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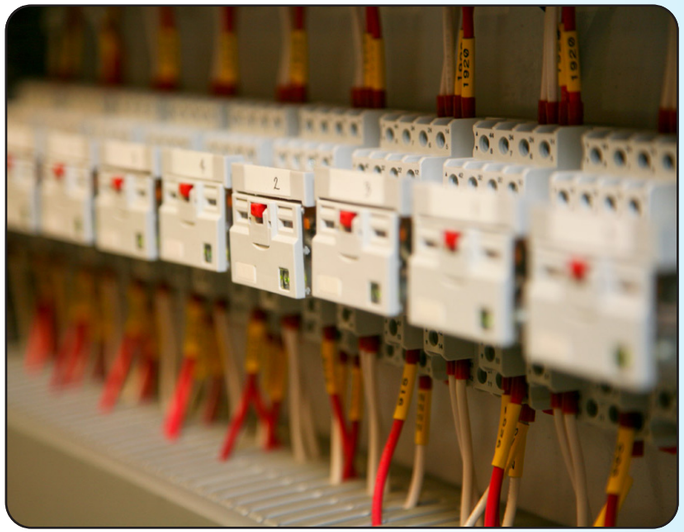
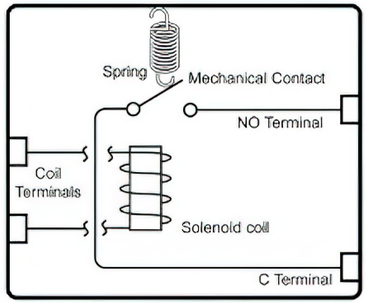
What are Relays?

Relays are fundamental devices used for switching electrical circuits on or off. They function like toggle or limit switches but use electrical control signals, instead of human hands or physical contact, for operation. They are typically used to provide electrical isolation and to allow low power circuits to operate higher power circuits.



How do relays work?

Common relays are electromechanical devices that have an electric solenoid coil on the "control" side of the circuit that, when energized, moves mechanical contacts on the "load" side.



Electro-mechanical relays use a small electrical control signal to shift contacts operating a separate circuit. The spring opposes the electro-mechanical action and returns the contact to its rest state when the coil is de-energized.

Electrical Ratings

Relay coils are rated to operate at specific voltage and current levels when energized. The minimum voltage required to energize a relay is the "pickup voltage" which is usually about 80% of the rated voltage. The relay will de-energize when the voltage falls below the "drop-out voltage." Relays frequently require a higher initial "inrush" current to energize them, but a lower holding current is acceptable to keep them energized.

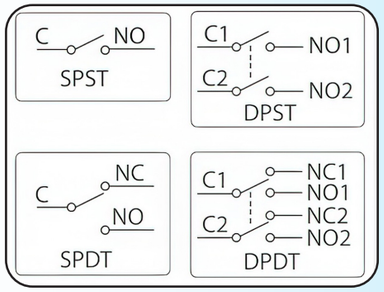
The output contacts, rated for various voltages and currents, control the high-power side of the load. When the contacts are isolated from the coils energized by the input, which is usually the case, they are called dry contacts. The external voltage connected to a dry contact is often called the wetting voltage.

Relay Contacts

The relay contact wiring terminations are designated as normally open (N.O.), normally closed (N.C.), and common (C). Also, three relay forms define the contact action at the terminals:

- Form A - normally open (N.O.) contacts pass power between the Common and N.O. terminals when the coil is energized
- Form B - normally closed (N.C.) contacts interrupt power between the Common and N.C. terminals when the coil is energized
- Form C - N.O./N.C., changeover, or transfer contacts pass power between the Common and N.O. terminals and interrupt power between the Common and N.C. terminals simultaneously when the coil is energized

Relays can have many different contact arrangements and configurations. The number of "poles" refers to the number of isolated output contacts a relay has. The most common configurations are single-pole (SP) and double-pole (DP). The term "throw" refers to the contact action. A Form A or B contact would be single-throw (ST), and a Form C contact would be double-throw (DT).



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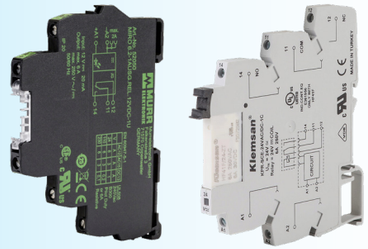
Types of Relays

Electromechanical Relays

Electromechanical relays receive an electrical input that magnetizes an internal coil, causing the relay's contacts to open or close. These relays serve a wide range of industrial applications and are available in a variety of styles to fit specific applications.



Slim interface relays are highly compact and lightweight relays, especially useful where cabinet space is a consideration.

Slim card relays are space-saving relay terminal modules containing multiple relays with one contact each, ideal for use as interposing relays between control and power circuits.

Power relays are highly reliable and able, can be used for applications uiring a maximum contact voltage 600 VAC, and are capable of ching load currents up to 40A.

Hazardous location relays are hermetically sealed units for installations in hazardous locations. These relays are vibration/shock resistant and can be used in washdown applications.

Force guided relays provide fail-safe operation by mechanically linking the N.O. and the associated N.C. contact. This ensures that one contact is closed while the other is open, preventing damage to equipment.

Ice cube relays are designed for high power control applications in machines and control panels.

Solid State Relays

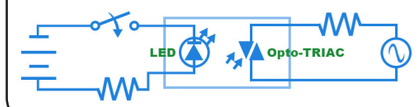
Solid state relays (SSR) are similar to electromechanical relays because both use a control circuit and a separate circuit for switching the load. Solid state relays use electronic components to switch the circuit on or off. When voltage is applied to the input of the SSR, the relay is energized by a light-emitting diode. The light from the diode is beamed into a light-sensitive semiconductor which signals the control circuit to turn on the output of the solid state switch. With no moving parts, these relays are ideal for applications requiring many contact closures and extended life.

Solid state relays energize in one of two ways:

Zero-crossing relays wait for the AC signal to cross zero before energizing, ideally suited for most commercial and industrial loads such as resistive heating elements, lamps and ballasts, and any other load with low initial impedance or capacitive characteristics. They are preferred in applications with some level of capacitance as they can minimize surge currents during the first conduction cycle.

Random turn-on (asynchronous) relays do not wait for the AC signal to cross zero before energizing and are commonly used with inductive loads (motors, contactor coils, transformers), where the phase shift between voltage and current would be an issue with zero-crossing relays.

Simple SSR Circuit Structure



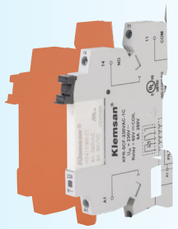
Solid state relays are available in panel and DIN rail mounting styles.

Panel mount relays feature a high load rating in a finger-safe "hockey puck" housing.

DIN rail mount solid state relays offer energy-efficient current switching in a slim housing ideal for space-saving applications.

For the latest prices, please check AutomationDirect.com.

Electro-Mechanical Relays Lineup



Starting at **$10.00** (KPR-SCF-230VAC-1)

Klemsan® Slim Interface Relays

Klemsan slim interface relays are highly compact, featuring a slim 6.2mm design in a self-extinguishing housing. These high quality, long life relays are ideal for space-limited applications.

- 12 to 230 VAC/VDC coil voltages
- 6A contact rating
- SPDT contact configuration
- Built-in coil surge suppression

Starting at **$11.50** (52000)

MURR ELEKTRONIK Slim Interface Relays

Murrelektronik slim interface relays are incredibly small with a width of only 6.2mm. These highly compact and lightweight relays are especially useful where cabinet space is a consideration.

- 24 to 230 VAC/VDC coil voltages
- Up to 8A contact rating
- SPST, SPDT, and DPDT contact configurations
- Integrated coil suppression

Starting at **$18.00** (OA5611-48-24)

DOLD Force Guided Relays

Dold force guided relays provide fail-safe operation via mechanically linked contacts to ensure all contacts move at the same time and prevent movement if any contact is immobilized.

- 24 VDC coil voltage
- 5A contact rating
- 4PST and 6PST contact configurations
- Polarity protection diode

Starting at **$5.00** (781-1C-24D)

AUTOMATIONDIRECT.COM 78 Series General Purpose Square Relays

AutomationDirect 78 series ice cube style relays feature a small package design with long life and high vibration and shock resistance. These relays are ideal for electrical control panels requiring stable and reliable relays.

- 12 VAC/VDC to 240 VAC coil voltage options
- 15A contact rating
- SPDT to 4PDT contact configurations
- Relay status flag indicator

Electro-Mechanical Relays Continued

AUTOMATIONDIRECT.COM 750R Series General Purpose Octal Relays

AutomationDirect 750R series cube relays with a standard octal base are general purpose relays designed for a wide range of applications, from power to sequence controls in various factory machines and control panels.

- 12 VAC/VDC to 240 VAC coil voltage options
- 10A contact rating
- DPDT and 3PDT contact configurations
- Relay status flag indicator

Starting at $9.00 (750R-2C-24D)

AUTOMATIONDIRECT.COM Hazardous Location Relays

AutomationDirect H750/H782 series hermetically sealed, ice cube style relays are designed for applications requiring hermetically sealed units for hazardous factory locations.

- 12 VAC/VDC to 240 VAC coil voltage options
- Up to 12A contact rating
- DPDT , 3PDT, and 4PDT contact configurations
- Class 1, Div. 2 Groups A, B, C, D

Starting at $41.00 (H782-4C3-24D)

AUTOMATIONDIRECT.COM Power Relays

AutomationDirect AD-PR40 series power relays feature an open, riveted construction designed to reliably switch high power contacts.

- 12 VDC to 240 VAC coil voltage options
- 40A contact rating
- SPDT, DPST, and DPDT contact configurations
- Up to 600 VAC contact voltage rating

Starting at $17.00 (AD-PR40-1C-12D)

Fuji Electric Card Relays

Fuji Electric RS series relays are compact, space-saving relay terminal modules containing four or six relays with one N.O. contact each. These relay-and-terminal modules are ideal for interfacing electronic control devices with output devices.

- 24 VDC coil voltage
- 5A contact rating
- SPST contact configuration
- Built-in suppression diodes

Starting at $44.50 (RS4N-DE)

For the latest prices, please check AutomationDirect.com.

Optocoupler Relays

MURR ELEKTRONIK Optocoupler Relays

Murrelektronik optocoupler relays are used to convert different signal levels or to isolate one signal from another. They provide an optoelectronic signal transfer between the input and output and have a long life span because they don't have any mechanical components that can wear out.

- Available in a range of AC and DC voltage ratings
- Up to 10A contact rating
- Galvanic separation between the input and output
- Up to 20kHz switching frequency (on select models)

Starting at $19.00 (52501)

Solid State Relays

GEFRAN BEYOND TECHNOLOGY GQ Series Panel Mount

Gefran GQ series "hockey puck" style, panel mount solid state relays offer contact ratings up to 90A. With no moving parts, these rugged solid state relays will provide millions of switching cycles with no mechanical wear.

- 3-32 VDC or 20-260 VAC input voltage ranges
- Up to 90A contact rating
- 24-230 VAC or 48-600 VAC output voltage ranges
- Zero cross switching
- Overload protection
- Thermal pad included with each panel mount solid state relay
- IP20 finger-safe protection rating

Starting at $24.00 (GQ-15-24-D-1-3)

GEFRAN BEYOND TECHNOLOGY GRSH Series DIN Rail Mount

Gefran GRSH series DIN rail mount solid state relays are ideal for industrial heating applications. These single-phase relays feature a compact design, integrated heatsinks, and zero cross switching. Select models offer built-in diagnostic features.

- 6-32 VDC or 20-260 VAC input voltage ranges
- Up to 120A contact rating
- 24-480 VAC or 48-600 VAC output voltage ranges
- Zero cross switching
- Overload protection
- Thermal alarm option with LED and alarm output
- Interrupted load option with LED and alarm output
- Integrated cooling fans on 90 and 120A models
- IP20 finger-safe protection rating

Starting at $49.50 (GRSH-15-48-D-0-0)

Phase Monitoring Relays

DOLD VARIMETER Series

Dold VARIMETER series phase monitoring relays provide early fault detection of conditions such as overvoltage, undervoltage, exceeding voltage range, phase unbalance, phase reversal, and missing or broken neutrals in single- or three-phase AC systems. Single-turn switches provide quick and easy setup, allowing monitoring function selection without a complex menu structure.

- Up to 575 VAC 50/60 Hz measuring range
- Single- or three-phase AC voltage monitoring
- 5A SPDT output contacts
- Adjustable voltage, hysteresis, and time delay
- Fast fault detection
- DIN rail mounting

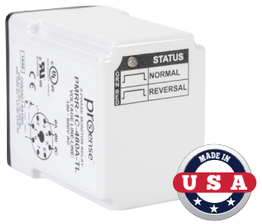
Starting at **$121.00** (RN9877-1203P4W525V)

ProSense PMRU-TL Series

ProSense PMRU-TL series phase monitor relays utilize a microprocessor based design to provide protection against phase loss, phase reversal, phase unbalance, undervoltage, and overvoltage. These universal voltage relays work on three-phase Wye or Delta systems.

- Universal voltage range of 190 to 500VAC
- 10A SPDT output contacts
- Automatic or Manual Reset
- User-selectable and adjustable settings

Starting at **$83.00** (PMRU-1C-480A-TL)



ProSense PMRR-TL Series

ProSense PMRR-TL series phase monitor relays provide protection against phase reversal in a compact, low-cost design. These relays are designed to be compatible with typical three-phase Wye or Delta systems.

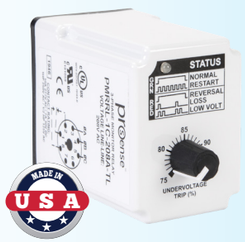
- Universal voltage range of 190 to 500VAC
- 10A SPDT output contacts
- LED indicates both normal and fault conditions

Starting at **$49.50** (PMRR-1C-480A-TL)

ProSense PMRRL-TL Series

ProSense PMRRL-TL series phase monitor relays provide protection against phase loss, phase reversal, and undervoltage. They are compatible with typical Wye or Delta systems. Phase monitor relays protect against single phasing regardless of any regenerative voltages.

- 208, 240, and 480 VAC input voltage
- 10A SPDT output contacts
- LED indicates both normal and fault conditions



Starting at **$57.00** (PMRRL-1C-208A-TL)

For the latest prices, please check AutomationDirect.com.

ProSense PMRU-2C Series

ProSense PMRU-2C series true RMS three-phase monitor relays provide protection against phase loss, phase reversal, phase unbalance, undervoltage, and overvoltage in most generator and other applications with non-sinusoidal waveforms.

- 190 to 600 VAC input voltage
- 10A SPDT output contacts
- Manual reset
- True RMS voltage measurement

Starting at **$91.00** (PMRU-2C-500A)

Voltage Monitoring Relays

DOLD VARIMETER Series

Dold VARIMETER series measuring relays safeguard equipment from damage caused by abnormal voltage fluctuations. These relays continuously monitor the voltage levels in a circuit and trigger responses when the voltages exceed or fall below a predetermined threshold. Four single-turn switches offer quick and easy configuration for a broad range of applications.

- Up to 250 VDC or 300 VAC measuring ranges
- For use in single-phase AC or DC systems
- Overvoltage, undervoltage, or voltage band monitoring
- 5A SPDT output contacts
- Adjustable voltage, hysteresis, time delay, and monitoring function
- Fast fault detection
- DIN rail mounting

Starting at **$110.00** (RL9854AC45-135V)

ProSense VMR Series

ProSense VMR series voltage monitoring relays monitor AC single-phase (50 to 60 Hz) or DC voltages to protect equipment from fault conditions.

- Over/under voltage relays with fixed or adjustable time-delay drop-out will protect equipment from over- or under-voltage conditions.
- Voltage band relays protect equipment required to operate within an upper and lower voltage limit; the relay will remain energized as long as the monitored voltage stays within the adjustable range.

Features

- Monitors AC single-phase (from 90 to 600 VAC) and DC voltages (from 9 to 138 VDC)
- 10A contact rating
- True RMS voltage measurement supports non-sinusoidal waveforms and ensures more accurate sensing
- Wide range of user-adjustable pick-up voltages

Starting at **$74.00** (VMR-2C-F-120A)

Alternating Relays

Starting at **$30.50** (AR-1C-120A-TL)

ProSense AR-TL Series

ProSense AR-TL series alternating relays increase equipment life by equalizing the run time of two loads using a duty/standby system arrangement.

- 10A contact rating
- Only one load runs at a time
- The standby device is a backup in case the first unit fails
- The alternating relay swaps the duty and standby loads to ensure even wear and prolong system life
- A three-position selector switch allows the unit to alternate the two loads normally or lock the relay to one load or the other

ProSense ARX-TL Series

ProSense ARX-TL series alternating relays provide cost savings by equalizing the run time of two loads using a duty/assist (lead/lag) system arrangement:

- 10A contact rating
- The lead pump runs by itself and is designed to handle the entire system load the majority of the time
- If the demand on the system is too great, the lag pump is also started to meet the increased demand
- The alternating relay switches the lead and lag pumps to ensure even wear and prolong system life
- A three-position selector switch allows the unit to alternate the two loads normally or lock the relay to always operate the same load first each time

Starting at **$33.00** (ARX-2C-120A-TL)

For the latest prices, please check AutomationDirect.com.

Pump Seal Failure Relays

Starting at **$59.00** (PSFR-1C-120A-TL)

ProSense PSFR Series

ProSense PSFR series pump seal failure relays are designed to monitor the shaft seals of submersible pumps. If the seal leaks, contaminating fluid will enter the seal cavity and lower the resistance between the internal probe and the common connection. When the resistance drops below the user-adjustable setpoint, the output energizes, which can be used to alert personnel of the leaking seal. The relay will automatically reset when the fault condition clears.

- In contact ratings up to 10A at 240 VAC
- 120 VAC coil voltage
- Single- and dual-pump monitoring options
- Adjustable sensitivity ranges (4.7K Ω to 100K Ω)

Intrinsically Safe Relays

Macromatic ISD Series

Macromatic ISD series intrinsically safe barrier relays provide a safe and reliable method to control up to four loads with up to four input devices located in a hazardous area.

- Isolated 5A relay outputs
- Isolated input terminals
- Universal input voltage, 10 to 125 VDC and 102 to 132 VAC, 50/60 Hz
- Approved for use in Class I Groups A, B, C, D, Class II Groups E, F, G, and Class III Hazardous Locations (Zones 0 & 1 in Canada)

Starting at **$314.00** (ISDUR4)

Starting at **$87.00** (ISEUR1)

Macromatic ISE Series

Macromatic ISE series intrinsically safe barrier relays control a single load with a single input device located in a hazardous area. Choose standard or inverse logic.

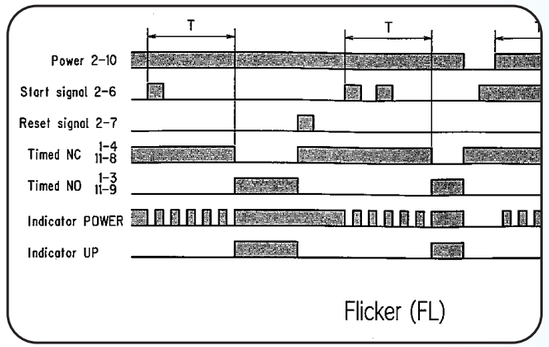
- 5A relay output
- Universal input voltage, 10 to 125 VDC and 102 to 132 VAC, 50/60 Hz
- Approved for use in Class I Groups A, B, C, D, Class II Groups E, F, G, and Class III Hazardous Locations (Zones 0 & 1 in Canada)

For the latest prices, please check AutomationDirect.com.

Timer Relays

Timer relays provide simple, cost-effective control of process and machine tools. They are configured via a mechanical dial or an LED digital display. Operation modes may include:

- On-delay: the output turns ON after a preset time is reached (timing example below)
- Fleeting (flicker): the output cycles between ON and OFF for the duration set by the preset time
- One-shot (on-interval): on the rising edge of the start signal, the output turns ON for the duration of the preset time
- Off-delay: the output remains high for a preset duration after the input goes low



Fuji Electric MS4S Series 1/16 DIN

Fuji Electric MS4S series 1/16 DIN style timer relays are plug-in 8-pin or 11-pin panel / DIN rail mountable relays. Basic units offer on-delay functionality, and multi-mode models offer four selectable timing functions.

- Up to 5A contact rating
- SPDT or DPDT contact configurations
- 24 VAC/VDC or 100-240 VAC coil voltage options
- 0.05 seconds to 60 hours timing ranges
- Large dial for easy timer setting
- Multi-mode models offer on-delay, flicker, one-shot, and off-delay timing modes

Starting at **$60.00** (MS4SC-CE-ADC)

MURR ELEKTRONIK Multi-Mode Timer Relay

Murrelektronik multi-mode timer relays are used for various industrial control functions, including engineering, automation, signal, and industrial installations. These timer relays feature a slim form factor and are ideal for space-limited applications.

- 6A contact rating
- SPST contact configuration
- Slim 6.2mm design
- 24 VDC coil voltage
- 0.1 to 300 seconds timing ranges
- On-delay, off-delay, one-shot, and cyclic timing modes

Starting at **$30.50** (52350)

DOLD MK Series Relay Timers

Dold MK series DIN rail mountable timer relays feature a wide timing range and are designed for a variety of industrial applications, such as process, machine tool, and safety control.

- Up to 5A contact rating
- Two changeover contacts
- 12-240 VAC/VDC coil voltage
- 0.05 seconds to 300 hours timing ranges
- On-delay, off-delay, and cyclic timing models
- Multi-mode models offer up to 8 selectable timing functions

Starting at **$60.00** (MK9906N-82-61)

Starting at **$49.00** (ST7P-2DE1N-ADC)

Fuji Electric ST7P Series Miniature

Fuji Electric ST7P series miniature DIN super timers are space-saving timer relays that provide a highly accurate timer operation. These on-delay timer relays provide a single adjustable timing range.

- 3A contact rating
- DPDT contact configuration
- 24 VDC or 120 VAC coil voltage options
- 0.4 seconds to 60 minutes timing ranges
- Large dial for easy timer setting

DOLD RK Series Relay Timers

Dold RK series single- and multi-function timer relays feature an economical, compact design suitable for a variety of time- dependent control functions in industrial and building automation systems.

- Up to 4A contact ratings
- One changeover contact
- 24 VAC/VDC and 110-127 VAC coil voltages
- Up to 300 hours selectable timing ranges
- On-delay, single-shot, and flasher models
- Multi-mode models offer eight selectable timing functions

Starting at **$34.00** (RK7815-71-61)

For the latest prices, please check AutomationDirect.com.

Timer Relays Continued

ProSense TRM Series Multi-Mode Relay Timers

ProSense TRM series 11-pin socket mount, multi-mode relay timers feature extremely wide timing ranges and a variety of selectable timing functions.

- 10A contact rating
- DPDT contact configuration
- Wide range of AC and DC coil voltage options
- Up to 10,230 hours selectable timing ranges
- Potentiometer, DIP switch, thumbwheel, or rotary switch programming options (depending on model)
- Models offer up to 16 selectable timing functions

ProSense T2S Series Relay Timers

ProSense T2S series relay timers offer a cost-effective design and compact size. This series utilizes a microprocessor-based design for reliable performance and maximum flexibility. All models are encapsulated to protect their internal components.

- 1A continuous / 10A inrush pilot duty contact rating
- N.O. solid state relay output
- 12-125VDC and 24-240VAC coil voltage options
- 0.1 seconds to 100 minutes selectable timing ranges
- On-delay, off-delay, fleeting, and on-interval options

ProSense T2R Series Relay Timers

ProSense T2R series timer relays feature a microprocessor- based design for reliable performance and maximum flexibility. Their relay output can handle most pilot duty and fractional horsepower loads, and all models are encapsulated for robust protection of internal components.

- 10A contact rating
- SPDT contact configuration
- Wide range of AC and DC coil voltage options
- 0.1 seconds to 100 minutes selectable timing ranges (T2R-M3-ADJ-240U goes up to 1000 minutes)
- Multi-mode, on-delay, off-delay, and fleeting mode options
- Multi-mode models offer 4 selectable timing functions in one unit

ProSense T30R Series Relay Timers

ProSense T30R series relay timers feature a high contact rating that can control loads without a separate contactor. These compact relays offer a microprocessor-based design for reliable performance and maximum flexibility. All models are encapsulated to protect their internal components.

- 30A contact rating
- SPDT contact configuration
- 24 VAC/VDC and 120 VAC/VDC coil voltage options
- 0.1 seconds to 10 hours selectable timing ranges
- On-delay, off-delay, fleeting, and cyclic mode options

ProSense T2L-ND Series Inline Relay Timers

ProSense T2L-ND series inline on-delay relay timers connect in series with the load and only require two connections. These relay timers feature a universal input voltage and are ideal for high duty cycle and long-life applications. Their enclosure is encapsulated for robust protection.

- 1A continuous / 10A inrush pilot duty contact rating
- N.O. solid state relay output
- 12-24 VDC and 24-240 VAC coil voltage
- 0.1 to 10.230 seconds selectable timing ranges
- DIP switch or potentiometer adjustment options (depending on model)

Multi-Function Digital Counter / Timer / Tachometer

AutomationDirect CTT Series Multi-Function Digital Counter / Timer / Tachometer

Versatile digital multi-function relay units are easily configured as a digital counter, timer, combination timer-counter, or tachometer. The two-color LCD shows values, settings, and setup parameters, easily set using the externally accessible DIP switches and the lockable keypad.

- Two-line, 6-digit, two-color LCD
- LED indicators for inputs, outputs, and functions
- Parameters are easily set using DIP switches or the lockable keypad
- Accepts inputs from a wide variety of NPN, PNP, or dry contact sensors
- Selectable counting speeds from 1 to 10,000 cycles per second
- 100-240 VAC and 24 VDC operating voltage
- Output 1 includes an SPST relay and concurrent NPN transistor
- SPDT or NPN transistor options for output 2
- Standard 1/16 DIN size with included panel mounting clip and gasket.
- IP66 protection rating (with proper enclosure installation)