

# SLIMLINE & A-LINE

## ELECTRONIC TIMERS



Our comprehensive ranges of Slimline and A-line Timers have many applications. The timer units cover a multitude of timing functions available in standard time ranges of up to 999 hours. The feature of being fully programmable allows parameters such as time and/or function to be set when the need arises. Because of this feature, the stockholders are able to carry less stock on their shelves. The Slimline is our 11-pin plug-in range and the A-Line is our Din-rail alternative.

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## ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY SUPPLY CONTACTS |
|------|-------|---------|--------------|-----------------------|
| ST   | 100   | 230V    | AC           | DP                    |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Examples

- Delayed energisation of loads on power-up.
- Energisation of loads for a set period of time.
- Switching loads on and off repetitively in equal intervals.
- Alternating operation of two loads in equal intervals.
- Sequential switching of loads.

## Features

- Failsafe feature.
- Programmable functions: delayed ON, interval (one shot), equal cycling.
- Programmable in six independent overlapping time ranges.
- Extended supply voltage range:  
10V to 30V AC/DC,  
90V to 250V AC.
- Specific power supply voltage available on request.
- Time adjustment on calibrated scale: 0 - 100%
- High repetitive accuracy.
- 5A double pole relay output (10A SPDT offered on request).
- Time range:  
ST-100: Up to 120 sec.  
ST-101: Up to 240 min.  
Extended time ranges available up to 25 hours or 200 hours on special order.

## Description of Operation

The **ST-100** and **ST-101** are programmable multi-function, multi-range timer. The ST-100 and ST-101 covers a time range of 0,15 seconds to 120 seconds/ 240 minutes. Time adjustment is provided in six independent overlapping ranges. The unit can be programmed to operate in either one of the following modes:

**1. Delayed ON Operation:** When power is applied to the unit, the LED illuminates dimly while the relay remains off. After expiry of the set time delay, the relay energises and the LED comes on brightly. The relay remains energised until the power supply to the unit is interrupted.

**2. Interval Operation:** When power is applied to the unit, the relay energises immediately and the LED comes on brightly. After expiry of the set time delay, the relay de-energises and remains off until the power supply is interrupted and re-applied to start another

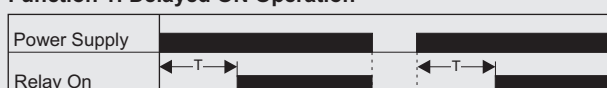
cycle.

**3. Equal Cycling, First Cycle Off Operation:** When power is applied to the unit, the relay will switch on and off repetitively, starting with the OFF cycle. The LED will glow dimly while the relay is de-energised and will come on brightly during the relay ON cycle. The duration of the ON cycle and OFF cycle are both equal to the set time.

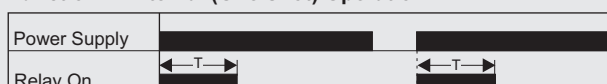
**4. Equal Cycling, First Cycle ON operation:** When power is applied to the unit, the relay will switch on and off repetitively, starting with the ON cycle. The LED will glow dimly while the relay is de-energised and will come on bright during the relay ON cycle. The duration of the ON cycle and OFF cycle are both equal to the set time.

## Operational Diagrams

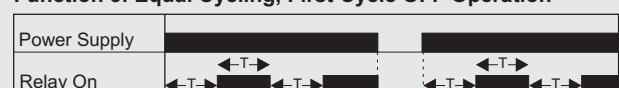
Function 1: Delayed ON Operation



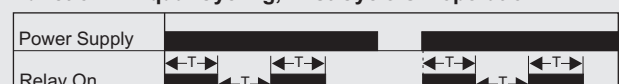
Function 2: Interval (One-shot) Operation



Function 3: Equal Cycling, First Cycle OFF Operation

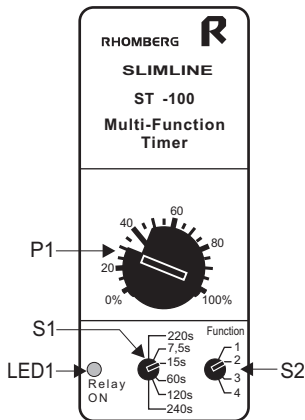


Function 4: Equal Cycling, First Cycle ON operation



T = set time

## Description of Controls



LED 1: The LED marked “Relay ON” glows dimly when power is on, but the relay is de-energised. The light illuminates brightly when the relay is energised.

P1: **The Time Setting** is adjusted on P1. Maximum setting of 100% corresponds with the time selected.

S1: **The Time Range** is set on S1, using a screwdriver.

S2: **The Timing Function** is set on S2, using a screwdriver.

Position 1: - delayed ON operation.

Position 2: - Interval (single shot) operation.

Position 3: - Equal cycling, first cycle Off operation.

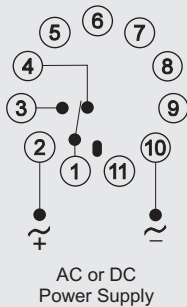
Position 4: - Equal cycling, first cycle ON operation.

## Wiring and Connection

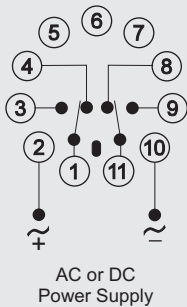
| Power Supply     |        |
|------------------|--------|
| Phase/Positive   | Pin 2  |
| Neutral/Negative | Pin 10 |

| Relay Contacts (SPDT) |       |
|-----------------------|-------|
| Normally Open         | 1 + 3 |
| Normally Closed       | 1 + 4 |

| Relay Contacts (DPDT) |        |
|-----------------------|--------|
| Normally Open         | 1 + 3  |
| Normally Closed       | 1 + 4  |
| Normally Open         | 11 + 9 |
| Normally Closed       | 11 + 8 |



**APPLICATION 1**  
Single pole (SPDT)



**APPLICATION 2**  
Double pole (DPDT)  
*Note: DPDT supplied as standard*

*Note: The timer can be supplied with an instantaneous relay on special order.*

## Technical Specifications

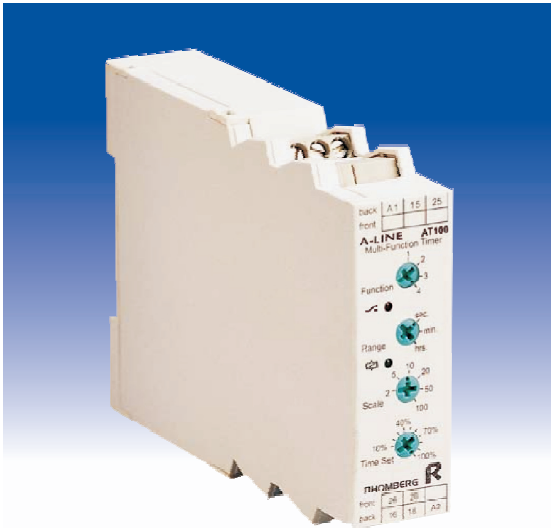
| POWER SUPPLY |                                                                                                                                                                  |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC:          | Supply voltage:<br>Not Galvanic: 90 - 250V<br>Galvanic: 12, 24, 110, 230, 400, 415, 525V ±15%<br>Power consumption: 3VA (approx.)<br>6VA for 415, 525V (approx.) |
| DC:          | Supply voltage: 48, 60, 110V ± 15%<br>Power consumption: 30mA                                                                                                    |
| AC/DC:       | Supply voltage: 10 - 30V AC/DC<br>Power consumption: 100mA                                                                                                       |

| ST-100    |              |
|-----------|--------------|
| Switch S1 | Time Ranges  |
| 1,8s      | - Up to 1,8s |
| 7,5s      | - Up to 7,5s |
| 15s       | - Up to 15s  |
| 30s       | - Up to 30s  |
| 60s       | - Up to 60s  |
| 120s      | - Up to 120s |

**Reset:** Power supply to be interrupted for at least 0,5 seconds. For high speed reset applications, refer to ST-110.

| ST-101    |              |
|-----------|--------------|
| Switch S1 | Time Ranges  |
| 220s      | - Up to 220s |
| 7,5m      | - Up to 7,5m |
| 15m       | - Up to 15m  |
| 60m       | - Up to 60m  |
| 120m      | - Up to 120m |
| 240m      | - Up to 240m |

Extended time range available on special order:  
• 6, 12, 5 and 25 hours  
• 50, 100, and 200 hours



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY CONTACTS | RELAY |
|------|-------|---------|-----------------------|-------|
| AT   | 100   | 230     | A                     | D     |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Examples

- Delayed energisation of loads on power-up.
- Energisation of loads for a set period of time.
- Switching loads on and off repetitively in equal intervals.
- Alternating operation of two loads in equal intervals.
- Sequential switching of loads.

## Features

- Failsafe feature.
- 4 programmable functions: Delayed ON, Interval (one shot) or Symmetrical recycling (OFF first or ON first).
- 18 overlapping programmable time ranges from 0,2 seconds to 100 hours, achieved by:
  - 3 programmable time ranges: seconds, minutes, hours.
  - 6 programmable time scales for each of 3 time ranges.
- Time Setting on calibrated scale (10% to 100%).
- High repetitive accuracy.
- Power ON and Relay ON LEDs.
- Flashing Power ON LED when unit is timing (flash rate increases when relay is about to switch).
- Microprocessor technology incorporated.
- 5A SPDT or DPDT relay output.

## Description of Operation

The **AT-100** is fully programmable, microprocessor based Multi-Function Timer. The unit has 18 overlapping time ranges within 0,2 seconds and 100 hours.

The unit can be programmed to operate in any of the following modes:

**1. Delayed ON Operation:** At power-up the relay is De-energised. After the set time expires, the relay energises. The relay remains energised until the power supply is interrupted for at least 0,5 seconds.

**2. Internal Operation:** At power-up the relay energises immediately. After the set time expires the relay de-energises. The relay remains de-energised until the power supply is interrupted (for at least 0,5 seconds) and re-applied to start another cycle.

**3. Symmetrical Recycling, First Cycle OFF Operation:** After applying power, the relay will switch on and off repetitively, starting with the OFF cycle first. The relay de-energises and/or remains de-energised if the power supply is interrupted for at least 0,5 seconds. The duration of the ON cycle and the OFF cycle are both equal to the set time.

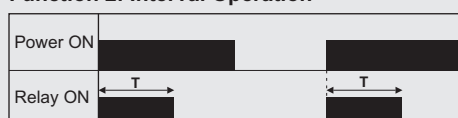
**4. Symmetrical Recycle, First Cycle ON Operation:** After apply power, the relay will switch on and off repetitively, starting with the ON cycle first. The relay de-energises and/or remains de-energised if the power supply is interrupted for at least 0,5 seconds. The duration of the ON cycle and the OFF cycle are both equal to the set time.

## Operational Diagrams

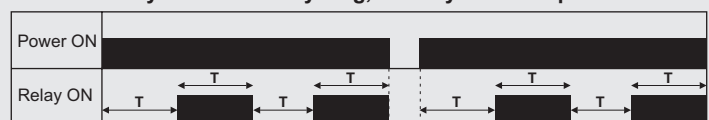
Function 1: Delayed ON Operation



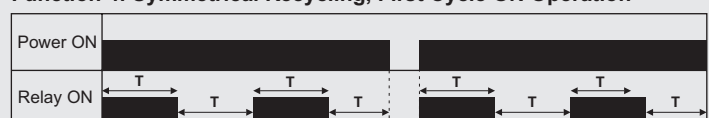
Function 2: Interval Operation



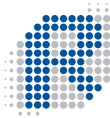
Function 3: Symmetrical Recycling, First Cycle OFF Operation



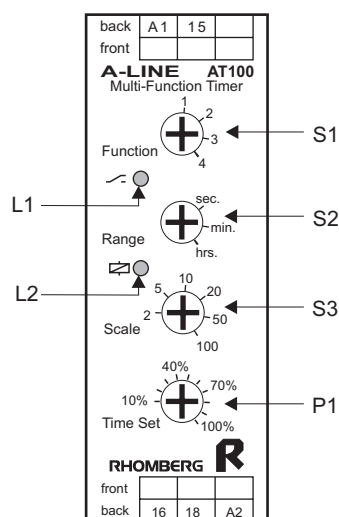
Function 4: Symmetrical Recycling, First Cycle ON Operation



T = Set time



## Description of Controls



L1: The red “Relay ON” LED marked illuminates when the relay is energised.

L2: The green “Power ON” LED marked illuminates when power is supplied to the unit. The LED flashes when the unit is timing. Before the relay switches (in the last 10% of the timed interval), the flash rate increases.

S1: The **Timing Function** is set on S1.

- Position 1: Delayed ON Operation
- Position 2: Interval Operation
- Position 3: Symmetrical recycling, first cycle OFF Cycle First
- Position 4: Symmetrical Recycling, ON Cycle First

S2: The **Time Range** is set on S2.

- Sec: Seconds
- Min: Minutes
- Hrs: Hours

S3: The **Time Scale** is set on S3. The time scale are 2, 5, 10, 20, 50 & 100.

P1: The **Time Setting** is adjusted on P1. The time setting can be adjusted from 10% to 100% of the selected time.

EXAMPLES OF TIME SETTINGS

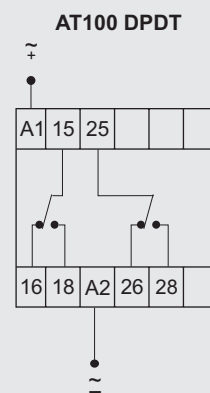
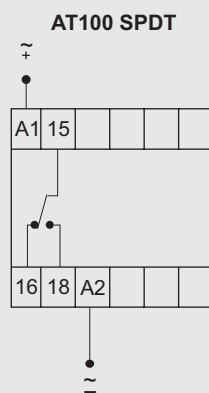
| Required Time | Time Scale | Time Range | Time Setting |
|---------------|------------|------------|--------------|
| 8 seconds     | 10         | Sec        | 80%          |
| 25 minutes    | 50         | Min        | 50%          |
| 4,5 hours     | 5          | Hrs        | 90%          |

## Wiring and Connection

| Power Supply     |    |
|------------------|----|
| Phase/Positive   | A1 |
| Neutral/Negative | A2 |

| Relay Contacts - SPDT |         |
|-----------------------|---------|
| Normally Open         | 15 + 18 |
| Normally Closed       | 15 + 16 |

| Relay Contacts - DPDT |                 |         |
|-----------------------|-----------------|---------|
| CONTACT 1             | Normally Open   | 15 + 18 |
|                       | Normally Closed | 15 + 16 |
| CONTACT 2             | Normally Open   | 25 + 28 |
|                       | Normally Closed | 25 + 26 |



## Technical Specifications

| POWER SUPPLY                            |                                                 |           |                 |
|-----------------------------------------|-------------------------------------------------|-----------|-----------------|
| Type                                    | Voltage                                         | Tolerance | Consumption     |
| AC Transformer (2kV galvanic isolation) | 12, 24, 115, 230 (220-240), 400 (380-415), 525V | ±15%      | 2VA (approx.)   |
| AC Reactive                             | 250 (90-250)V                                   | -         | 2VA (approx.)   |
| DC                                      | 48, 60, 110V                                    | ±15%      | 30mA (approx.)  |
| AC/DC                                   | 12/24V                                          | ±15%      | 100mA (approx.) |

| RELAY                    |      |      |                      |
|--------------------------|------|------|----------------------|
| Relay Options (250V, 5A) | SPDT | DPDT | SPDT & Instantaneous |

| HOUSING       |                |            |
|---------------|----------------|------------|
| Voltage       | 250V and below | Above 250V |
| Housing Width | 22.5mm         | 45mm       |

| TIME RANGES (STANDARD) |                          |                                               |
|------------------------|--------------------------|-----------------------------------------------|
| Time Scale Selection   | Time Setting: 10 to 100% | Time Range Selection: Seconds, minutes, hours |
| 2                      | 0.2 to 2                 | Sec, min or hrs                               |
| 5                      | 0.5 to 5                 | Sec, min or hrs                               |
| 10                     | 1 to 10                  | Sec, min or hrs                               |
| 20                     | 2 to 20                  | Sec, min or hrs                               |
| 50                     | 5 to 50                  | Sec, min or hrs                               |
| 100                    | 10 to 100                | Sec, min or hrs                               |

| TIME SPECIFICATION |      |
|--------------------|------|
| Setting Accuracy   | 5%   |
| Repeatability      | 0.5% |

Additional information in Section J, page 131.

# ST-110/ST-111 (NPN) ST-112/ST-113 (PNP)

## Electronic Reset Timer



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| ST   | 110   | 230V    | AC           | DP             |

SEE PAGE 60 FOR ORDERING OPTIONS

# SLIMLINE

MONITORING RELAYS

## Application Examples

- Safety control on elevator door closure.
- Control of access boom in multi storey car parks.
- Automatic starting of stand-by system.
- Off delay timer in conveyor and numerous other applications.
- Pile-up detection on canning or bottling lines.
- Energy saving in large corridors (buildings or mines) through delayed switching off of lights.
- Gap detection on canning or bottling lines.
- Low RPM under-speed or slip detection on conveyor belts.
- Extending of high speed impulses.
- Delayed release after sensor or limit switch operation.

## Features

- Failsafe feature.
- Programmable functions: delayed ON, interval (one shot), both withhold or pulse reset.
- Programmable in six independent overlapping time ranges.
- Direct interface with DC three-wire NPN (ST-110/ST111) and PNP (ST-112/ST113) sensors.
- High speed electronic reset.
- High repetitive accuracy.
- Time adjustment on calibrated scale, 0-100%.
- 5A double pole relay output (10A SPDT offered on request).
- Time Ranges: ST-110/ST112: Up to 120 sec.  
ST111/ST113: Up to 240 min.
- Extended time ranges available up to 200 hours on special order.

## Description of Operation

The **ST-110/ST-111/ST-112/ST-113** are programmable multi-range timers for high speed electronic reset applications. The ST-110/ST-112 covers a time range of 0, 15 to 120 seconds while the ST-111/ST-113 covers a range of 10 seconds to 240 minutes. Time adjustment is provided in six overlapping ranges. The units interface readily with three wire NPN/PNP proximity sensors, potential free contacts or limits switches, providing high speed reset operation. The timer is reset by closing the contact between the reset inputs. If another reset occurs before the set time period has expired, the timer is set back to zero and a new timing cycle is initiated. The units can be programmed to operate in either one of the following modes:

**1. Delayed On Operation, Hold Reset:** When power is applied, the relay remains de-energised until reset occurs. When the reset contact is released, the timer starts running and the relay energises when the set time has elapsed. When the reset contact closes again, the relay switches off and the timer assumes a "reset and hold" mode. When the reset contact releases, the timer starts running, and the relay remains off until the set time has elapsed. When the set time has expired, the relay switches on until another reset occurs.

**2. Delayed On Operation, Pulse Reset:** When power is applied, the relay remains de-energised until a reset occurs. When the reset contacts closes, the timer starts running and the relay energises when the set time has elapsed. When the reset contact closes again, the relay switches off and the timer starts running immediately, irrespective of the duration of the reset contact closure. When the set time has elapsed, the relay switches on until another reset occurs.

**3. Interval Operation, Hold Reset:** When power is applied to the unit, the relay remains de-energised until a reset occurs. When the reset contact closes, the relay energises and the timer assumes a "reset and hold" mode. When the reset contact releases, the timer starts running and the relay remains energised until the set time has elapsed. When the set time has expired, the relay switches off until another reset occurs.

**4. Interval Operation, Pulse Reset:** When power is applied to the unit, the relay remains de-energised until a reset occurs. When the reset contact closes, the relay switches on and the timer starts running immediately, irrespective of the duration of the reset contact closure. When the set time has elapsed, the relay switches off until another reset occurs.

## Operational Diagrams

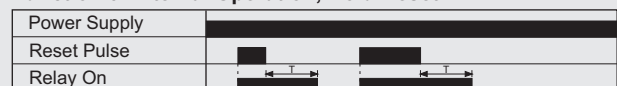
Function 1: Delayed ON Operation, Hold Reset.



Function 2: Delayed ON Operation, Pulse Reset



Function 3: Interval Operation, Hold Reset



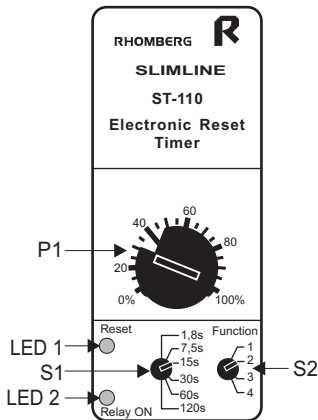
Function 4: Interval Operation, Pulse Reset



T = set time



## Description of Controls



P1: **The Time Setting** is adjusted on P1. Maximum setting of 100% corresponds with the time selected on S1.

S1: **The Time Range** is set on S1.

S2: **The Timing Function** is set on S2.

- Position 1: Delayed ON operation, hold reset.
- Position 2: Delayed ON operation, pulse reset
- Position 3: Interval operation, hold reset.
- Position 4: Interval operation, pulse reset.

LED 1: The LED marked **“Reset”** illuminates whenever the reset input is activated, ie. the reset contact is closed.

LED 2: The LED marked **“Relay ON”** glows dimly when power is on, but the relay is de-energised. The light illuminates brightly when the relay is energised.

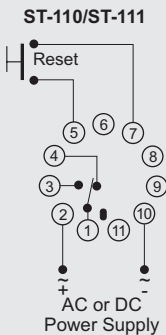
## Wiring and Connection

| Power Supply     |        |
|------------------|--------|
| Phase/Positive   | Pin 2  |
| Neutral/Negative | Pin 10 |

| Relay Contacts SPDT |      |
|---------------------|------|
| Normally open       | 1+3  |
| Normally closed     | 1+4  |
| Relay Contacts DPDT |      |
| Normally open       | 1+3  |
| Normally closed     | 1+4  |
| Normally open       | 11+9 |
| Normally closed     | 11+8 |

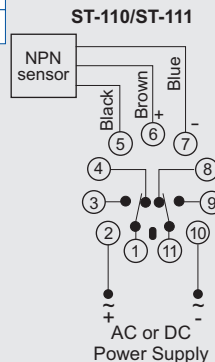
| Reset Input                                                                                                                                                        |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Limit switch or contact:</b><br>To be connected between pin 5 and pin 7.                                                                                        |  |
| <b>DC sensor (NPN or PNP):</b><br>- Brown wire to be connected to pin 6 (+)<br>- Blue wire to be connected to pin 7 (-).<br>- Black wire to be connected to pin 5. |  |

**Note:** For extended wiring, screened wire is recommended to eliminate erratic switching due to noise or electromagnetic interference. The screen should be connected to pin 7 or earth.



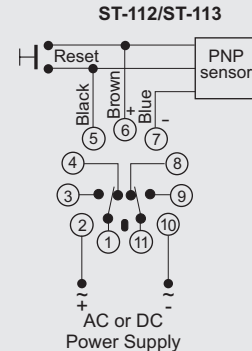
**APPLICATION 1**

Single pole (SPDT) reset with dry contact or switch.



**APPLICATION 2**

Double pole (DPDT) reset with DC sensor (NPN)



**APPLICATION 3**

Double pole (DPDT) reset with dry contact in parallel with a PNP sensor

**Note:** DPDT supplied as standard. For further information on sensor refer to our Detector Catalogue.

## Technical Specifications

| POWER SUPPLY |                                                                                                                                                                                |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC:          | Supply voltage: 12, 24, 110, 230, 400, 415, 525V $\pm 15\%$<br>Isolation (reset input to power supply): 2kV<br>Power consumption: 3VA (approx.)<br>6VA for 415, 525V (approx.) |
| DC:          | Supply voltage: 10-30V, 48, 60, 110V $\pm 15\%$<br>Isolation: no galvanic isolation<br>Power consumption: 100mA (10-30V),<br>30mA for higher ranges.                           |

| ST-110/112 |              |
|------------|--------------|
| Switch S1  | Time Ranges  |
| 1,8s       | - Up to 1,8s |
| 7,5s       | - Up to 7,5s |
| 15s        | - Up to 15s  |
| 30s        | - Up to 30s  |
| 60s        | - Up to 60s  |
| 120s       | - Up to 120s |

| ST-111/113 |              |
|------------|--------------|
| Switch S1  | Time Ranges  |
| 220s       | - Up to 220s |
| 7,5m       | - Up to 7,5m |
| 15m        | - Up to 15m  |
| 60m        | - Up to 60m  |
| 120m       | - Up to 120m |
| 240m       | - Up to 240m |

Extended time ranges available on special order:

- 6, 12, 5 and 25 hours
- 50, 100, and 200 hours

| RESET INPUT:                                                                          | 12V DC OUTPUT:                                              |
|---------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Reset time: 2milliseconds<br>Short circuit current: 1mA<br>Open circuit voltage: 8.2V | Voltage tolerance: 10-15V DC<br>Source current: 30mA (max.) |

Additional information in Section J, page 131.



## ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| AT   | 110   | 230     | A            | D              |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Examples

- Safety control on elevator door closure.
- Control of access booms in multi-storey car parks.
- Automatic starting of stand-by system.
- Off delay timer in conveyor and numerous other applications.
- Pile-up detection on canning or bottling lines.
- Gap detection on canning or bottling lines.
- Energy savings in large corridors through delayed switching off of lights (hallway timer).
- Under-speed or slip detection on conveyor belts.
- Extending of high-speed impulses.
- Delayed release after sensor or limit switch operation.
- Watchdog timer for PLCs.

## Features

- Failsafe feature.
- 4 programmable functions: Delayed ON or Interval (One shot), both with hold or pulse reset.
- 18 overlapping programmable time ranges from 0,2 seconds to 100 hours, achieved by:
  - 3 programmable time ranges: seconds, minutes, hours.
  - 6 programmable time scales for 3 time ranges.
- Time Setting on calibrated scale (10% to 100%)
- High repetitive accuracy.
- Direct interface with DC Three-wire PNP/NPN sensors, with reset inputs for either PNP or NPN in the same unit.
- High speed electronic reset.
- Power ON, Relay ON and Reset LEDs.
- Flashing Power ON LED when unit is timing (flash rate increases when relay is about to switch).
- Microprocessor technology incorporated.
- 5A SPDT or DPDT relay output.

## Description of Operation

The **AT-110** is a fully programmable, microprocessor based Electronic Reset Timer. The unit has 18 overlapping programmable time ranges from 0.2 seconds to 100 hours. The unit interfaces readily with three-wire PNP and NPN proximity sensors, potential free contacts or limit switches, providing high-speed reset operation. The unit can be programmed to operate in any of the following modes:

**1. Delayed ON Operation, Hold Reset:** At power-up the relay is de-energised. Timing only commences on release of the reset input. After the set time expires, the relay energises. The relay remains energised until the timer is reset or the power supply is interrupted for at least 0,5 seconds.

**2. Delayed ON Operation, Pulse Reset:** At power-up the relay is de-energised. Timing only commences on activation of the reset-input. After the set time expires, the relay energises. The relay remains energised until the

timer is reset or the power supply is interrupted for at least 0,5 seconds.

**3. Interval Operation, Hold Reset:** At power-up the relay is de-energised. On activation of the reset-input, the relay energises. Timing will only commence on the release of the reset-input. After the set time expires, the relay de-energises.

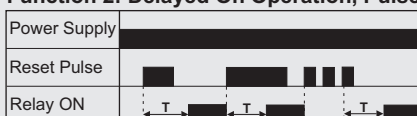
**4. Interval Operation, Pulse Reset:** At power-up the relay is de-energised. On activation of the reset-input, the relay energises and timing commences, irrespective of the duration of the reset contact closure. After the set time expires, the relay de-energises.

## Operational Diagrams

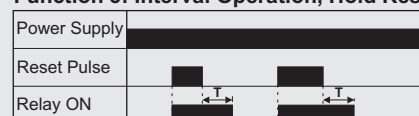
Function1: Delayed On Operation, Hold Reset.



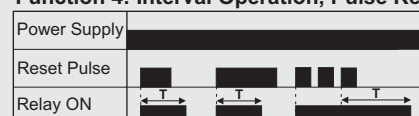
Function 2: Delayed On Operation, Pulse Reset.



Function 3: Interval Operation, Hold Reset.



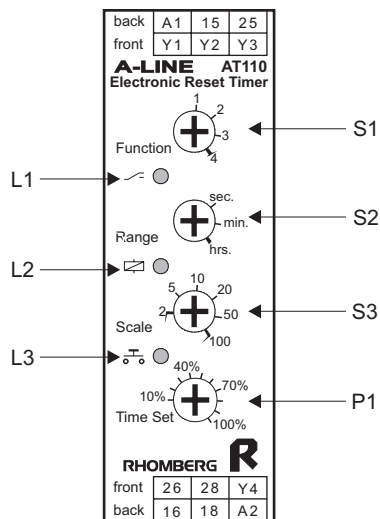
Function 4: Interval Operation, Pulse Reset.



T = Set time



## Description of Controls



L1: The red “Relay ON” LED marked illuminates when the relay is energised.

L2: The green “Power ON” LED marked illuminates when power is supplied to the timer. The LED flashes when the unit is timing. Before the relay switches, the flash rate increases.

L3: The red “Reset” LED illuminates whenever the reset input is activated, i.e. the reset contact is closed.

S1: The **Timing Function** is set on S1.

- Position1: Delayed ON Operation, Hold Reset.
- Position2: Delayed ON Operation, Pulse Reset.
- Position3: Interval Operation, Hold Reset.
- Position4: Interval Operation, Pulse Reset.

S2: The **Time Range** is set on S2.

- Sec: Seconds
- Min: Minutes
- Hrs: Hours

S3: The **Time Scale** is set on S3. The time scales are 2, 5, 10, 20, 50 & 100.

P1: The **Time Setting** is adjusted on P1. The time setting can be adjusted from 10% to 100% of the selected time.

### EXAMPLES OF TIME SETTINGS

| Required Time | Time Scale (S3) | Time Range (S2) | Time Setting (P1) |
|---------------|-----------------|-----------------|-------------------|
| 8 seconds     | 10              | Sec             | 80%               |
| 25 minutes    | 50              | Min             | 50%               |
| 4,5 hours     | 5               | Hrs             | 90%               |

## Wiring and Connection

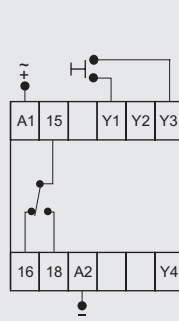
| Relay Contacts-DPDT |                 |         |
|---------------------|-----------------|---------|
| CONTACT 1           | Normally Open   | 15 + 18 |
|                     | Normally Closed | 15 + 16 |
| CONTACT 2           | Normally Open   | 25 + 28 |
|                     | Normally Closed | 25 + 26 |

| Power Supply     |    |
|------------------|----|
| Phase/Positive   | A1 |
| Neutral/Negative | A2 |

| Reset Input              |         |
|--------------------------|---------|
| Potential free contact   | Y1 + Y3 |
| NPN AC sensor Black wire | Y1      |
| Brown wire, +            | Y2      |
| Blue wire, -             | Y3      |
| PNP DC sensor Black wire | Y4      |
| Brown wire, +            | Y2      |
| Blue wire, -             | Y3      |

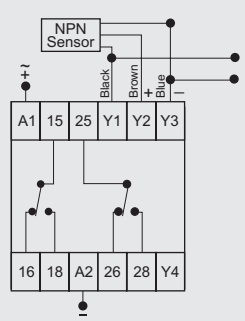
| Relay Contacts-SPDT |         |
|---------------------|---------|
| Normally Open       | 15 + 18 |
| Normally Closed     | 15 + 16 |

### AT110 SPDT



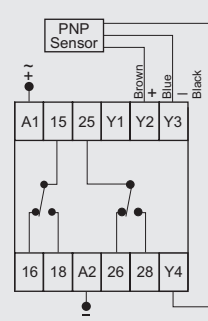
**APPLICATION 1**  
Reset with a potential free contact or switch.

### AT110 DPDT



**APPLICATION 2**  
Reset with a DC sensor (NPN) in parallel with a potential free contact.

### AT110 DPDT



**APPLICATION 3**  
Reset with a DC sensor (PNP).

**Note:** For extended wiring, screened wire is recommended to eliminate erratic switching due to electromagnetic interference. The screen should be connected to Y3

## Technical Specifications

| POWER SUPPLY                            |                                                 |           |                 |
|-----------------------------------------|-------------------------------------------------|-----------|-----------------|
| Type                                    | Voltage                                         | Tolerance | Consumption     |
| AC Transformer (2kV galvanic isolation) | 12, 24, 115, 230 (220-240), 400 (380-415), 525V | ±15%      | 2VA (approx.)   |
| DC                                      | 48, 60, 110V                                    | ±15%      | 30mA (approx.)  |
| AC/DC                                   | 12/24V                                          | ±15%      | 100mA (approx.) |

| RELAY                   |      |      |
|-------------------------|------|------|
| Relay Options (250, 5A) | SPDT | DPDT |

| HOUSING       |                |            |
|---------------|----------------|------------|
| Voltage       | 250V and below | Above 250V |
| Housing Width | 22,5mm         | 45mm       |

| TIME RANGES (STANDARD) |                           |                                               |
|------------------------|---------------------------|-----------------------------------------------|
| Time Scale Selection   | Time Settings: 10 to 100% | Time Range Selection: Seconds, minutes, hours |
| 2                      | 0,2 to 2                  | Sec, min or hrs                               |
| 5                      | 0,5 to 5                  | Sec, min or hrs                               |
| 10                     | 1 to 10                   | Sec, min or hrs                               |
| 20                     | 2 to 20                   | Sec, min or hrs                               |
| 50                     | 5 to 50                   | Sec, min or hrs                               |
| 100                    | 10 to 100                 | Sec, min or hrs                               |

| RESET INPUT          |                                                    |
|----------------------|----------------------------------------------------|
| Input type           | NPN Sensor<br>PNP Sensor<br>Potential free contact |
| Minimum Pulse width  | 4mS                                                |
| Open circuit Voltage | <5, 6V                                             |

| DC OUTPUT         |        |
|-------------------|--------|
| Voltage tolerance | 10-24V |
| Source Current    | 10mA   |

| DC OUTPUT        |      |
|------------------|------|
| Setting Accuracy | 5%   |
| Repeatability    | 0,5% |

Additional information in Section J, page 131.

# ST-130

## Star-Delta Timer

# SLIMLINE

MONITORING RELAYS



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| ST   | 130   | 230V    | AC           | DP             |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Example

- Timed switching of contactors from star to delta, with pause, to prevent contactors operating simultaneously.

## Features

- Failsafe feature.
- Relay de-energises to “centre-off” position for failsafe operation.
- Adjustable time range of 0-60 seconds.
- Incorporates 75 millisecond pause time to prevent overlapping of Star and Delta switching.
- LED indication of relay output status, i.e.: Star or Delta mode.
- Two relay method for interlocking of contacts ensuring break before make.
- 5A relay output.
- Rated for continuous operation.

## Description of Operation

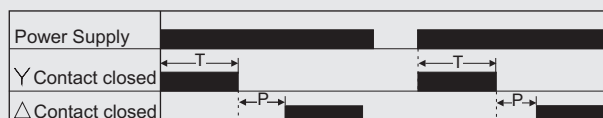
The **ST-130** is a high performance electronic timer to enable the star-delta starter to be switched safely from star to delta. Interlocking and an electronically controlled star make period, ensures failsafe operation. A pause time of 75 milliseconds prevents overlapping of sluggish star-delta contractors.

The key feature of this timer is that in the event of a failure, the relay fails to the “centre-off” position, meaning that neither the star nor delta contractors are energised.

**Operation:** When power is applied to the unit, the star contact (pins 1 & 4) closes and the preset time cycle starts (LED 1 illuminates). When the star time cycle ends, the star contacts opens and the pause period of 75 milliseconds starts. During the pause cycle, both the star and delta contacts are open. When the pause cycle ends, the delta contact (pin 1 and 3) closes (LED 2 illuminates).

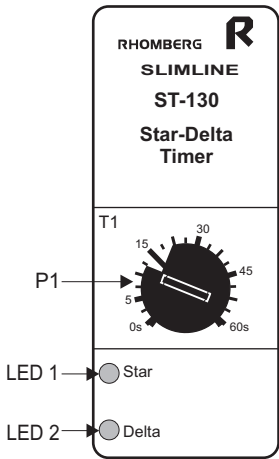
The timer remains in the delta cycle until the power to the unit is interrupted. The relay then returns to the safe central position.

## Operational Diagram



T = Time setting  
P = Pause of approximately 75ms

## Description of Controls

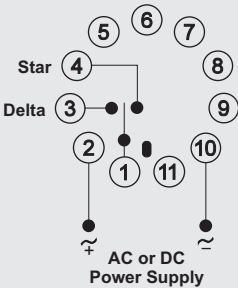


- P1: **The Time Setting** is adjusted on P1, between 0 - 60 seconds, i.e. the star contact closure time.
- LED 1: The LED marked **“Star”** is illuminated when star contact is closed (i.e. pins 1 & 4 are connected).
- LED 2: The LED marked **“Delta”** is illuminated when delta contact is closed (i.e. pins 1 & 3 are connected).

## Wiring and Connection

| Power Supply     |        |
|------------------|--------|
| Phase/Positive   | Pin 2  |
| Neutral/Negative | Pin 10 |

| Relay Contacts            |       |
|---------------------------|-------|
| Closed during Delta cycle | 1 + 3 |
| Closed during Star cycle  | 1 + 4 |



**Note:** Relay de-energises to the “centre OFF” position when power is off.

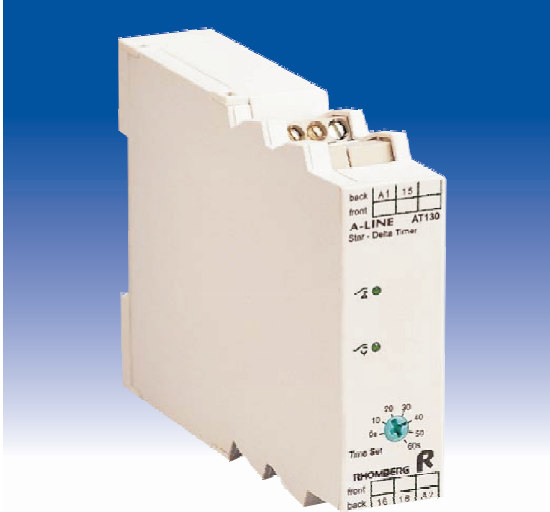
## Technical Specifications

| POWER SUPPLY |                                                                                                                                                                |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC:          | Supply voltage: 48, 60, 110, 230, 400, 415, 525V ±15%<br>Power consumption: 3VA (approx.)<br>6VA for 415, 525V (approx.)                                       |
| DC:          | Supply voltage: 10-30V AC/DC, 48, 60, 110V DC ±10%<br>Isolation: no galvanic isolation<br>Power consumption: 100mA for 10-30V AC/DC<br>30mA for higher ranges. |

| RESET                                                 |
|-------------------------------------------------------|
| Power supply to be interrupted for at least 1 second. |

| TIME SETTING               |
|----------------------------|
| 0 - 60 seconds adjustable. |

| PAUSE TIMER                         |
|-------------------------------------|
| Approximately 75 milliseconds ±10%. |



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| AT   | 130   | 230     | A            | D              |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Example

- Timed switching of contactors from Star to Delta, with pause, to prevent contactors operating simultaneously.

## Features

- Failsafe feature.
- Relay de-energises to "centre-off" position for failsafe operation.
- Adjustable Star Time range of up to 60 seconds.
- Fixed 75 millisecond pause time to prevent overlapping of Star and Delta switching.
- LED indication of relay output status i.e. Star or Delta mode.
- Two SPDT relays with neutral centre position ensure break before make.
- Microprocessor technology incorporated.
- 5A SPDT relay output.
- Rated for continuous operation.

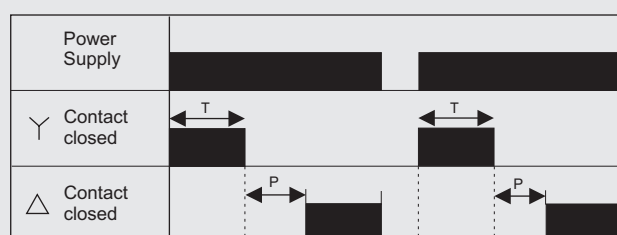
## Description of Operation

The **AT-130** is a high performance microprocessor based electronic timer, designed to enable the Star-Delta starter to be switched safely from Star to Delta. An electronically controlled Star-make period enables failsafe operation. A pause time of 75 milliseconds prevents the overlapping of sluggish Star-Delta contactors.

The key feature of this timer is that, in the event of a failure, the relay fails to the "centre OFF" position, meaning that neither the Star or the Delta contactors are energised.

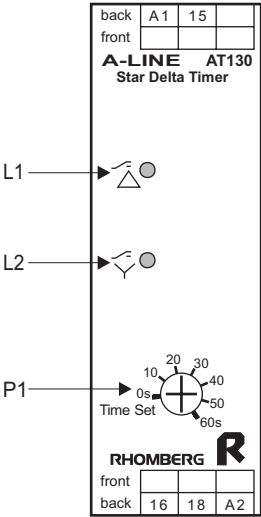
**Operation:** When power is applied to the unit, the Star contact closes and the preset time cycle starts (L2 illuminates). When the Star time cycle ends, the star contact opens and the pause period of 75 milliseconds starts. During the pause cycle, both the Star and Delta contacts are open. When the pause cycle ends, the Delta contact closes (L1 illuminates). The timer remains in the Delta cycle until the power to the unit is removed. The relay then returns to the safe central position.

## Operational Diagram



$T$  = Set time  
 $P$  = Pause of approximately 75ms

## Description of Controls

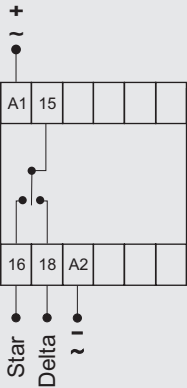


- L1: The red LED marked  illuminates when the **Delta contact** is closed.
- L2: The red LED marked  illuminates when the **Star contact** is closed.
- P1: **Time Set**: The Star contact closure time, adjustable from 0 to 60 seconds, is set on P1.

## Wiring and Connection

| Power Supply      |    |
|-------------------|----|
| Phase/ Positive   | A1 |
| Neutral/ Negative | A2 |

| Relay Contacts                           |         |
|------------------------------------------|---------|
| Normally Open, Closed during Delta cycle | 15 + 18 |
| Normally Open, Closed during Star cycle  | 15 + 16 |



**NOTE:** Relay de-energised to the “centre-OFF” position when power is off.

## Technical Specifications

| POWER SUPPLY                               |                                                  |           |                                |
|--------------------------------------------|--------------------------------------------------|-----------|--------------------------------|
| Type                                       | Voltage                                          | Tolerance | Consumption                    |
| AC Transformer<br>(2kV galvanic isolation) | 12, 24, 115, 230(220-240),<br>400(380-415), 525V | ±15%      | 2VA (approx.)<br>6VA (approx.) |
| AC Reactive                                | 250 (90-250)V                                    | -         | 100mA                          |
| DC Supply                                  | 48, 60, 110V                                     | ±15%      | 30mA                           |
| AC/ DC                                     | 12/24V                                           | ±15%      | 100mA                          |

| RELAY                    |                                                 |
|--------------------------|-------------------------------------------------|
| Relay Options (250V, 5A) | SPDT (1 x SPST for Delta and 1 x SPST for Star) |

| HOUSING       |                |            |
|---------------|----------------|------------|
| Voltage       | 250V and below | Above 250V |
| Housing Width | 22,5mm         | 45mm       |

| RESET                                                |
|------------------------------------------------------|
| Power supply to be interrupted for at least 1 second |
| STAR TIME ADJUSTMENT                                 |
| 0-60 seconds                                         |
| PAUSE TIME                                           |
| 75 milliseconds                                      |

Additional information in Section J, page 131.

# ST-200/ST-201 ST-202/ST-203

Unequal Cycling Timer

## SLIMLINE

MONITORING RELAYS



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| ST   | 200   | 230V    | AC           | DP             |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Examples

- Refrigeration plants for freezing cycle and defrost cycle.
- Centre pivoting for watering cycle and moving cycle on irrigation systems.
- Systems purging on boiler control panels.
- Chemical dosing and mixing.
- Conveyor transfer control for manual packaging.
- Material handling control in cutting application.
- Periodic lubrication control on equipment.
- Periodic moisture cycle control in catering equipment.

## Features

- Failsafe feature.
- Programmable OFF-cycle first or ON-cycle first.
- Programmable in 6 independent overlapping time ranges.
- Time Ranges:

| Type   | Cycle-One      | Cycle-Two      |
|--------|----------------|----------------|
| ST-200 | up to 120 sec. | up to 120 sec. |
| ST-201 | up to 120sec.  | up to 240min.  |
| ST-202 | up to 240min.  | up to 240min.  |
| ST-203 | up to 240min.  | up to 120sec.  |

- Extended time ranges available up to 25 hours or 200 hours on special order.
- Extended supply voltage range: 10V to 30V AC/DC and 90V to 250V AC
- Separate off/on time adjustment on calibrated scale, 0-100%.
- High repetitive accuracy.
- 5A double pole relay output (10A SPDT offered on request).

## Description of Operation

The **ST-200/ ST-201/ ST-202/ ST-203** are programmable multi-range, unequal cycling timers. Both the ON-cycle as well as the OFF-cycle can be adjusted independently in 6 overlapping ranges.

The units can be programmed to operate in either one of the following two modes:

### 1. Unequal Cycling, First Cycle OFF Operation:

When power is applied the relay will switch on and off repetitively, starting with the OFF-cycle. The LED will glow dimly while the relay is de-energised, and will come on brightly during the relay ON-cycle. The duration of the ON-cycle and the OFF-cycle can be adjusted independently. The range of adjustment can also be selected individually for both cycles.

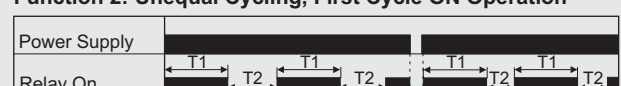
**2. Unequal Cycling, First Cycle ON Operation (Pin 6 and 7 Linked):** When power is applied the relay will switch on and off repetitively, starting with the ON-cycle. The LED will glow dimly while the relay is de-energised, and will come on bright during the relay ON-cycle. The duration of the ON-cycle and the OFF-cycle can be adjusted independently. The range of adjustment can also be selected individually for both cycles.

## Operational Diagrams

### Function 1: Unequal Cycling, First Cycle OFF Operation

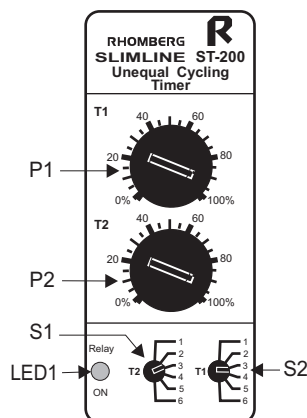


### Function 2: Unequal Cycling, First Cycle ON Operation



T1 = Time setting of first cycle  
T2 = Time setting of second cycle

## Description of Controls



P1: The Time Setting of the first cycle is adjusted on P1. Maximum setting of 100% corresponds with the time selected on S1.

P2: The Time Setting of the second cycle is adjusted on P2. Maximum setting of 100% corresponds with the time selected on S2.

S1: The Time Range of the first cycle is set on S1, using a screwdriver.

S2: The Time Range of the second cycle is set on S2, using a screwdriver. See table below in General Specifications.

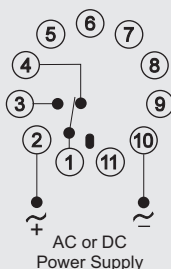
LED 1: The LED marked "Relay ON" glows dimly when power is on, but the relay is de-energised. The LED illuminates brightly when the relay is energised.

## Wiring and Connection

| Power Supply     |        |
|------------------|--------|
| Phase/Positive   | Pin 2  |
| Neutral/Negative | Pin 10 |

| Relay Contacts SPDT |       |
|---------------------|-------|
| Normally open       | 1 + 3 |
| Normally closed     | 1 + 4 |

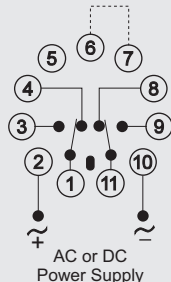
| Relay Contacts DPDT |        |
|---------------------|--------|
| Normally open       | 1 + 3  |
| Normally closed     | 1 + 4  |
| Normally open       | 11 + 9 |
| Normally closed     | 11 + 8 |



**APPLICATION 1**

Single pole (SPDT) OFF-Cycle first

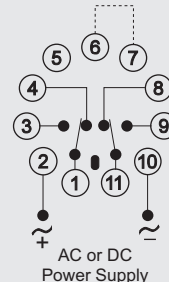
(Link for ON cycle first)



**APPLICATION 2**

Double pole (DPDT)  
ON-Cycle first

(Link for ON cycle first)



**APPLICATION 3**

Double pole (DPDT)

**Note:** DPDT supplied as standard

## Technical Specifications

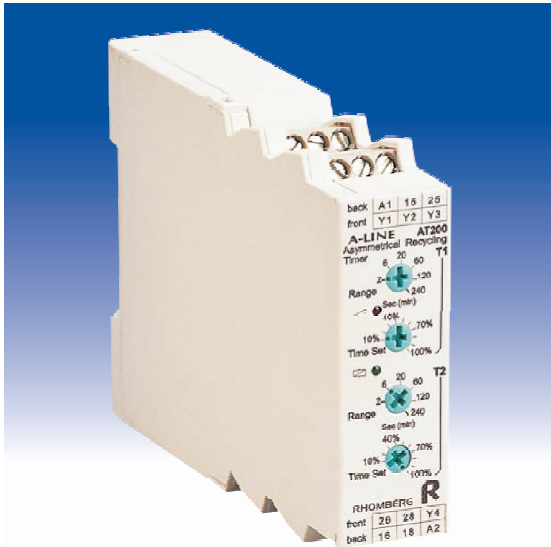
| POWER SUPPLY  |                                                                                                                                                             |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AC:</b>    | Supply voltage: 90-250V, 400, 415, 525V $\pm 15\%$<br>Power consumption: 3VA (approx.)<br>6VA for 415, 525V (approx.)                                       |
| <b>DC:</b>    | Supply voltage: 48, 60, 110V DC $\pm 15\%$<br>Power consumption: 30mA                                                                                       |
| <b>AC/DC:</b> | Supply voltage: 10-30V AC/DC<br>Power consumption: 100mA                                                                                                    |
| <b>Reset:</b> | Power supply to be interrupted for at least 0,5 seconds<br>Extended time ranges available on special order: 6, 12, 5 and 25 hours<br>50, 100 and 200 hours. |

| Timer | T1 | T2 |
|-------|----|----|
| ST200 | A  | A  |
| ST201 | A  | B  |
| ST202 | B  | B  |
| ST203 | B  | A  |

| A               |              |
|-----------------|--------------|
| Switch Position | Time Ranges: |
| 1               | - up to 1,8s |
| 2               | - up to 7,5s |
| 3               | - up to 15s  |
| 4               | - up to 30s  |
| 5               | - up to 60s  |
| 6               | - up to 120s |

| B               |              |
|-----------------|--------------|
| Switch Position | Time Ranges: |
| 7               | - up to 220s |
| 8               | - up to 7,5m |
| 9               | - up to 15m  |
| 10              | - up to 60m  |
| 11              | - up to 120m |
| 12              | - up to 240m |

## Asymmetrical Recycling Timer



## ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| AT   | 200   | 230     | A            | D              |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Examples

- Refrigeration plants for freezing cycle and defrost cycle.
- Centre pivoting for watering cycle and moving cycle on irrigation systems.
- Systems purging on boiler control panels.
- Chemical dosing and mixing.
- Conveyor transfer control for manual packaging.
- Material handling control in cutting application.
- Periodic lubrication control on equipment.
- Periodic moisture cycle control in catering equipment.

## Features

- Failsafe feature.
- Programmable for either OFF cycle first or ON cycle first.
- 12 overlapping programmable time ranges from 0,2 seconds to 4 hours.
- High repetitive accuracy.
- Power ON and Relay ON LEDs.
- Flashing Power ON LED when unit is timing (flash rate increases when relay is about to switch).
- Microprocessor technology incorporated.
- 5A SPDT or DPDT relay output.
- Separate OFF/ON time range selection and time adjustments on calibrated scales, 0-100%.

## Description of Operation

The **AT-200** is a fully programmable, microprocessor based asymmetrical timer. Two independently adjustable time intervals are provided in 12 overlapping time ranges within 0,2 seconds and 4 hours.

The time units (seconds or minutes) of T1 and T2 can be configured by the connection of external wire links. Time interval T1 is configured by linking/not linking terminals Y1 and Y3. Similarly interval T2 is configured with terminals Y2 and Y3. Without the terminals linked the selected range is in seconds, and with the terminals linked it is in minutes.

Terminals Y3 and Y4 are used to configure the unit to operate in one of the following modes:

## 1. Asymmetrical Recycling, First Cycle OFF

**Operation:** If terminals Y3 & Y4 are not linked when power is applied to the unit, the relay will switch on and off repetitively, starting with the OFF cycle. The duration of the OFF cycle and the ON cycle can be adjusted independently. In this mode interval T1 is the OFF cycle and interval T2 the ON cycle.

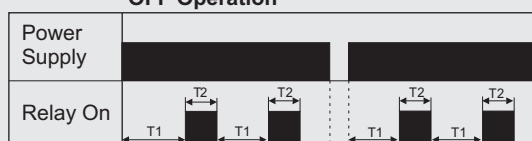
## 2. Asymmetrical Recycling, First Cycle ON

**Operation:** If terminals Y3 & Y4 are linked when power is applied to the unit, the relay will switch on and off repetitively, starting with the ON cycle. The duration of the ON cycle and the OFF cycle can be adjusted independently. In this mode interval T1 is the ON cycle and interval T2 the OFF cycle.

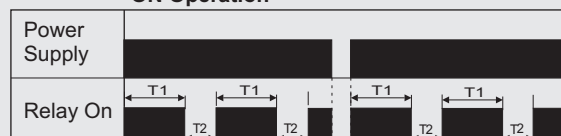
**Note:** To change the configuration of any of the links, the power supply to the unit must be interrupted for at least 0,5 seconds.

## Operational Diagrams

Function 1: Asymmetrical Recycling, First Cycle OFF Operation



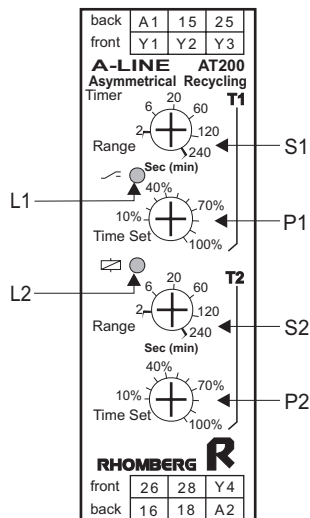
Function 2: Asymmetrical Recycling, First Cycle ON Operation



T1 = Time setting for first cycle  
T2 = Time setting for second cycle



## Description of Controls



L1: The red “Relay ON” LED marked illuminates when the relay is energised.

L2: The green “Power ON” LED marked illuminates when power is supplied to the unit. The LED flashes when the unit is timing. Before the relay switches (in the last 10% of the timed interval), the flash rate increases.

S1: The **time range of the first time interval (T1)** is set on **S1**. Time ranges are 2, 6, 20, 60, 120 & 240. The range selected is timed in seconds with no link to Y1, or minutes with Y1 linked to Y3.

S2: The **time range of the second time interval (T2)** is set on **S2**. Time ranges are 2, 6, 20, 60, 120 & 240. The range selected is timed in seconds with no link to Y2 or minutes if Y2 is linked to Y3.

P1: The **time setting of the first time interval (T1)** is adjusted on **P1**. The time setting can be adjusted from 10% to 100% of the selected time.

P2: The **time setting of the second time interval (T2)** is adjusted on **P2**. The time setting can be adjusted from 10% to 100% of the selected time.

EXAMPLES OF TIME SETTINGS

| Required Time | Time Range (S1 + S2) | Time Setting (P1 + P2) |
|---------------|----------------------|------------------------|
| 30 seconds    | 60 seconds           | 50%                    |
| 45 minutes    | 60 minutes           | 75%                    |

## Wiring and Connection

| Power Supply      |    | Relay Contacts-SPDT |         |
|-------------------|----|---------------------|---------|
| Phase/ Positive   | A1 | Normally Open       | 15 + 18 |
| Neutral/ Negative | A2 | Normally Closed     | 15 + 16 |

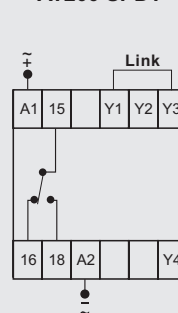
  

| Relay Contacts-DPDT |                 |         |
|---------------------|-----------------|---------|
| CONTACT 1           | Normally open   | 15 + 18 |
|                     | Normally closed | 15 + 16 |
| CONTACT 2           | Normally open   | 25 + 28 |
|                     | Normally closed | 25 + 26 |

| Link Options                          |                     |                |
|---------------------------------------|---------------------|----------------|
| Time interval T1                      | Set Time in Seconds | Y1, Not linked |
|                                       | Set Time in Minutes | Link Y1 & Y3   |
| Time interval T2                      | Set Time in Seconds | Y2, Not linked |
|                                       | Set Time in Minutes | Link Y2 & Y3   |
| Interval T1 at Power up (First cycle) | Relay OFF           | Y4, Not linked |
|                                       | Relay ON            | Link Y3 & Y4   |

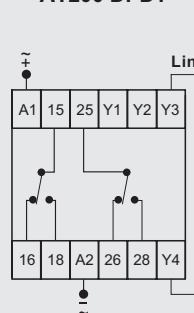
AT200 SPDT



APPLICATION 1

Time interval T1 timed in minutes, T2 in seconds. first cycle OFF operation.

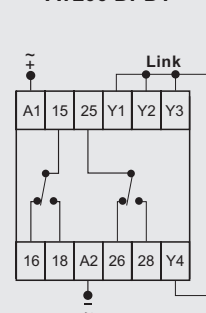
AT200 DPDT



APPLICATION 2

Time intervals T1 and T2 timed in seconds. first cycle ON operation.

AT200 DPDT



APPLICATION 3

Time intervals T1 and T2 timed in minutes, first cycle ON operation.

## Technical Specifications

| POWER SUPPLY                            |                                               |           |                                |
|-----------------------------------------|-----------------------------------------------|-----------|--------------------------------|
| Type                                    | Voltage                                       | Tolerance | Consumption                    |
| AC Transformer (2kV galvanic isolation) | 12, 24, 115, 230(220-240), 400(380-415), 525V | ±15%      | 2VA (approx.)<br>6VA (approx.) |
| AC Reactive                             | 250 (90-250)V                                 | -         | 100mA                          |
| DC Supply                               | 48, 60, 110V                                  | ±15%      | 30mA                           |
| AC/ DC                                  | 12/24V                                        | ±15%      | 100mA                          |

| RELAY                    |      |      |
|--------------------------|------|------|
| Relay Options (250V, 5A) | SPDT | DPDT |

| HOUSING       |                |            |
|---------------|----------------|------------|
| Voltage       | 250V and below | Above 250V |
| Housing Width | 22.5mm         | 45mm       |

| TIME SPECIFICATION |      |
|--------------------|------|
| Setting Accuracy   | 5%   |
| Repeatability      | 0.5% |

| TIME RANGES (STANDARD) |                          |                                       |
|------------------------|--------------------------|---------------------------------------|
| Time Range Selection   | Time Setting: 10 to 100% | Time Unit Selection: (Link Dependent) |
| 2                      | 0,2 to 2                 | Sec or min                            |
| 6                      | 0,6 to 6                 | Sec or min                            |
| 20                     | 2 to 20                  | Sec or min                            |
| 60                     | 6 to 60                  | Sec or min                            |
| 120                    | 12 to 120                | Sec or min                            |
| 240                    | 24 to 240                | Sec or min                            |

Additional information in Section J, page 131.

# ST-210

## Multi-function Asymmetrical Reset Timer

# SLIMLINE

MONITORING RELAYS



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| ST   | 210   | 230V    | AC           | DP             |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Examples

- Operation of air-piece extractors in multi-cycle machinery.
- Provision for cooling time on control circuit of point soldering machines.

## Features

- Failsafe feature.
- 6 Programmable reset functions with hold or pulse reset or both, and power supply on reset
- Programmable in 6 independent overlapping time ranges up to 120 seconds.
- Direct interface with DC three-wire NPN sensor.
- High speed electronic reset.
- High repetitive accuracy.
- Time adjustment on calibrated scale, 0-100%.
- 5A double pole relay output (10A SPDT offered on request).

## Description of Operation

The **ST-210** is a programmable multi-function, multi-range timer for high speed applications. Both the ON-cycle as well as the OFF cycle can be adjusted independently in 6 overlapping ranges. The unit interfaces directly with DC three-wire NPN sensors or potential free contacts providing high speed reset operation. The timer is reset by closing the contact between the reset input pin 5 and pin 7. If another reset occurs before the set time period has expired, the timers is set back to zero and a new timing cycle is initiated. This unit may be programmed to operate in one of the following modes:

**A. Pulse Reset:** When power is applied, the unit remains de-energised until a reset occurs. When the reset contact closes, the timing period T1 is initiated and the relay de-energised. When the timing period T1 has elapsed, the relay energises for second timing period T2. After T2 has elapsed, the relay de-energises. This sequence (T1 + T2) is referred to as the timing cycle. The relay remains de-energised until the next reset pulse.

**B. Hold Reset:** When power is applied, the unit remains de-energised until the reset contact is released. The release of the reset contact starts a single timing cycle (T1 + T2). If the reset contact is closed during or after the initial timing cycle (T1 + T2), the relay will de-energise. Once the reset contact is opened, another timing cycle (T1 + T2) is initiated.

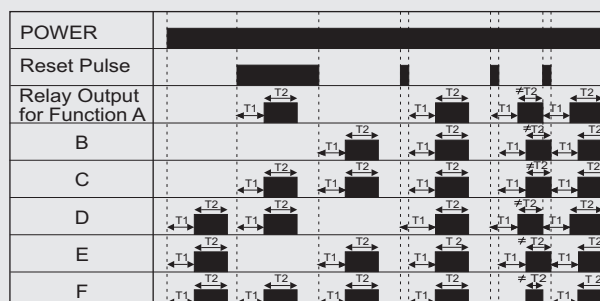
**C. Pulse + Hold Reset:** When power is applied, the unit remains de-energised until a reset occurs. When the reset contact closes, the first timing period T1 is initiated with the relay de-energised. When T1 has elapsed, the relay energises for the second timing period T2. When the reset contact opens, another timing cycle (T1 + T2) is initiated.

**D. Power Supply + Pulse Reset:** When power is applied to the unit, the first timing period T1 is initiated and the relay remain de-energised. When T1 has elapsed, the relay energises for the second timing period T2. If the reset contact is closed after the initial timing cycle, another timing cycle (T1 + T2) is initiated.

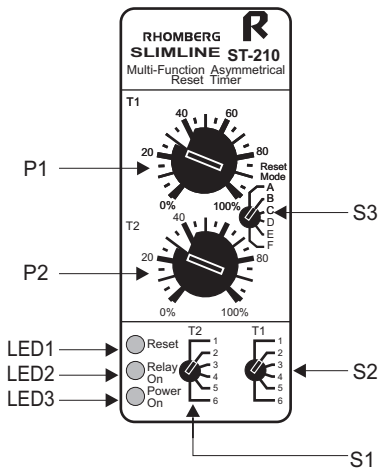
**E. Power Supply + Hold Reset:** When power is applied to the unit, the first timing period T1 of the cycle is initiated and the relay remains de-energised. When T1 has elapsed, the relay energises for the second timing period T2. If the reset contact is closed during or after the initial timing cycle (T1 + T2), the relay will de-energise. Once the reset contact is opened, another timing cycle (T1 + T2) is initiated.

**F. Power Supply + Pulse + Hold Reset:** When power is applied to the unit, the timing cycle (T1 + T2) is immediately initiated. Should the reset contact be opened or closed during or after the initial timing cycle, a new timing cycle (T1 + T2) is initiated.

## Operational Diagram



## Description of Controls



- P1: The **time setting of the first cycle** T1 is adjusted on P1. Maximum setting of 100% corresponds with the time scale selected on S1.
- P2: The **time setting of the second cycle** T2 is adjusted on P2. Maximum setting of 100% corresponds with the time scale selected on S2.
- S1: The **time range** of the first cycle is set on S1.
- S2: The **time range** of the second cycle is set on S2.
- S3: The **reset mode** is set on S3.
- LED 1: The LED marked “**Reset**” illuminates each time the reset input is activated, i.e. The reset contact is closed.
- LED 2: The LED marked “**Power on**” illuminates when power is applied to the unit.
- LED 3: The LED marked “**Relay on**” illuminates when the relay is energised.

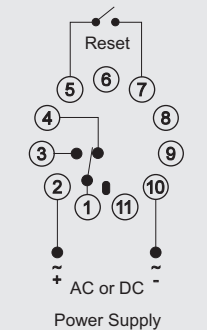
## Wiring and Connection

| Power Supply     |        |
|------------------|--------|
| Phase/Positive   | Pin 2  |
| Neutral/Negative | Pin 10 |

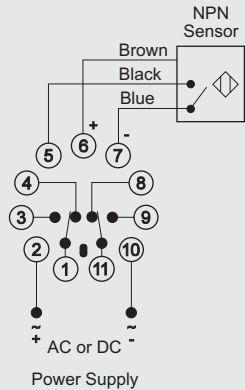
| Relay Contacts SPDT |       |
|---------------------|-------|
| Normally open       | 1 + 3 |
| Normally closed     | 1 + 4 |

| Relay Contacts DPDT |        |
|---------------------|--------|
| Normally open       | 1 + 3  |
| Normally closed     | 1 + 4  |
| Normally open       | 11 + 9 |
| Normally closed     | 11 + 8 |

| Reset Input                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Limit switch or contact to be connected between pin 5 and pin 7                                                                                                                               |
| <b>DC NPN Sensor:</b>                                                                                                                                                                         |
| Brown wire to be connected to pin 6 (+)                                                                                                                                                       |
| Blue wire to be connected to pin 7 (-)                                                                                                                                                        |
| Black wire to be connected to pin 5                                                                                                                                                           |
| <b>Note:</b> For extended wiring, screened wire is recommended to eliminate erratic switching due to noise or electromagnetic interference. The screen should be connected to pin 7 or earth. |



**APPLICATION 1**  
Reset with a dry contact or switch



**APPLICATION 2**  
Reset with a NPN DC sensor

## Technical Specifications

| POWER SUPPLY |                                                                                                                                                                               |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC:          | Supply voltage: 12, 24, 110, 230, 400, 415, 525V $\pm 10\%$<br>Isolation (reset to power supply): 2kV<br>Power consumption: 3VA (approx.)<br>6VA for 400, 415, 525V (approx.) |
| DC:          | Supply voltage: 10-30V, 48, 60, 110V DC $\pm 15\%$<br>Isolation: no galvanic isolation<br>Power consumption: 100mA (10-30V)<br>30mA for higher ranges                         |

| RESET INPUT                                 |  |
|---------------------------------------------|--|
| Reset time: 6ms                             |  |
| Short circuit current: 2mA                  |  |
| Open circuit voltage: 8,2V                  |  |
| 12V DC Output: Voltage tolerance: 10-15V DC |  |
| Source current: 30mA (max.)                 |  |

| Switch Position | Time Ranges: |
|-----------------|--------------|
| 1               | - up to 1,8s |
| 2               | - up to 7,5s |
| 3               | - up to 15s  |
| 4               | - up to 30s  |
| 5               | - up to 60s  |
| 6               | - up to 120s |

# ST-300/ST-301

## No Power Delayed OFF Timer



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| ST   | 300   | 230V    | AC           | DP             |

SEE PAGE 60 FOR ORDERING OPTIONS

# SLIMLINE

MONITORING RELAYS

## Application Examples

- Timed interval during the change-over sequence from main supply to stand-by supply.
- Prevention of unnecessary generator set initiation due to brief power failure.
- Prevention of unnecessary plant or equipment shut-down due to brief power failure.
- Power failure alarm timing.

**Important:** This timer is designed for power failure applications. Refer to 'Note' in Description of Operation (below).

## Features

- Internal NiCd battery back-up on ST-301.
- Programmable in 6 independent overlapping time ranges.
- Extended supply voltage range: 10V to 30V AC/DC.
- Time adjustment on calibrated scale, 0-100%.
- High repetitive accuracy.
- 10A single pole or 5A double pole relay output.
- Time ranges:  
ST-300: up to 120 sec.  
ST-301: up to 240min.

## Description of Operation

The **ST-300/ST-301** are multi-range timers, providing delayed release of the relay after power supply failure. The time delay is adjustable in six overlapping ranges.

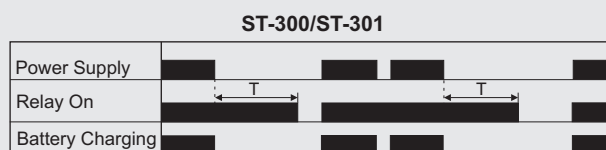
When power is applied to the unit the relay energises immediately and the LED indicates that power is on. While power is on, an internal battery or capacitor is charged. As soon as power fails, the LED goes off but the relay still remains in its energised position. The timer now draws power from the internal capacitor or battery. If power remains off for longer then the set time, the relay de-energises. If however, power is re-applied before the set time has elapsed, the relay will remain energised.

**ST-300:** The ST-300 covers a time range of 0.15 seconds to 120 seconds. Power has to be applied to the unit for at least two seconds before interruption to allow the internal capacitor to be charged.

**ST-301:** The ST-301 covers a time range of 10 seconds to 240 minutes. Prior to commissioning or when the unit has been without power supply for an extended periods of time, power should be applied for at least 24 hours to allow sufficient charging of the battery before a time cycle is initiated. During repetitive power ON-OFF operation, the power ON time should be twice as long as the power OFF duration (i.e. 67% duty cycle) to sufficiently recharge the battery.

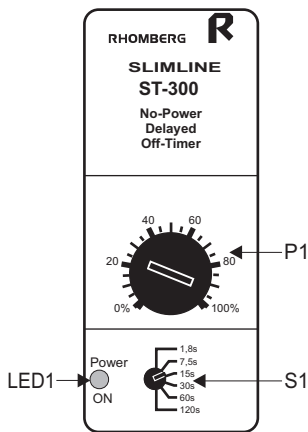
**Note:** In applications where the supply voltage is present and delayed release of contacts is required, the ST-110 or ST-111 is the correct timer to use.

## Operational Diagram



$T = \text{set time}$

## Description of Controls



P1: The **Time Setting** is adjusted on P1. Maximum setting of 100% corresponds with the time selected on S1.

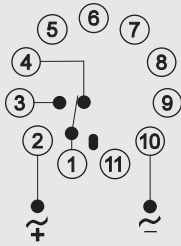
S1: The **Time Range** is set on S1, using a screwdriver.

LED 1: The **“Power ON”** LED illuminates when power is supplied to the unit.

## Wiring and Connection

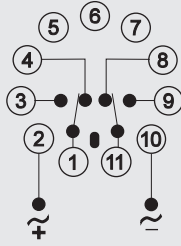
| Power Supply     |        |
|------------------|--------|
| Phase/Positive   | Pin 2  |
| Neutral/Negative | Pin 10 |

| Relay Contacts SPDT |        |
|---------------------|--------|
| Normally open       | 1 + 3  |
| Normally closed     | 1 + 4  |
| Relay Contacts DPDT |        |
| Normally open       | 1 + 3  |
| Normally closed     | 1 + 4  |
| Normally open       | 11 + 9 |
| Normally closed     | 11 + 8 |



AC or DC  
Power Supply

APPLICATION 1  
Single pole (SPDT)



AC or DC  
Power Supply

APPLICATION 2  
Double pole (DPDT)

## Technical Specifications

### POWER SUPPLY

**AC:** Supply voltage: 12, 24, 110, 230, 400, 415, 525V ±15%  
Power consumption: 3VA (approx.)  
6VA for 415, 525V (approx.)

**DC:** Supply voltage: 48, 60, 110V ± 15%  
Power consumption: 30mA

**AC/DC:** Supply voltage: 10 - 30V AC/DC  
Power consumption: 100mA

| ST-300    |              |
|-----------|--------------|
| Switch S1 | Time Ranges  |
| 1,8s      | - Up to 1,8s |
| 7,5s      | - Up to 7,5s |
| 15s       | - Up to 15s  |
| 30s       | - Up to 30s  |
| 60s       | - Up to 60s  |
| 120s      | - Up to 120s |

| ST-301    |              |
|-----------|--------------|
| Switch S1 | Time Ranges  |
| 220s      | - Up to 220s |
| 7,5m      | - Up to 7,5m |
| 15m       | - Up to 15m  |
| 60m       | - Up to 60m  |
| 120m      | - Up to 120m |
| 240m      | - Up to 240m |

# ST-410/ST-411

AC - Interval Lamp Flasher/  
Complementary Lamp Flasher

## SLIMLINE

MONITORING RELAYS



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| ST   | 410   | 230V    | AC           | -              |

SEE PAGE 60 FOR ORDERING OPTIONS

### Application Examples

- Flashing of traffic lights.
- Flashing of lights on pedestrian crossings.
- Flashing of warning lights on level crossings.
- Flashing of display signs.
- Flashing of warning beacons.
- Machine start-up indication (interval flashing).
- Machine failure indication (continuous flashing).
- Flashing of lights in shop windows.

### Features

- Programmable: continuous flashing or interval flashing.
- Adjustable interval 1 - 10 seconds.
- Pulse rate of 90 flashes per minute as standard (other rates on special order).
- Solid state switching.
- Switching capacity 4A, 1000W/250V.
- Power supply range 90V - 250V AC.
- Two wire in-line connection (ST-410) or three wire in-line connection (ST-411).

### Description of Operation

The **ST-410/ST-411** are programmable flashers designed specifically for incandescent lamps. The solid state switching output eliminates the arcing and mechanical wear and tear associated with relay contacts and thus ensures exceptional durability under continuous operation. The unit is programmable for continuous flashing or interval flashing. The unit is programmable for continuous flashing or interval flashing, thus extending suitability for traffic lights as well as "hurry-up" warning on pedestrian crossings.

**Continuous Flashing:** (no link between pin 8 and pin 9). When power is applied, the unit will flash the light on and off repetitively until the power supply is interrupted.

**Complementary Flashing:** (ST-411 only) When power is applied, the unit will alternately flash the lights connected to pin 3 and pin 4 repetitively until the power is interrupted.

**Interval Flashing:** (link between pin 8 and pin 9)  
When power is applied, the unit will flash the light on and off repetitively. When the set interval has expired, flashing will stop and the lamp will stay on continuously until the power supply is interrupted.

**Note:** The power supply needs to be interrupted for at least 5 seconds to reset the unit before another cycle is started.

### Operational Diagrams

#### ST-410

##### Continuous Flashing

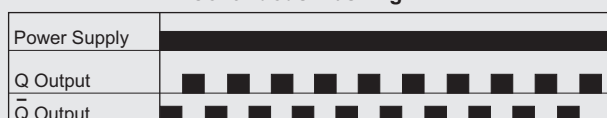


##### Interval Flashing

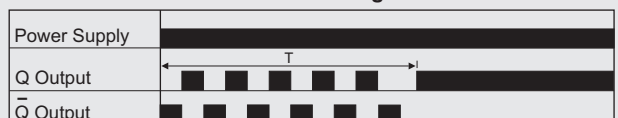


#### ST-411

##### Continuous Flashing

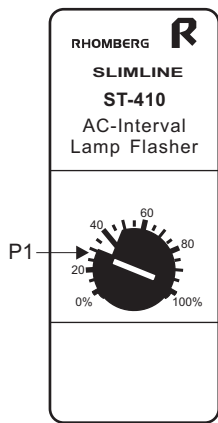


##### Interval Flashing



T = Interval period

## Description of Controls

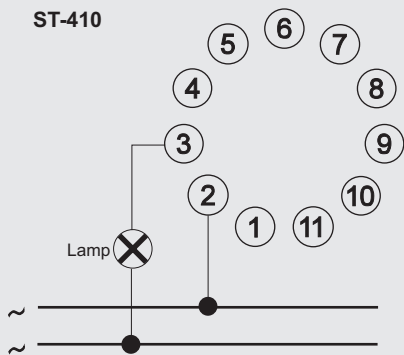


P1: The **Interval Period** is adjusted on P1.

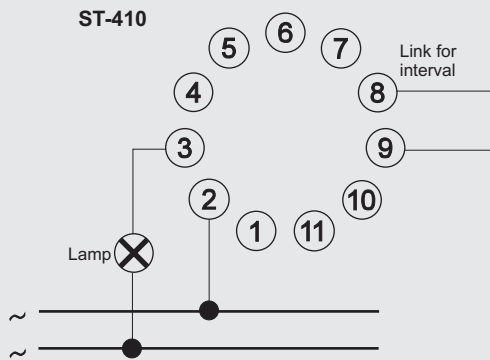
## Wiring and Connection

**Power Supply**  
The ST-410 flasher is to be connected in series with the load.

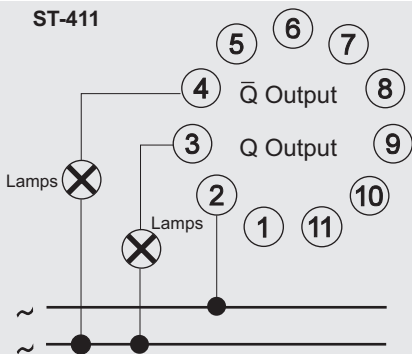
**Note:** Make sure that the load is connected **IN SERIES** and does not exceed 1000W (250 VAC) or 400W (100VAC). A short circuit or overload will result in damage to the unit.



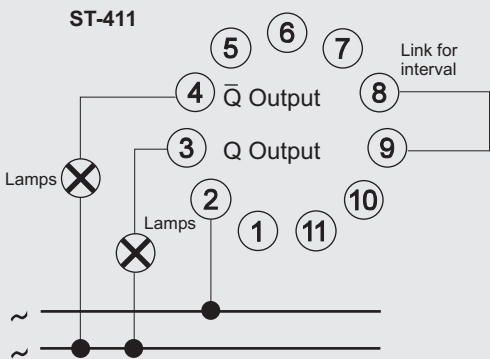
**APPLICATION 1**  
Continuous flashing



**APPLICATION 2**  
Interval flashing



**APPLICATION 1**  
Complementary flashing



**APPLICATION 2**  
Complementary flashing with interval

## Technical Specifications

| POWER SUPPLY          |                                 |
|-----------------------|---------------------------------|
| Supply voltage:       | 90-250V AC                      |
| Supply frequency:     | 45-70Hz                         |
| Minimum load:         | 15W (250V AC), 10W(110V AC)     |
| Maximum load:         | 1000W (250V AC), 400W (110V AC) |
| Maximum load current: | 4A continuous                   |

| TIMING      |                                                                                       |
|-------------|---------------------------------------------------------------------------------------|
| Flash rate: | 90 flashes per minute (standard).<br>Optional pulse rates available on special order. |
| Interval:   | 1 - 10 seconds (adjustable).                                                          |

| RESET                                                  |  |
|--------------------------------------------------------|--|
| Power supply to be interrupted for at least 5 seconds. |  |

Additional information in Section J, page 131.

# ST-500

## Multi-start Attempt Unit

# SLIMLINE

MONITORING RELAYS



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| ST   | 500   | 230V    | AC           | DP             |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Examples

- Repeated starting attempts of standby generator sets with start failure alarm output.

## Features

- Programmable number of starts: 3 to 8.
- Adjustable cranking time: 1 to 10 seconds.
- Starts failure alarm output.

## Description of Operation

The **ST-500** is designed to initiate repetitive starting of standby generator sets. The maximum number of start attempts and the cranking time are adjustable.

**Starting:** When power is applied to the ST-500, the starter relay will energise to initiate the first start attempt. If power supply to the ST-500 remains uninterrupted, the first attempt will be followed by a succession of starts with pauses in between. The cranking time is equal to the pause and can be adjusted. If the start attempt is successful, power supply to the ST-500 should be interrupted as soon as the generator set is running, thus preventing further cranking of the starter motor.

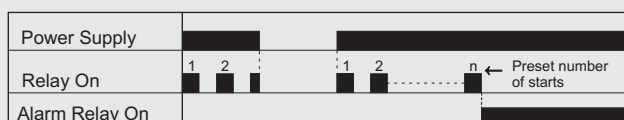
**Starter Failure Alarm:** If the generator set fails to start

after the set number of attempts, the starter sequence will be terminated and the start failure alarm relay will energise.

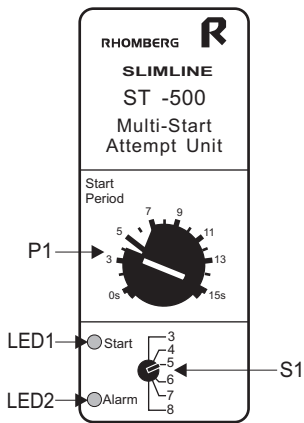
• **Generator Start-up Detection:** Successful start-up can be detected by:

- Monitoring the output RPM of the generator set with the SC-320 tachometer relay.
- Monitoring the output frequency of the generator set with the SP-320 frequency Monitor.
- Monitoring the output voltage of the generator set with the SP-220 or SP-230 voltage comparator.

## Operational Diagram



## Description of Controls



P1: The **Cranking Time** is adjusted on P1.

S1: The **Maximum Number of Start Attempts** is set on S1.

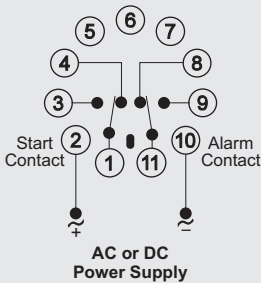
LED1: The green LED marked “**Start**” will illuminate whenever the start relay energises.

LED2: The red LED marked “**Alarm**” will illuminate when the start failure alarm relay is energised.

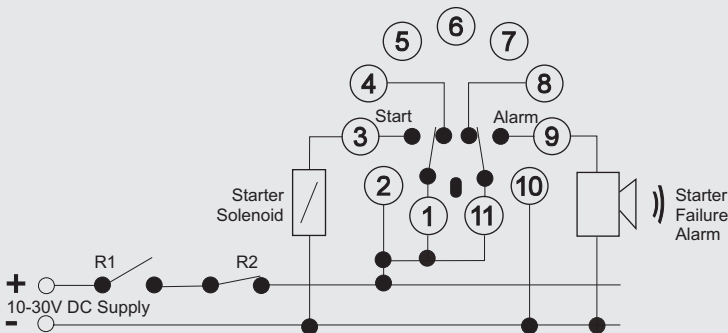
## Wiring and Connection

| Power Supply     |        |
|------------------|--------|
| Phase/Positive   | Pin 2  |
| Neutral/Negative | Pin 10 |

| Start Relay     |        |
|-----------------|--------|
| Normally open   | 1 + 3  |
| Normally closed | 1 + 4  |
| Alarm Relay     |        |
| Normally open   | 11 + 9 |
| Normally closed | 11 + 8 |



**APPLICATION 1**  
Standard connection



**APPLICATION 2**  
Typical wiring:  
R1 = Mains failure contact, closing when starting is required.  
R2 = Start inhibit contact, opening when the generator set has started (see “Generator start-up detection” in Description of Operation)

## Technical Specifications

| POWER SUPPLY |                                                                            |
|--------------|----------------------------------------------------------------------------|
| AC:          | Supply voltage: 48, 60, 110, 230V ±15%<br>Power consumption: 3VA (approx.) |
| DC:          | Supply voltage: 48, 60, 110V ±15%<br>Power consumption: 30mA               |
| AC/DC:       | Supply voltage: 10 - 30V AC/DC<br>Power consumption: 100mA                 |

|                                   |                                                          |
|-----------------------------------|----------------------------------------------------------|
| <b>RESET:</b>                     | Power supply to be interrupted for at least 0,5 seconds. |
| <b>NUMBER OF STARTS:</b>          | 3 to 8 (programmable).                                   |
| <b>DURATION OF START ATTEMPT:</b> | Adjustable from 1 to 10 seconds.                         |
| <b>DURATION OF PAUSE:</b>         | Equal to set duration of start attempt.                  |



### ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY CONTACTS | RELAY CONTACTS |
|------|-------|---------|-----------------------|----------------|
| AT   | 500   | 024     | E                     | S              |

SEE PAGE 60 FOR ORDERING OPTIONS

## Application Example

- Repeated starting attempts of standby generator sets with start failure alarm output.

## Features

- Programmable number of start attempts: 3 to 8.
- Start failure alarm output.
- Separately adjustable starter and pause times.
- Adjustable starter time: 1 to 20 seconds.
- Adjustable pause time: 1 to 20 seconds.
- Power On, Start Relay and Alarm Relay LEDs.
- Microprocessor technology incorporated.
- 5A SPDT Start Relay.
- 5A SPDT Alarm Relay (start failure).

## Description of Operation

The **AT-500** is designed to initiate repetitive starting of standby generator sets. The maximum number of start attempts, the starter (cranking) time and pause times are adjustable.

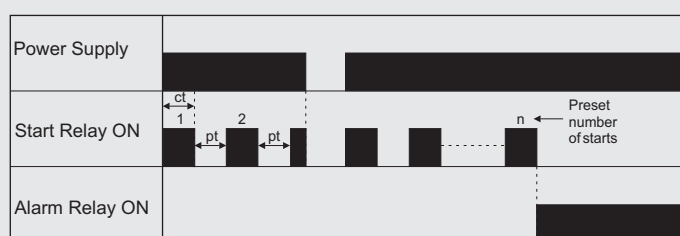
**Starting:** When power is applied to the AT-500, the Starter relay will energise to initiate the first start attempt. If the power supply of the AT-500 remains uninterrupted, the first start attempt will be followed by a succession of starts with pauses in between. The starter time and paused time can be adjusted independently. If the start attempt is successful, the power supply to the AT-500 should be interrupted as soon as the generator set is running, thus preventing further cranking of the starter motor.

**Start Failure Alarm:** If the generator set fails to start after the set number of attempts, the starter sequence will be terminated and the start failure alarm relay will energise.

**Generator Start-up Detection:** Successful start-up can be detected by:

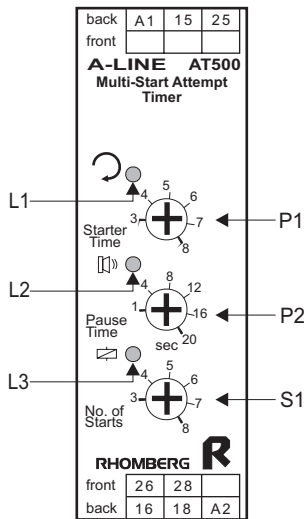
- Monitoring the output RPM of the generator set with the A-Line AC320 rotational speed monitor,
- Monitoring the output frequency of the generator set with the A-Line AP320 frequency monitor,
- Monitoring the output voltage of the generator set with the A-Line AP220 or AP230 voltage Comparator.

## Operational Diagram



ct = cranking time  
pt = Pause time

## Description of Controls



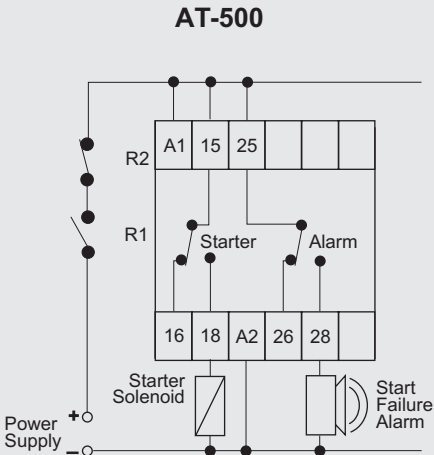
- L1: The red “**Starter**” LED marked  illuminates when the starter relay is energised.
- L2: The red “**Alarm**” LED marked  illuminates when the starter failure alarm is energised.
- L3: The green “**Power ON**” LED marked  illuminates when power is applied to the unit.
- S1: The maximum **number of start attempts**, adjustable between 3 and 8 is set on **S1**.
- P1: The **Starter time** (i.e. the duration of each start attempt ), adjustable from 1 to 20 seconds is set on **P1**.
- P2: The **Pause time** between start attempts, adjustable from 1 to 20 seconds is set on **P2**.

## Wiring and Connection

| Power Supply      |    |
|-------------------|----|
| Phase/ Positive   | A1 |
| Neutral/ Negative | A2 |

| Starter Relay   |         |
|-----------------|---------|
| Normally Open   | 15 + 18 |
| Normally Closed | 15 + 16 |

| Alarm Relay     |         |
|-----------------|---------|
| Normally Open   | 25 + 28 |
| Normally Closed | 25 + 26 |



### APPLICATION 1

Typical wiring  
R1 = Mains failure contact, closing when starting is required.  
R2 = Start inhibit contact, opening when the generator set has started (see “Generator start-up detection” in Description of Operation).

## Technical Specifications

| POWER SUPPLY                            |                                               |           |               |
|-----------------------------------------|-----------------------------------------------|-----------|---------------|
| Type                                    | Voltage                                       | Tolerance | Consumption   |
| AC Transformer (2kV galvanic isolation) | 12, 24, 115, 230(220-240), 400(380-415), 525V | ±15%      | 2VA (approx.) |
| AC Reactive supply                      | 250 (90-250V)                                 | -         | 2VA           |
| DC Supply                               | 48, 60, 110V                                  | ±15%      | 30mA          |
| AC/ DC supply                           | 12/ 24V                                       | ±15%      | 100mA         |

| START ATTEMPTS                           |                                 |
|------------------------------------------|---------------------------------|
| Number of Start Attempts                 | 3 to 8                          |
| Duration of Start Attempts               | Adjustable from 1 to 20 seconds |
| Duration of Pause between start attempts | Adjustable from 1 to 20 seconds |

| STARTER RELAY           |      |
|-------------------------|------|
| Contact Rating 250V, 5A | SPDT |

| ALARM RELAY             |      |
|-------------------------|------|
| Contact Rating 250V, 5A | SPDT |

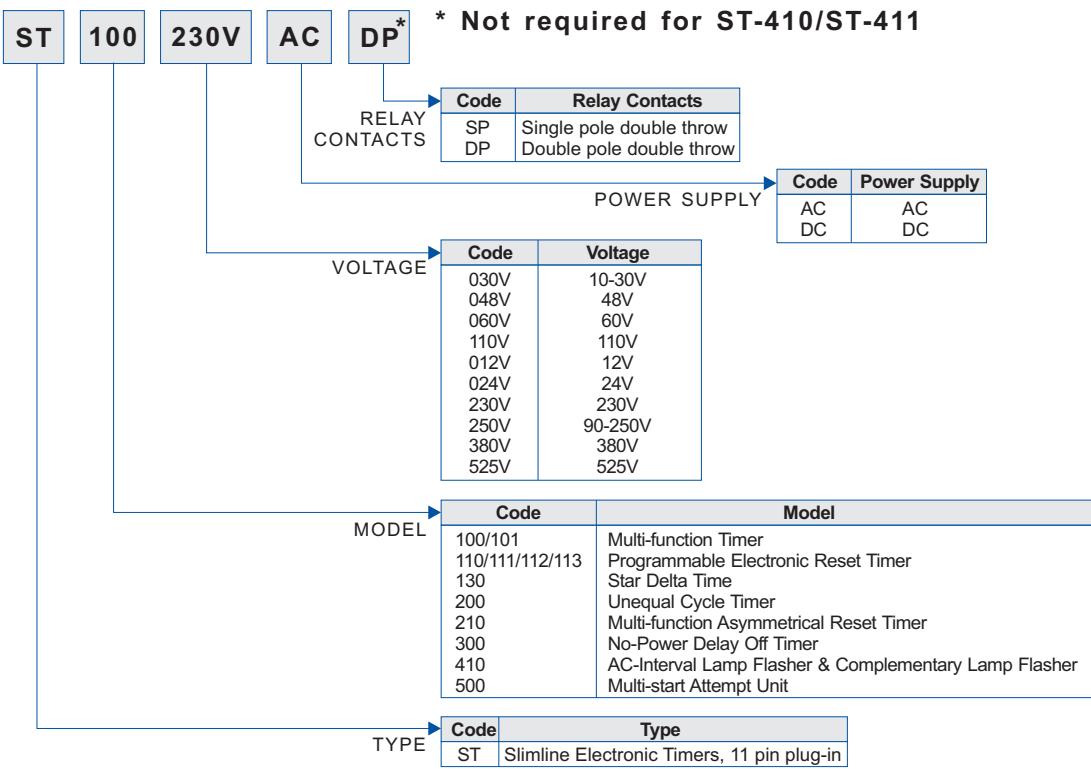
| HOUSING       |                |            |
|---------------|----------------|------------|
| Voltage       | 250V and below | Above 250V |
| Housing Width | 22.5mm         | 45mm       |

Additional information in Section J, page 131.

# HOW TO ORDER

## ELECTRONIC TIMERS

### Slimline Ordering Code



### A-line Ordering Code

