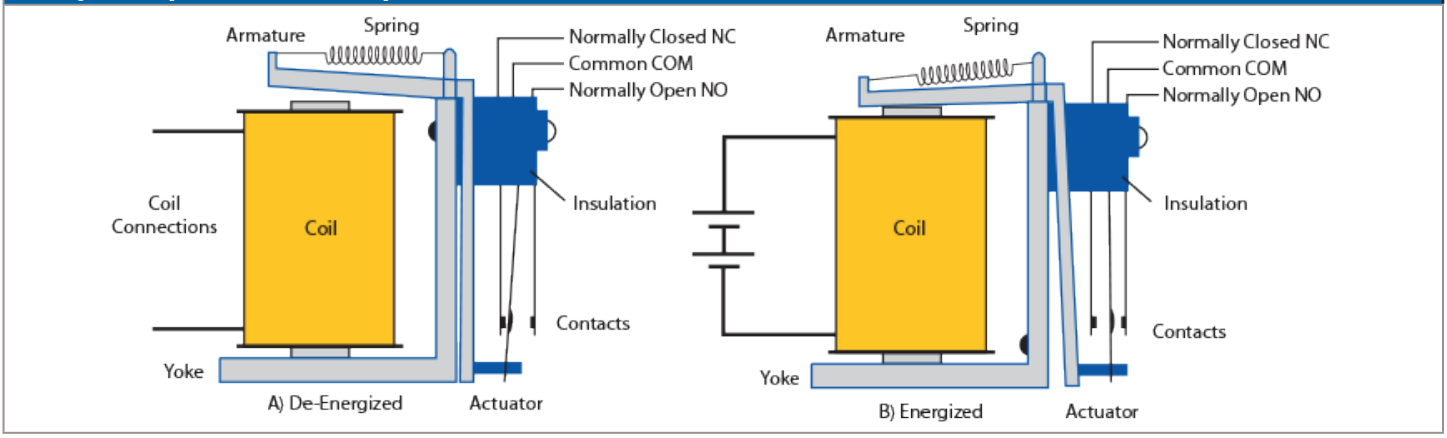
There are certain components that form the core of the modern control systems. One such important component used in many applications is an Electronic Timing Relay (ETR). Let us start by understanding some basics.

What are Electronic Timing Relays?

A relay is an electromagnetic switch which operates on a small electric current. These switches are used to turn on or off a circuit of higher amperage. When electricity is applied, the electromagnetic coil causes the armature to move, opening or closing the contacts, controlling the flow of electricity from a high current source connected to the load side of the relay. Relays act as bridges that activate larger currents using smaller ones. This allows you to use a relay to safely switch on and off different devices.

An Electronic Timing Relay has circuitry integrated which controls the armature motion upon input voltage being applied. This addition gives the relay the property of time-delay actuation. Electronic Timing Relays are constructed to delay armature motion on coil energization, de-energization, or both. ETRs provide a wide range of selectable functions so that users can customize their specific machine operation.

Relay Components and Operation



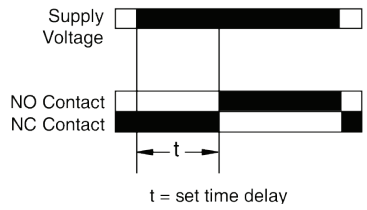
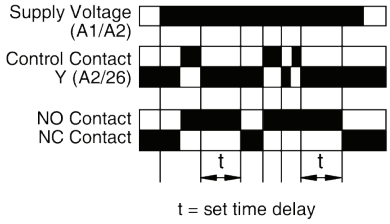
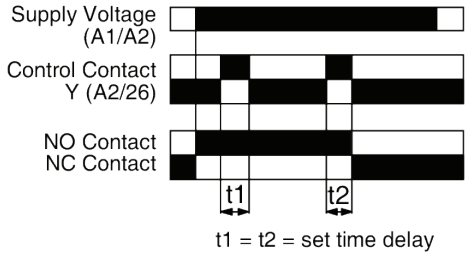
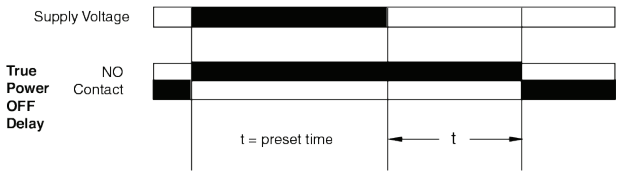
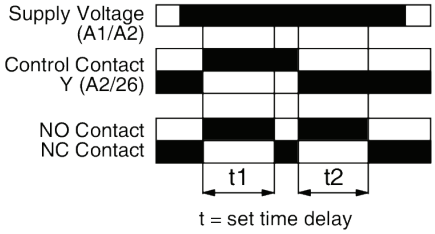
What are the Best Features of Electronic Timing Relays?

Electronic timing relays are used in a number of electronic applications, owing to the unending list of their features, which are as follows:

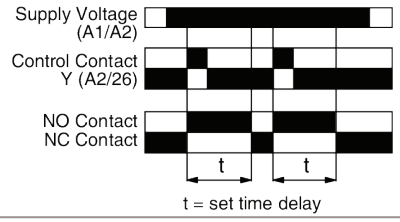
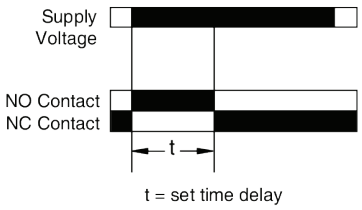
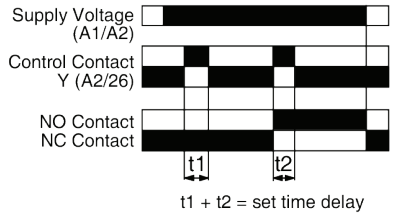
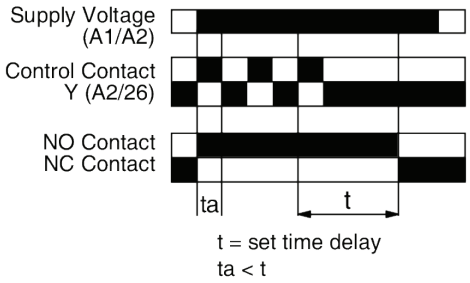
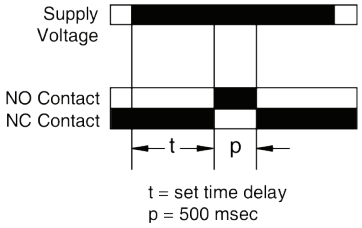
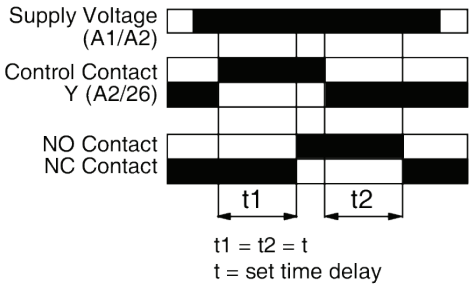
- Multi-function timer, which allows the user to adjust between multiple timing functions.
- High duty cycle applications.
- DIN rail or panel mounting.
- Resistant to mechanical shock and vibration.
- Ability to set the timer anywhere between 0.05 seconds and 10 hours for timing operation.
- Extremely compact standard dimensions (17.5mm and 22.5mm).
- Power factor metering and correction.
- Frequency control applications.
- Timing functions such as:
  - ON Delay
  - OFF Delay
  - Interval Delay

Understanding the Functions on the Relay with Function Selector

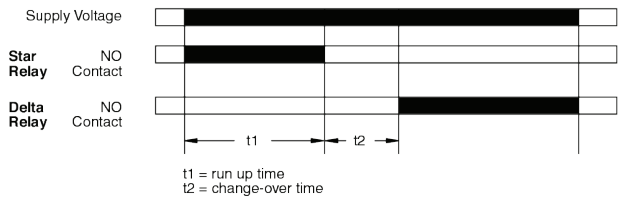
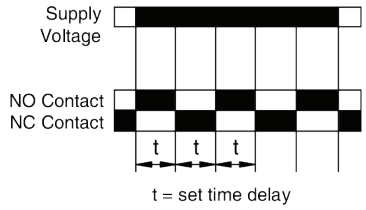
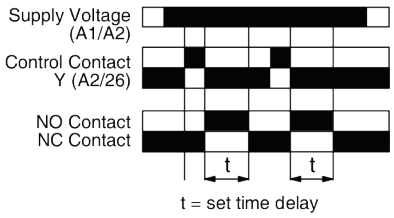
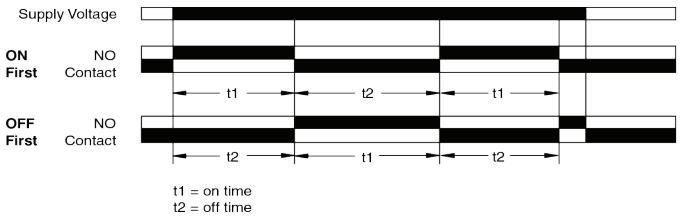
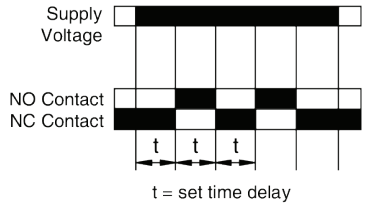
There are a number of functions that can be selected using the function selector on the electronic timing relay. Here are some of those functions:

Understanding the Functions on an Electronic Timing Relay	
FUNCTION / OPERATION	**TIMING CHART**
ON DELAY (ENERGIZE DELAY) With application of input voltage, the time delay begins. At the end of the time delay, the output is energized. Input voltage must be removed to reset the time delay and de-energize the output.	
DELAY ON BREAK With closure of a normally open (NO) external initiate switch, the load transfers immediately and remains transferred as long as the external initiate switch is closed.	
INTERVAL WITH TOTALIZE (TIME STORAGE) Input voltage is applied before and during timing. The output is energized before and during the time delay. Each time the control contact (Y) is closed, the time delay progresses; when it opens, timing stops. When the amount of time control contact is closed equals the full time delay, the output de-energizes and remains de-energized until reset. Removing input voltage resets the time delay and output.	
OFF DELAY (DE-ENERGIZE DELAY) With application of input voltage, the time delay is ready to accept a trigger. When the trigger is applied, the output is energized. With removal of the trigger, the time delay begins. At the end of the time delay, the output is de-energized. Any application of the trigger during the time delay will reset the time delay and the output remains energized.	
INTERVAL ON MAKE / INTERVAL ON BREAK Internal on Make time delay t1 and Interval on break time delay t2 are the same i.e. t. With application of input voltage and the closure of 'Y', t1 begins and the output energizes. At the end of t1, the output de-energizes. With the opening of 'Y' t2 begins and the output energizes again. At the end of t2, the output de-energizes. Reset: If 'Y' is opened during t1, then t1 is reset and the output remains energized. And if 'Y' is closed during t2 then t2 is reset and the output remains energized. Removing input voltage resets the time delay and output.	

Understanding the Functions on an Electronic Timing Relay (continued)

FUNCTION / OPERATION	TIMING CHART
SINGLE SHOT With application of input voltage, the time delay is ready to accept a trigger. When the trigger is applied, the output is energized and the time delay begins. During the time delay, the trigger is ignored. At the end of the time delay, the output is de-energized and the time delay relay is ready to accept another trigger.	
INTERVAL DELAY Applying the supply voltage starts the time delay & the output relay gets energized. At the end of the preset time, the contact gets de-energised. The timer is reset when the input power is removed.	
DELAY ON MAKE WITH TOTALIZE (TIME STORAGE) Input voltage is applied before and during timing. The output is de-energized before and during the time delay. Each time the 'Y' contact is closed, the time delay progresses; when it opens, timing stops. When the amount of time 'Y' is closed equals the full time delay, the output energizes and remains energized until reset. Removing input voltage resets the time delay and output.	
RETRIGGERABLE SINGLE SHOT The supply voltage must be constantly applied to the device. When the control switch is applied, the relay switches to the ON position and the set interval begins. After the interval has expired, the output relay switches to the OFF position. Closing the control switch during interval will reset the time. Continuous cycling of the trigger signal at a rate faster than the preset time will cause the relay to remain in the ON position.	
PULSE OUTPUT Applying the power supply starts the time delay, during which the output relay remains de-energized. At the end of the preset period, the relay gets energized for a preset time P(P=500ms). At the end of time P again relay de-energizes. Removing input voltage resets the time delay, output relay and the sequence.	
DELAY ON MAKE / DELAY ON BREAK Delay on Make time delay t1 and delay on break time delay t2 are the same i.e. With application of input voltage and the closure of 'Y', t1 begins and the output remains deenergized. At the end of t1, the output energizes. With the opening of 'Y' t2 begins. At the end of t2, the output de-energizes. Reset: If 'Y' is opened during t1, then t1 is reset and the output remains de-energized. If 'Y' is closed during t2 then t2 is reset and the output remains energized. Removing input voltage resets the time delay and output.	

Understanding the Functions on an Electronic Timing Relay (continued)

FUNCTION / OPERATION	TIMING CHART
STAR (WYE) DELTA There are two sequentially switching delayed outputs for starting motors in star-delta mode. After expiration of the pre-selected acceleration time for the star mode and a fixed transit time the second contact switches into the operating position for the delta mode. When the energizing quantity switches off the contact switches into the OFF position.	
REPEAT CYCLE EQUAL (ON FIRST) With application of input voltage, the output is energized and the time delay begins. At the end of the time delay, the output is de-energized and remains in that condition for the time delay. At the end of this time delay, the output is energized and the sequence repeats until input voltage is removed.	
INTERVAL AFTER BREAK Input voltage is applied before and during timing. With application of input voltage, the output remains de-energized. On opening (after a closure), the control contact 'Y' the output energizes and time delay begins. The output remains energized during timing. At the end of the time delay the output de-energizes. Reset: Opening (by closing and then opening) the 'Y' contact during timing resets the time delay. Removing input voltage resets the Time delay and output.	
(ASYMMETRICAL) CYCLIC ON FIRST, CYCLIC OFF FIRST **On First:** With application of input voltage, the output relay energizes and Time t begins. At the end of the time t, output relay de-energizes for set time t. At the end of time t again relay energizes and this cycle continues until input voltage is removed. Removing input voltage resets the time delay, output relay and the sequence. **Off First:** With application of input voltage, the output relay remains deenergized and time t begins. At the end of the time t, output relay energizes for set time t. At the end of time t again relay de-energizes and this cycle continues until input voltage is removed. Removing input voltage resets the time delay, output relay and the sequence.	
REPEAT CYCLE EQUAL (OFF FIRST) Upon application of input voltage, the time delay (t1) begins. At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of this time delay, the output is de-energized and the sequence repeats until input voltage is removed.	

Things to Consider while Buying Electronic Timing Relays

There are certain things that you need to consider prior to buying electronic timing relays for your applications. The following are some of the most important factors to take into account:

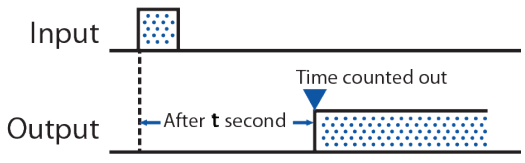
1. **Proven Design:** Make sure to buy the relays that are CE marked and UL listed, as you can use them anywhere in the world. Electrical ratings and product certifications are usually on the housing for easy reference.
2. **Timing Accuracy:** This is yet another important thing to consider. The timing relay must have a good accuracy to deliver accurate control application performance.
3. **Contact Parameters:** Based on the number of loads connected to the electronic timing relay and their respective amperage, it is recommended to consider contact related parameters such as number of contacts, type and rating of contacts.
4. **Timing Range:** It is important to check the timing range parameters of the relay to confirm it has a time interval that meets your application requirements.
5. **Operating Mode:** Not all electronic timing relays support every operating mode stated in the above section. Therefore, it is important to select a relay that offers an operating mode suitable for your application.
6. **Superior Protection:** The relay that you are planning to buy should feature IP20 terminal guards that help avoid accidental contact with live parts.
7. **Multi-Voltage Capability:** It is recommended that select relays have a multi-voltage capability, meaning that they are capable of accepting a wide range of input supply voltages. This helps you reduce inventory.

Where are these Electronic Timing Relays Used?

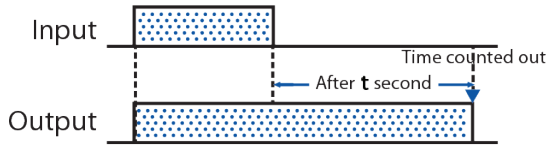
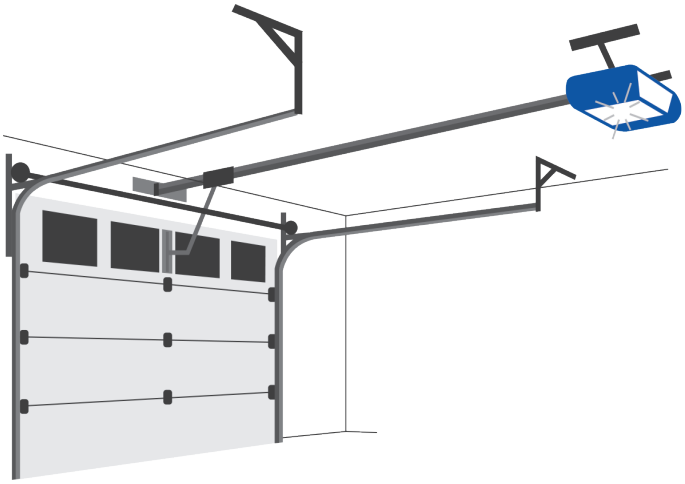
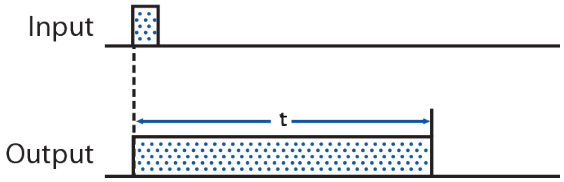
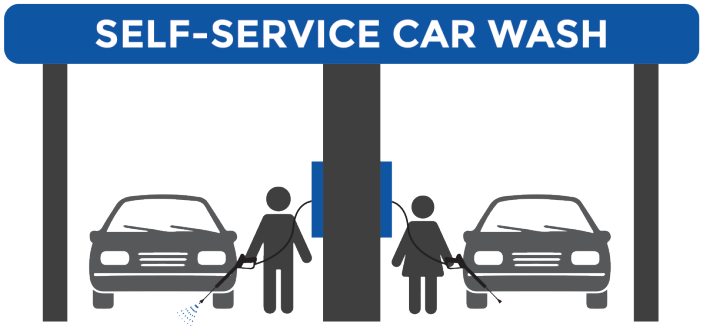
The several functions and features of this most critical electronic component make it an important element in a wide range of applications. Here are some most common applications of these devices:

1. Conveyor Lines
2. Discrete Automation
3. Process Control
4. Lighting
5. Food/Beverage Packaging
6. General Machine Automation

Examples of How an Electronic Timing Relay is Applied

OPERATION	APPLICATION
ON-Delay With ON-Delay operation, the Timer receives an input and then an output signal is output by switching the timer contacts after a set time delay. This name is used because there is a delay between when the input signal is received, e.g., turns ON, and when the output signal is output. ON-Delay operation is the operating mode most often used for automated machines. 	**Push Button for Crosswalk** When you push the button for a walk signal, the signal light changes from don't walk to walk after a delay. 

Examples of How an Electronic Timing Relay is Applied (continued)

OPERATION	APPLICATION
OFF-Delay With OFF-Delay operation, the output turns ON at the same time as the input and then the output turns OFF when the timer contacts switch after the set time has expired. The set time is calculated from when the input turns OFF. This name is used because there is a delay between when the input turns OFF and when the output turns OFF. 	**Garage Door Opener Light** When you open or close your garage door, the celing light turns on. The light remains lit for a few minutes after you open or close the door. 
Interval With Interval operation, the output turns ON at the same time as the input and the output turns OFF after a set time. 	**Car Wash** The car wash operates for five minutes when money is inserted. 

We hope the information provided in this white paper has helped you better understand electronic timing relays. It should help you in making the right selection for your application requirements.

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