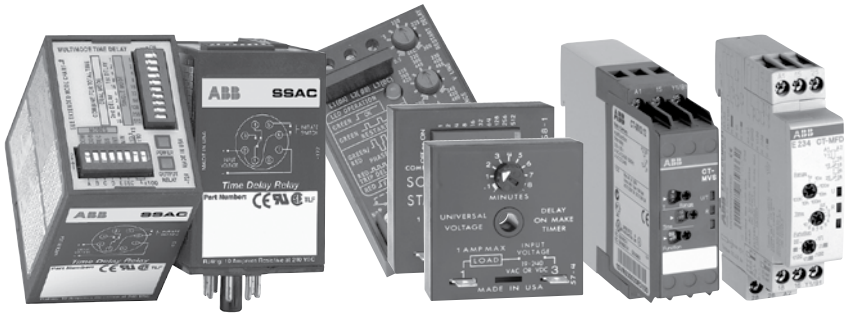
# Timers & controls

## Timers and controls
## Express Products

*Over 10 million timers available in 2 days or less!!*




7

***Reliable designs that provide what you want; when you want it!***

**Products included:**

- Timers
- Time delay relays
- Encapsulated timing modules
- Universal timers
- Multifunction timers
- ProgramaCube® timers and counters
- Solid state flashers
- Tower & obstruction lighting controls
- Voltage monitors
- Phase monitors
- Current sensors & monitors
- Liquid level controls
- Alternating relays
- Accessories

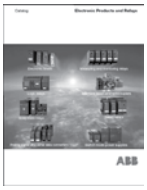
TEN YEAR 10 WARRANTY

UL

RoHS

**Express Delivery Products**
The express delivery products group was selected from the list of most popular and widely used timers and controls. All products in this section are In Stock, available for immediate delivery, or where marked QS, are available through the QuickShip program. This catalog includes general specifications. Complete product details are available in the full line catalog pages. The Express Products home page provides a fast and direct path to find the details on all the express products in the catalog.

**Full Line Catalog**
The complete contents of the SSAC product line is available in the SS3 Catalog, #1TRC001009C0202. the SS3 is easy-to-use and can be understood by designers, technicians, service contractors and non-technical users. Each data sheet includes complete specifications, illustrations, photos and operational information needed to select one of the over 225 product series. Quality designs and rugged encapsulated construction allow the SSAC brand products to provide reliable performance and are backed by an exclusive 10 Year Product Warranty. The SS3 includes informative application notes along with a colorful plant tour, and information about custom products design programs. The SS3 is available in print, on DC-ROM or for downloading at http://literature.abb-newsletters.com/2



**Electronic Products & Relays Catalog**
The complete IEC DIN mount timers and monitoring relays product offering is found in the EPR Catalog, # 2CDC110004C0205. The most popular part numbers are available at standard lead times. These products have a large list of Global approvals including cULus Listing and CE Certification and Global support through ABB sales offices in over 100 countries. The EPR is available in print or for downloading at: http://literature.abb-newsletters.com/2.

# KRPS Series Single Function
## Time Delay Relay (10A SPDT)


US Patent 6708135

TEN YEAR 10 WARRANTY

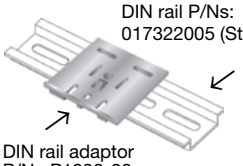
- Choose 1 of 14 Standard Functions
- Factory Programmed
- Microcontroller Circuitry, +/-0.5% Repeat Accuracy
- Isolated 10 A SPDT Output Contacts
- Universal Voltage 24...240 V AC/DC
- Delays from 100 ms...1000 h in 9 Ranges
- Onboard, External Adjust or Fixed Time Delay

Complete Product Details:
http://www.ssac.com/pp1.htm

### Accessories

100K Ohm External adjust potentiometer
P/Ns:
P1004-95 (fig A)
P1004-95-X (fig B)

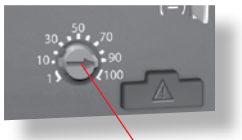
Versa-knob
P/N: P0700-7



DIN rail P/Ns:
017322005 (Steel)

DIN rail adaptor
P/N: P1023-20

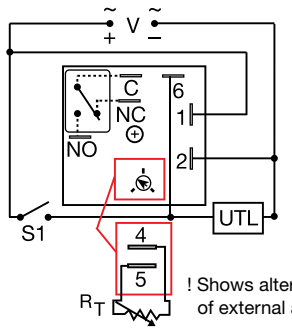
See accessory pages



The KRPS Series is a factory programmed time delay relay available in any 1 of 14 functions and measures only 2 inches square. Modules are manufactured without the function assigned. When an order is received, the function and time delay software are added. This approach provides fast QuickShip delivery on all time ranges and functions. Encapsulation protects against shock, vibration, and humidity. The KRPS Series is a cost effective approach for OEM applications that require small size, isolation, accuracy, and long life.

Choose from 1 of 14 standard single functions, fixed or onboard or external adjustment, and 9 time ranges. All available through the QuickShip program.

### Connection




! Shows alternate location of external adjust

V = Voltage C = Common, Transfer Contact
NC = Normally Closed NO = Normally Open
S1 = Initiate Switch UTL = Untimed Load

A knob is supplied for adjustable units, or RT terminals 4 & 5 for external adjust. Select a 100K ohm potentiometer for full time range adjustment. The untimed load is optional. S1 is not used for some functions. Dashed lines are internal connections.

### **Function Chart

| | Code |
|---|---|
| Delay On Make | M |
| Delay On Break | B |
| Recycle (ON Time First, Equal Times) | RE |
| Recycle OFF Time First, Equal Times) | RD |
| Single Shot | S, SD |
| Interval | I |
| Trailing Edge Single Shot | TS |
| Inverted Single Shot | US |
| Inverted Delay On Break | UB |
| Accumulative Delay on Make | AM |
| Motion Detector / Retriggerable Single Shot | PSD, PSE |
| Alternating Relay | FT |
| Flip Flop (leading edge) | F |

*See page 9 for function time diagrams*

### Technical Data

| | |
|---|---|
| **Output** | |
| Rating (at 40°C) | 10 A resistive at 125 V AC<br>5 A resistive at 230 V AC & 28 V DC<br>1/4 hp at 125 V AC |
| **Mechanical** | |
| Mounting | Surface mt. with one #10 (M5 x 0.8) screw |
| Package | 2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connects |

### Ordering Table

KRPS **Series**

X **Input**
- A - 24 ... 240 V AC/DC
- D - 12 ... 48 V DC†

X **Adjustment**
- 1 - Fixed
- 2 - Onboard Adjustment
- 3 - External Adjustment

X **Time Delay***
- 1 - 0.1 ... 10 s
- 2 - 1 ... 100 s
- 3 - 10 ... 1000 s
- 4 - 0.1 ... 10 m
- 5 - 1 ... 100 m
- 6 - 10 ... 1000 m
- 7 - 0.1 ... 10 h
- 8 - 1 ... 100 h
- 9 - 10 ... 1000 h

X **Function****
Specify Function (Refer to Function Chart for Code)

†**Note:** Grayed option is available in standard lead time.

* If Fixed Delay is selected, insert delay [0.1 ... 1000] followed by (S) secs., (M) mins., or (H) hrs.

**Example P/N:**
**KRPSA23RE** = Universal AC/DC voltage, onboard adjustment, 10...1000 sec., recycling, ON time first
**KRPSA10.5SI** = Universal AC/DC voltage, fixed delay of 0.5 sec., interval function

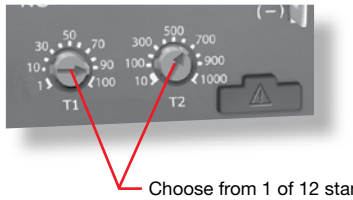
KRPSpp 12.28.07

# KRPD Series Dual Function
## Time Delay Relay (10A SPDT)


US Patent 6708135

- Choose 1 of 12 Standard Dual Functions
- Factory Programmed
- Microcontroller Circuitry, +/-0.5% Repeat Accuracy
- Isolated 10 A SPDT Output Contacts
- Universal Voltage 24 ... 240 V AC/DC
- Delays from 100 ms ...1000 h in 9 Ranges

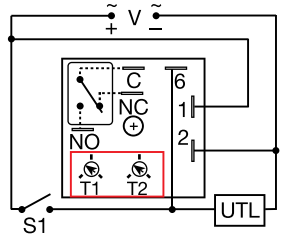
Complete Product Details:
http://www.ssac.com/pp1.htm




Choose from 1 of 12 standard single functions, fixed or onboard adjustment and 9 time ranges. All available through the Quick Ship program.

The KRPD Series is a factory programmed time delay relay available with 1 of 12 standard dual functions. Modules are manufactured without the function assigned. When an order is received, the function and time delay software are added. This approach provides Quick Ship delivery on all standard time ranges and functions. Encapsulation protects against shock, vibration, and humidity. The KRPD Series is a cost effective approach for OEM applications that require small size, isolation, accuracy, and long life.

## Connection




V = Voltage C = Common, Transfer Contact
NC = Normally Closed NO = Normally Open
S1 = Initiate Switch UTL = Optional Untimed Load

A knob is supplied for adjustable units. The untimed load is optional. S1 is not used for some functions. Dashed lines are internal connections.

## **Function Chart

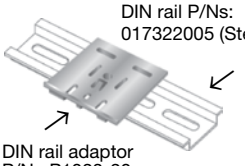
| | Code |
|---|---|
| Delay On Make/Delay on Break | MB |
| Delay On Make/Recycle (ON Time First, Equal Times) | MRE |
| Delay On Make/Interval | MI |
| Delay On Make/Single Shot | MS |
| Interval/Recycle (ON Time First, Equal Times) | IRE |
| Delay On Break/Recycle (ON Time First, Equal Times) | BRE |
| Single Shot/Recycle (ON Time First, Equal Times) | SRE |
| Recycle (Both Times Adjustable, ON Time First) | RXE |
| Recycle (Both Times Adjustable, OFF Time First) | RXD |
| Interval/Delay On Make | IM |
| Accumulative Delay On Make/Interval | AMI |
| Single Shot Lockout | SL |

*See page 10 for function time diagrams*

## Technical Data

| | |
|---|---|
| **Output** | |
| Rating (at 40°C) | 10 A resistive at 125 V AC<br>5 A resistive at 230 V AC & 28 V DC<br>1/4 hp at 125 V AC |
| **Mechanical** | |
| Mounting | Surface mount with one #10 (M5 x 0.8) screw |
| Package | 2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connects |

## Mounting Accessory



DIN rail P/Ns:
017322005 (Steel)

DIN rail adaptor
P/N: P1023-20

## Ordering Table

KRPD Series

**X Input**
- A - 24 ... 240 V AC/DC
- D - 12 ... 48 V DC

**X First Adjustment** (T1 or RT1)
- 1 - Fixed
- 2 - Onboard Adjust
- 3 - External Adjust

**X First Time Delay***
- 1 - 0.1 ... 10 s
- 2 - 1 ... 100 s
- 3 - 10 ... 1000 s
- 4 - 0.1 ... 10 m
- 5 - 1 ... 100 m
- 6 - 10 ... 1000 m
- 7 - 0.1 ... 10 h
- 8 - 1 ... 100 h
- 9 - 10 ... 1000 h

**X Second Adjustment** (T2 or RT2)
- 1 - Fixed
- 2 - Onboard Adjust
- 3 - External Adjust

**X Second Time Delay***
- 1 - 0.1 ... 10 s
- 2 - 1 ... 100 s
- 3 - 10 ... 1000 s
- 4 - 0.1 ... 10 m
- 5 - 1 ... 100 m
- 6 - 10 ... 1000 m
- 7 - 0.1 ... 10 h
- 8 - 1 ... 100 h
- 9 - 10 ... 1000 h

**X Function****
- Specify Function (Refer to Function Chart for Code)

†**Note:** Grayed options are available in standard lead time.

*If Fixed Delay is selected, insert delay [0.1 ... 999] followed by (S) secs., (M) mins., or (H) hrs.

**Example P/N:**

**KRPDA2525MRE** = Universal AC/DC voltage, onboard adjustment, T1=1...100 m, T2=1...100 m, delay on make /recycling - ON time first

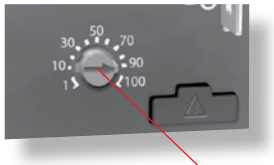
**KRPDD10.5S110SMB** = Universal AC/DC voltage, fixed delays, T1= 0.5 sec., T2 = 100 sec. delay on make /delay on break

# KSPS Series Single Function
## Timing Module (1A Solid State Output)

US Patent 6708135

- Choose 1 of 14 Standard Functions
- Factory Programmed
- Microcontroller Circuitry, +/-0.5% Repeat Accuracy
- Solid State Output 1 A Steady, 10 A Inrush
- Onboard, External Adjust or Fixed Time Delay
- Universal Voltage 24 ... 240 V AC
- Delays from 100 ms...1000 h in 9 Ranges

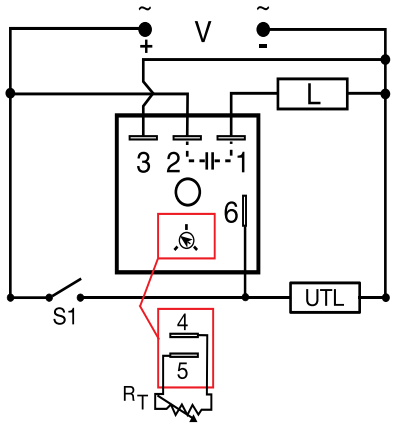
Complete Product Details:
http://www.ssac.com/pp1.htm



The KSPS Series is a factory programmed module available in any 1 of 14 standard functions. Modules are manufactured without the function assigned. When an order is received, the function and time delay software are added. This approach allows QuickShip delivery on a large number of part numbers. The 1 A steady, 10 A inrush rated solid state output provides 100 million operations typical. Encapsulation protects against shock, vibration, and humidity. The KSPS Series is a cost effective approach for OEM applications that require small size and solid state reliability.

Choose from 1 of 14 standard single functions, fixed or onboard or external adjustment, and 9 time ranges. All available through the QuickShip program.

## Connection




A knob is supplied for adjustable units, or RT terminals 4 & 5 for external adjustment. Select a 100K ohm potentiometer for full time range adjustment. The untimed load is optional. S1 is not used for some functions. Dashed lines are internal connections.

## **Function Chart

| | Code |
|---|---|
| Delay on Make | M |
| Delay on Break | B |
| Recycle (ON Time First, Equal Times) | RE |
| Recycle ( OFF Time First, Equal Times) | RD |
| Single Shot | S, SD |
| Interval | I |
| Trailing Edge Single Shot | TS |
| Inverted Single Shot | US |
| Inverted Delay on Break | UB |
| Accumulative Delay on Make | AM |
| Motion Detector/Retriggerable Single Shot | PSD. PSE |
| Flip Flop (trailing edge, alternating) | FT |
| Flip Flop (leading edge) | F |

*See page 9 for function time diagrams*

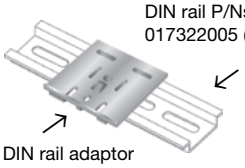
## Technical Data

| | |
|---|---|
| **Output** | |
| Rating | 1 A steady, 10 A inrush for 16 ms |
| **Mechanical** | |
| Mounting | Surface mt. with one #10 (M5 x 0.8) screw |
| Package | 2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connects |

## Accessories

100 K Ohm External adjust potentiometer P/Ns:
P1004-95 (fig A)
P1004-95-X (fig B)

Versa-knob
P/N: P0700-7



DIN rail P/Ns:
017322005 (Steel)

DIN rail adaptor
P/N: P1023-20

See accessory pages

## Ordering Table

KSPS **Series**

**X — Input**
- A - 24 ... 240 V AC
- P - 12 ... 120 V DC Positive Switching
- N - 12 ... 120 V DC Negative Switching

**X — Adjustment**
- 1 - Fixed
- 2 - Onboard Adjustment
- 3 - External Adjustment

**X — Time Delay***
- 1 - 0.1 ... 10 s
- 2 - 1 ... 100 s
- 3 - 10 ... 1000 s
- 4 - 0.1 ... 10 m
- 5 - 1 ... 100 m
- 6 - 10 ... 1000 m
- 7 - 0.1 ... 10 h
- 8 - 1 ... 100 h
- 9 - 10 ... 1000 h

**X — Function****
Specify Function (Refer to Function Chart for Code)

†**Note:** Grayed options are available in standard lead time.

* If Fixed Delay is selected, insert delay [0.1 ... 1000] followed by (S) secs., (M) mins., or (H) hrs.

**Example P/N:**

**KSPSA23RE** = Universal AC voltage, onboard adjustment, 10...1000 sec., recycling, ON time first
**KSPSA10.5SI** = Universal AC voltage, fixed delay of 0.5 sec., interval function

# KSPD Series Dual Function
## Timing Module (1A Solid State Output)

US Patent 6708135

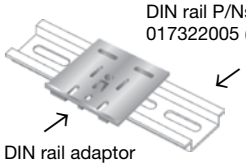
- Choose 1 of 6 Standard Dual Functions
- Factory Programmed
- Microcontroller Circuitry, +/-0.5% Repeat Accuracy
- 1 A Steady, 10 A Inrush
- Universal Voltage 24 ... 240 V AC
- Delays from 100 ms ...1000 h in 9 Ranges
- Onboard, External Adjust or Fixed Time Delay

Complete Product Details:
http://www.ssac.com/pp1.htm

### Accessories

100 K Ohm External adjust potentiometer
P/Ns:
P1004-95 (fig A)
P1004-95-X (fig B)

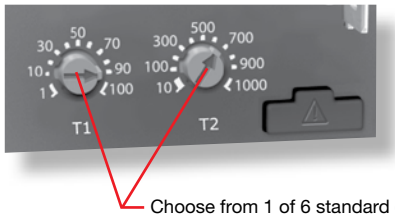
Versa-knob
P/N: P0700-7



DIN rail P/Ns:
017322005 (Steel)

DIN rail adaptor
P/N: P1023-20

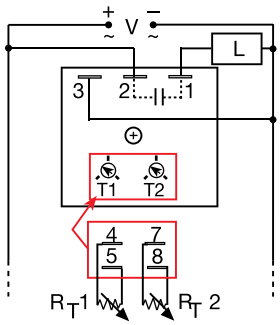
See accessory pages



The KSPD Series is a factory programmed module available with 1 of 6 standard dual functions. Modules are manufactured without the function assigned. When an order is received, the function and time delay software are added. This approach provides QuickShip delivery on all adjustment options and time ranges. The solid state output provides 100 million operations, typical. Encapsulation protects against shock, vibration, and humidity. The KSPD Series is a cost effective approach for OEM applications that require small size and long life.

Choose from 1 of 6 standard dual functions, fixed or onboard or external adjustment, and 9 time ranges. All available through the QuickShip program.

### Connection



Terminal Location for External Adjustment.

V = Voltage
L = Load
T1 & $R_T$1 = First Adjustment
T2 & $R_T$2 = Second Adjustment

A knob is supplied for adjustable units or $R_T$ terminals for external adjust. Use a 100 K ohm potentiometer for full time range adjustment. Dashed lines are internal connections.

### **Function Chart

| | Code |
|---|---|
| Delay On Make/Recycle (ON Time First, Equal Times) | MRE |
| Delay On Make/Interval | MI |
| Interval/Recycle (ON Time First, Equal Times) | IRE |
| Recycle (Both Times Adjustable, ON Time First) | RXE |
| Recycle (Both Times Adjustable, OFF Time First) | RXD |
| Interval/Delay On Make | IM |

*See page 10 for function time diagrams*

### Technical Data

| | |
|---|---|
| **Output** | |
| Rating | 1 A steady, 10 A inrush for 16 ms |
| **Mechanical** | |
| Mounting | Surface mt. with one #10 (M5 x 0.8) screw |
| Package | 2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connects |

**KSPD Series** | **X**

**Input**
- A - 24 ... 240 V AC
- P - 12 ... 120 V DC Positive Switching
- N - 12 ... 120 V DC Negative Switching

**X**

**First Adjustment**
- 1 - Fixed
- 2 - Onboard Adjust
- 3 - External Adjust

**X**

**First Time Delay* (T1 or $R_T$1)**
- 1 - 0.1 ... 10 s
- 2 - 1 ... 100 s
- 3 - 10 ... 1000 s
- 4 - 0.1 ... 10 m
- 5 - 1 ... 100 m
- 6 - 10 ... 1000 m
- 7 - 0.1 ... 10 h
- 8 - 1 ... 100 h
- 9 - 10 ... 1000 h

**X**

**Second Adjustment**
- 1 - Fixed
- 2 - Onboard Adjust
- 3 - External Adjust

**X**

**Second Time Delay* (T2 or $R_T$2)**
- 1 - 0.1 ... 10 s
- 2 - 1 ... 100 s
- 3 - 10 ... 1000 s
- 4 - 0.1 ... 10 m
- 5 - 1 ... 100 m
- 6 - 10 ... 1000 m
- 7 - 0.1 ... 10 h
- 8 - 1 ... 100 h
- 9 - 10 ... 1000 h

**X**

**Function****
Specify Function (Refer to Function Chart for Code)

†**Note:** Grayed options are available in standard lead time.

*If Fixed Delay is selected, insert delay [0.1 ... 999] followed by (S) secs., (M) mins., or (H) hrs.

**Example P/N:**

**KSPDA2525MRE** = 24...240V AC, onboard adjustment, T1=1...100 m, T2=1...100 m, delay on make /recycling - ON time first
**KRPDD10.5S110SMB** = 24...240V AC, fixed delays, T1= 0.5 sec., T2 = 15 sec. recycling - both times adjustable, ON time first.

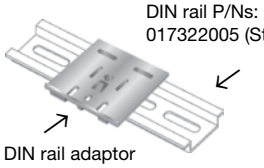
# KSPU Series Single Timer or Counter Function
## Timing Module (1A Solid State Output)


US Patent 6708135

- Choose 1 of 16 Standard Functions
- Factory Programmed
- Microcontroller Circuitry, +/-0.1% Repeat Accuracy
- Solid State Output 1 A Steady, 10 A Inrush
- Accurate Switch Adjustment
- Universal Voltage 24 ... 240 V AC
- Delays from 100 ms...1023 h in 6 ranges
- Counts to 1023 in 3 Ranges

Complete Product Details:
http://www.ssac.com/pp1.htm

### Mounting Accessory



DIN rail P/Ns:
017322005 (Steel)

DIN rail adaptor
P/N: P1023-20

See accessory pages

### Switch Adjustment

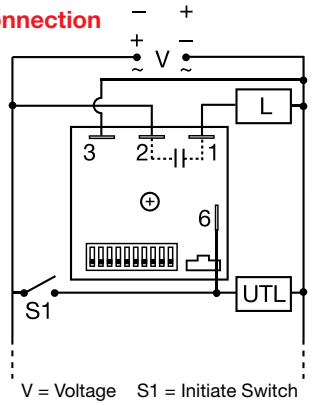
**Adjustment Switch Operation**

| TIME DELAY | | COUNTER | |
|---|---|---|---|
| 0.1...102.3 | 1...1023 | 1...165 | 1...63 |
| OFF ►ON | OFF ►ON | OFF ►ON | OFF ►ON |
| 0.1 0.2 0.4 0.8 1.6 3.2 6.4 12.8 25.6 51.2 | 1 2 4 8 16 32 64 128 256 512 | 1 2 3 4 5 10 20 30 40 50 | 1 2 4 8 16 32 M 1 2 4 |
| 6.3 | 544 | 57 counts | 44 s Delay<br>2 counts to Start |

One or more switches must be ON for proper operation.

The KSPU Series is a factory programmed 1 amp solid state module available in any 1 of 16 switch adjustable timer or counter functions. Modules are manufactured without the function assigned. When an order is received, the function and time delay software are added. This approach provides fast QuickShip delivery on a large number of part numbers. Switch adjustment allows accurate selection of the time delay or number of counts the first time and every time. The solid state output provides 100 million operations, typical. The KSPU Series is a cost effective approach for OEM applications that require small size, solid state reliability, and accurate switch adjustment.

### Connection




V = Voltage S1 = Initiate Switch
L = Load UTL = Untimed Load

The untimed load is optional. S1 is not used for some functions. Dashed lines are internal connections.

### **Function Chart

| | Code |
|---|---|
| Delay on Make | M |
| Delay on Break | B |
| Recycle (ON Time First, Equal Times) | RE |
| Recycle ( OFF Time First, Equal Times) | RD |
| Single Shot | S, SD |
| Interval | I |
| Trailing Edge Single Shot | TS |
| Inverted Single Shot | US |
| Inverted Delay on Break | UB |
| Accumulative Delay on Make | AM |
| Motion Detector/Retriggerable, Single Shot | PSD PSE |
| Counter/Pulsed Output | C |
| Counter/Interval Output | CI |
| Flip Flop (trailing edge, alternating) | FT |
| Flip Flop (leading edge) | F |

*See page 9 for function time diagrams*

### Technical Data

| | |
|---|---|
| **Count** | |
| Rate | ≤ 25 counts per second |
| **Output** | |
| Rating | 1 A steady, 10 A inrush for 16 ms |
| Counter Output (P/N Variable 7 & 8) | Output Pulse width: 300 ms +/-20% |
| **Protection** | |
| Circuitry | Encapsulated |
| **Mechanical** | |
| Mounting | Surface mt. with one #10 (M5 x 0.8) screw |
| Package | 2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connects |

### Ordering Table

**KSPU Series** — **X Input**

- A - 24 ... 240 V AC
- P - 12 ... 120 V DC Positive Switching
- N - 12 ... 120 V DC Negative Switching

†**Note:** Grayed option is available in standard lead time.

**X Time Delay/Counts**

- 1 - 0.1 ... 102.3 s
- 2 - 1 ... 1023 s
- 3 - 0.1 ... 102.3 m
- 4 - 1 ... 1023 m
- 5 - 0.1 ... 102.3 h
- 6 - 1 ... 1023 h
- 7 - 1 ... 165 counts (straight) w/pulsed output
- 8 - 1 ... 1023 counts (binary) w/pulsed output
- 9 - 1 ... 7 counts to start 1 ... 63 s or m interval time

**X Function****

Specify Function (Refer to Function Chart for Code)

**Example P/N:**

**KSPUA2RE** = Universal AC voltage, switch adjustment, 1...1023 sec., recycling, ON first

# HRPS/HRIS Series Single Function
## Time Delay Relay (30A SPDT)

US Patent 6708135

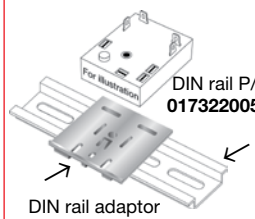
- 30 A SPDT N.O. Output Contacts
- Factory Programmed
- Universal Voltage
  24 ... 240 V AC ... 110 V DC
- Encapsulated Circuitry
- Onboard, External Adjust or Fixed Time Delay
- Delays from 100 ms...1000 h in 9 ranges
- +/-0.5% Repeat Accuracy

Complete Product Details:
http://www.ssac.com/pp1.htm

### Accessories

100 K Ohm External adjust potentiometer P/Ns:
**P1004-95** (fig A)
**P1004-95-X** (fig B)

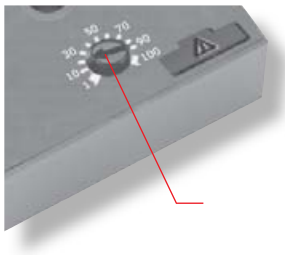
Versa-knob P/N: **P0700-7**




DIN rail P/Ns:
**017322005** (Steel)

DIN rail adaptor P/N: **P1023-20**

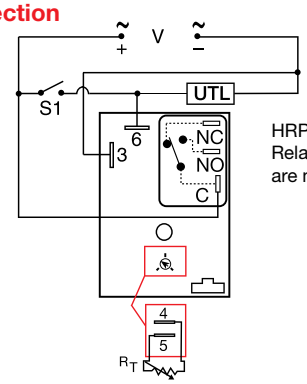
See accessory pages.



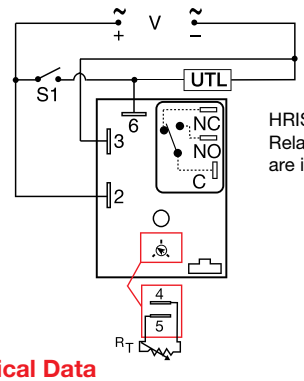
The HRPS/HRIS Series combines a 30 amp rated electromechanical relay output with any 1 of 14 standard functions. Modules are manufactured without the function assigned. When an order is received, the function and time delay software are added. This approach allows Quick Ship delivery on all time ranges and functions The 30A res. output contact rating allows for direct operation of heavy loads such as compressors, pumps, blower motors, heaters, etc. This series is ideal for OEM applications where cost is a factor. HRPS has non-isolated SPDT relay contacts, and HRIS has isolated SPDT relay contacts.

Choose from 1 of 14 standard single functions, fixed or onboard or external adjustment, and 9 time ranges. All available through the QuickShip program.

### Connection




HRPS Series
Relay contacts
are not isolated.




HRIS Series
Relay contacts
are isolated.

### **Function Chart

| | Code |
|---|---|
| Delay on Make | M |
| Delay on Break | B |
| Recycle (ON Time First, Equal Times) | RE |
| Recycle ( OFF Time First, Equal Times) | RD |
| Single Shot | S, SD |
| Interval | I |
| Trailing Edge Single Shot | TS |
| Inverted Single Shot | US |
| Inverted Delay on Break | UB |
| Accumulative Delay on Make | AM |
| Motion Detector/Retriggerable Single Shot | PSD. PSE |
| Alternating Relay | FT |
| Flip Flop (leading edge) | F |

*See page 9 for function time diagrams*

**NOTE:** A knob is supplied for adjustable units, or RT terminals for 4 & 5 for external adjustment. Select a 100K ohm potentiometer for full time range adjustment. The untimed load is optional. S1 is not used for some functions. Dashed lines are internal connections.

V = Input Voltage S1 = Initiate Switch
C = Common UTL = Optional Untimed Load
NO = Normally Open NC = Normally Closed

### Technical Data

| | | |
|---|---|---|
| **Output** | | |
| Ratings: | SPDT-N.O | SPDT-N.C. |
| General Purpose 125/240 V AC | 30 A | 15 A |
| Motor Load 125 V AC | 1 hp* | 1/4 hp** |
| 240 V AC | 2 hp** | 1 hp** |
| Life | Electrical -- 1 x 105, *3 x 104, **6,000 | |
| **Mechanical** | | |
| Mounting | Surface mt. with one #10 (M5 x 0.8) screw | |
| Package | 3 x 2 x 1.5 in (76.7 x 51.3 x 38.1 mm) | |
| Termination | 0.25 in. (6.35 mm) male quick connects | |

### Ordering Table

**HRPS/HRIS Series**

**X — Input**
- W - 24 ... 240 V AC
  24 ... 110 V DC
- D - 12 ... 48 V DC †

**X — Adjustment**
- 1 - Fixed
- 2 - Onboard Adjust
- 3 - External Adjust

**X — Time Delay ***
- 1 - 0.1 ... 10 s
- 2 - 1 ... 100 s
- 3 - 10 ... 1000 s
- 4 - 0.1 ... 10 m
- 5 - 1 ... 100 m
- 6 - 10 ... 1000 m
- 7 - 0.1 ... 10 h
- 8 - 1 ... 100 h
- 9 - 10 ... 1000 h

**X — Function ****
Specify Function (Refer to Function Chart for Code)

*If Fixed Delay is selected, insert delay [0.1 ... 1000] followed by (S) secs., (M) mins., or (H) hrs.

†**Note:** Grayed option is available in standard lead time.

**Example P/N:**
**HRPSW23S** = Universal AC/DC voltage, onboard adjustment, 10...1000 sec., single shot function
**HRISW10.5SB** = Universal AC/DC voltage, isolated contacts, fixed delay of 0.5 sec., delay on break function

# HRPU/HRIU Series Single Function
## Time Delay Relay (30A SPDT)

US Patent 6708135

7

- Choose 1 of 16 Standard Functions
- Factory Programmed
- Microcontroller Circuitry, +/-0.1% Repeat Accuracy
- 30 A, N.O. Output Contacts
- Accurate Switch Adjustment
- 24 ... 240 V AC; 24 ... 110 V DC
- Delays from 100 ms ...1023 h in 6 Ranges
- Counts to 1023 in 3 Ranges

Complete Product Details:
http://www.ssac.com/pp1.htm

## Switch Adjustment

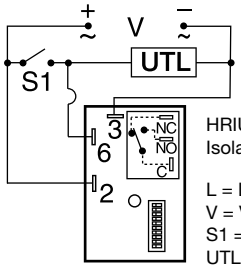
**Adjustment Switch Operation**

| TIME DELAY | | COUNTER | |
|---|---|---|---|
| 0.1...102.3 | 1...1023 | 1...165 | 1...63 |
| OFF ►ON | OFF ►ON | OFF ►ON | OFF ►ON |
| 0.1 0.2 0.4 0.8 1.6 3.2 6.4 12.8 25.6 51.2 | 1 2 4 8 16 32 64 128 256 512 | 1 2 3 4 5 10 20 30 40 50 | 1 2 4 8 16 32 M 1 2 4 |
| 6.3 | 544 | 57 counts | 44 s Delay 2 counts to Start |

One or more switches must be ON for proper operation.

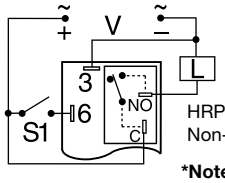
The HRPU/HRIU features a 30A rated electromechanical relay output with any 1 of 16 standard switch adjustable timer or counter functions. Its switching capacity allows direct control of loads like compressors, pumps, motors, heaters, and lighting. Modules are manufactured without the function assigned. When an order is received, the function and time delay software are added. This approach provides Quick Ship delivery on a large number of part numbers. Switch adjustment allows accurate selection of the time delay or number of counts the first time and everytime. The HRPU has non-isolated relay contacts, the HRIU has isolated relay contacts. The HRPU/HRIU Series is a cost effective approach for OEM applications that require small size, reliability and accurate switch adjustment.

## Connection




HRIU
Isolated Output

L = Load
V = Voltage
S1 = Initiate Switch*
UTL = Optional Untimed Load




HRPU
Non-Isolated Output

***Note:** S1 is not used for some functions.
Dashed lines are internal connections.

## **Function Chart

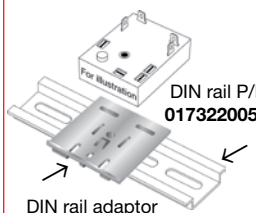
| | Code |
|---|---|
| Delay on Make Timer | M |
| Delay on Break Timer | B |
| Recycle Timer (ON Time First, Equal Times) | RE |
| Recycle Timer (OFF Time First, Equal Times) | RD |
| Single Shot Timer | S,SD |
| Interval Timer | I |
| Trailing Edge Single Shot Timer | TS |
| Motion Detector/Retriggerable Single Shot | PSD, PSE |
| Inverted Single Shot Timer | US |
| Accumulative Delay on Make Timer | AM |
| Inverted Delay on Break Timer | UB |
| Counter/Pulsed Output | C |
| Counter/Interval Output | CI |
| Flip Flop (Trailing Edge, Alternating) | FT |
| Flip Flop (Leading Edge) | F |

*See page 9 for function time diagrams*

## Technical Data

| | | | |
|---|---|---|---|
| **Count** | | | |
| Rate | ≤ 25 counts per second | | |
| **Output** | | | |
| Ratings: | Voltage | SPDT-N.O. | SPDT-N.C. |
| General Purpose | 125/240 V AC | 30 A | 15 A |
| Motor Load | 125 V AC | 1 hp* | 1/4 hp** |
| | 240 V AC | 2 hp** | 1 hp** |
| Life | Electrical -- 1 x 105, *3 x 104, ** 6,000 | | |
| Counter Output | (P/N Variable 7 & 8) Output Pulse width 300 ms +/- 20% | | |
| **Mechanical** | | | |
| Mounting | Surface mt. with one #10 (M5 x 0.8) screw | | |
| Termination | 0.25 in. (6.35 mm) male quick connects | | |
| Package | 3 x 2 x 1.5 in.(76.7 x 51.3 x 38.1mm) | | |

## Mounting Accessory




DIN rail P/Ns:
**017322005** (Steel)

DIN rail adaptor
P/N: **P1023-20**

See accessory pages

## Ordering Table

**HRPU/HRIU Series**

**X Input**
- **W** - 24 ... 240 V AC
  24 ... 110 V DC
- **D** - 12 ... 48 V DC

†**Note:** Grayed option is available in standard lead time.

**X Time Delay/Counts**
- **1** - 0.1 ... 102.3 s
- **2** - 1 ... 1023 s
- **3** - 0.1 ... 102.3 m
- **4** - 1 ... 1023 m
- **5** - 0.1 ... 102.3 h
- **6** - 1 ... 1023 h
- **7** - 1 ... 165 counts (straight) w/pulsed output
- **8** - 1 ... 1023 counts (binary) w/pulsed output
- **9** - 1 ... 7 counts to start 1 ... 63 s or m interval time

**X Function****
Specify Function (Refer to Function Chart for Code)

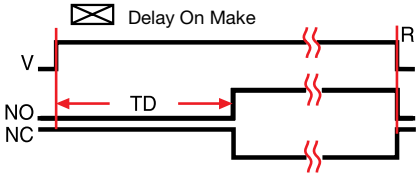
**Example P/N:**
**HRPUW2S** = Universal AC/DC voltage, switch adjustment, 1...1023 sec., single shot function
**HRIUW3B** = Universal AC/DC voltage, isolated relay contacts, switch adjustment,0.1...102.3 min., delay on break function

HRPUpp 01.08.08

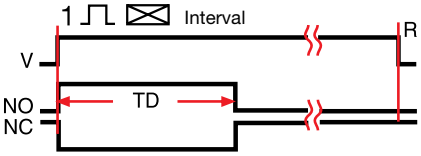
# ProgramaCube® Function Selector
## For KRPS, KSPS, KSPU, HRPS, HRPU, HRIU
## Single Adjustment Functions

### Function Diagrams

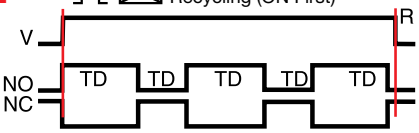
**M** Delay On Make



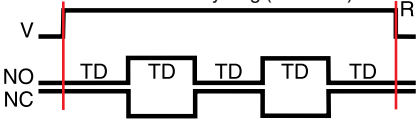

**I** Interval



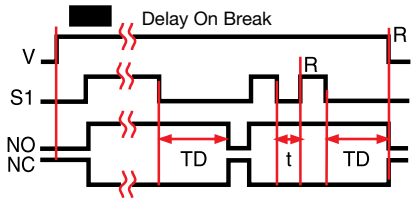

**RE** Recycling (ON First)



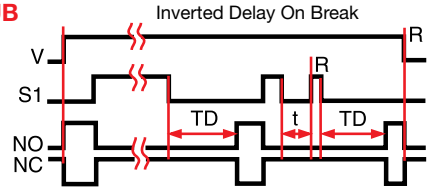

**RD** Recycling (OFF First)



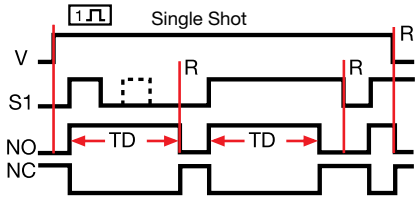

**B** Delay On Break




**UB** Inverted Delay On Break

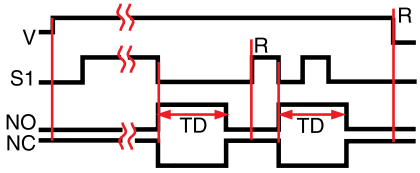



**S** Single Shot

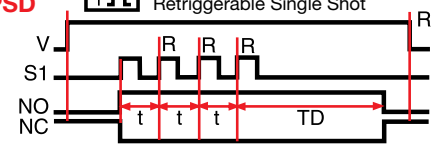



**SD** Operates same as S except will not energize and start timing if initiate switch is closed when input voltage is applied.

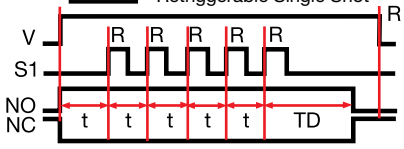
**TS** Trailing Edge Single Shot



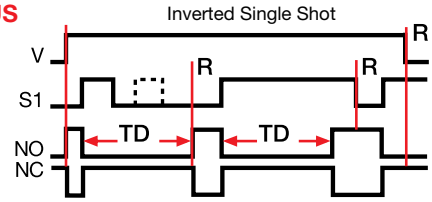

**PSD** Motion Detector Retriggerable Single Shot



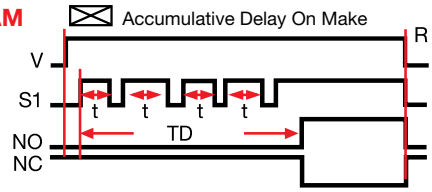

**PSE** Motion Detector (PSE) Retriggerable Single Shot



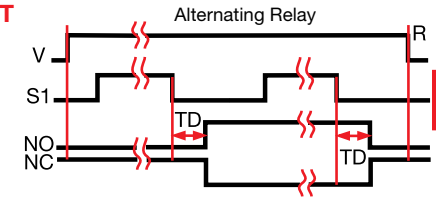

**US** Inverted Single Shot



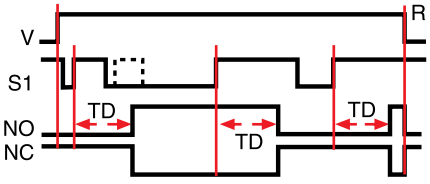

**AM** Accumulative Delay On Make



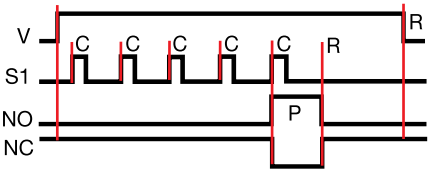

**FT** Alternating Relay



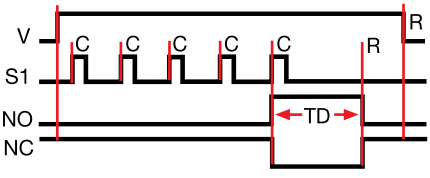

**F** Leading Edge Flip-Flop




**C** Counter with Pulsed Output




**CI** Counter with Interval Output




### Legend

V = Voltage R = Reset S1 = Initiate Switch
TD1, TD2 = Time Delay C = Count
P = Pulse Duration t = Incomplete Time Delay
NO = Normally Open NC = Normally Closed
—≠— = Undefined time

Note: If S1 is closed when input voltage is applied, the function starts and the time delay begins. (B, S, TS, US, UB, AM, PSD, FT)

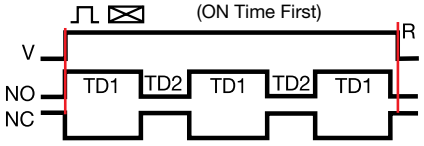
7

KRPSpp 01.04.08

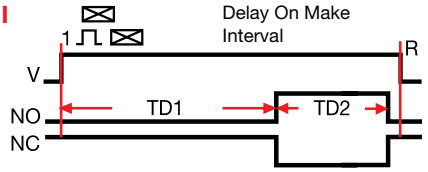
# ProgramaCube® Function Selector
## For KRPD, KSPD Series
## Dual Adjustment Functions

### Function Diagrams

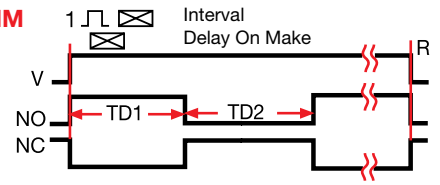
**RXE** Recycle, Both Times Adjustable (ON Time First)



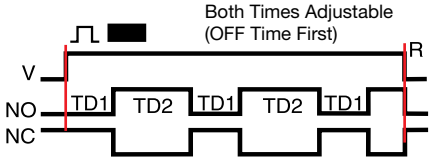

**MI** Delay On Make Interval



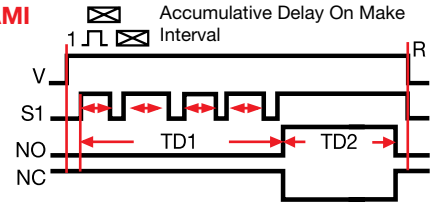

**IM** Interval Delay On Make



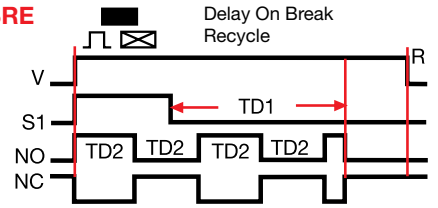

**RXD** Recycle, Both Times Adjustable (OFF Time First)



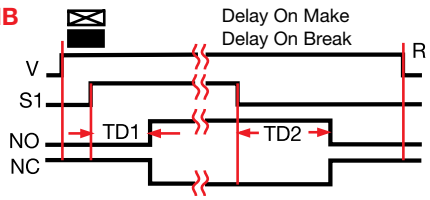

**AMI** Accumulative Delay On Make Interval



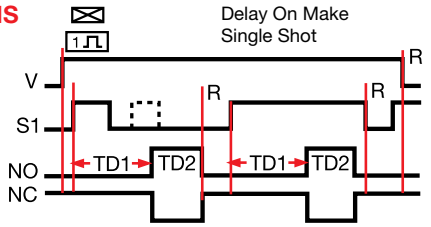

**BRE** Delay On Break Recycle



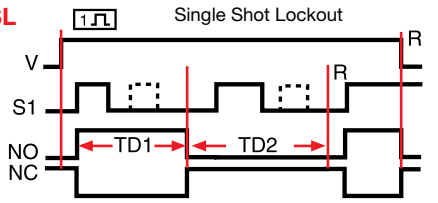

**MB** Delay On Make, Delay On Break



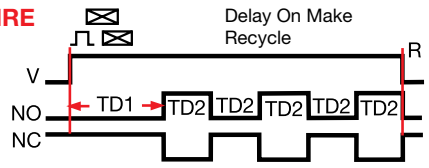

**MS** Delay On Make Single Shot



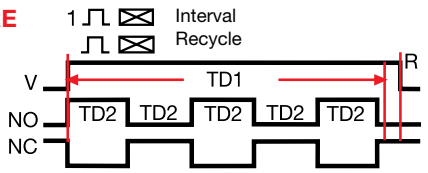

**SL** Single Shot Lockout



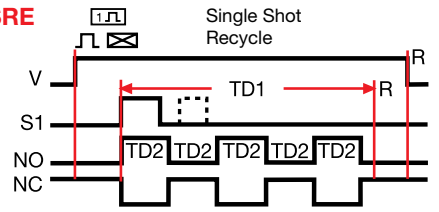

**MRE** Delay On Make Recycle




**IRE** Interval Recycle




**SRE** Single Shot Recycle




### Legend

V = Voltage  R = Reset  S1 = Initiate Switch
TD1, TD2 = Time Delay  t = Incomplete Time Delay
NO = Normally Open  NC = Normally Closed
—⫽— Undefined time

Note: If S1 is closed when input voltage is applied, the function starts and the time delay begins. (MB, MS, BRE, SRE, AMI, SL)

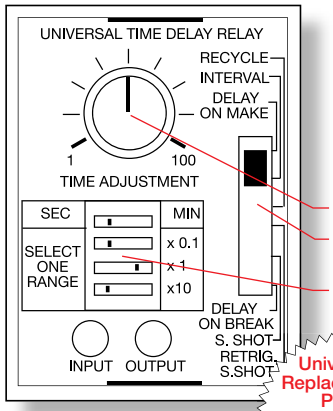
7

KRPDpp 01.04.08

# Multifunction, Multirange
## TRU Series, Knob Adjustable
## Universal Time Delay Relay

- Multifunction and Multirange
- Six Timing Functions are Switch Selectable
- 0.1 s ... 1000 m in Six Ranges
- Knob Adjustable Time Delay
- Microcontroller +/-0.1% Repeat Accuracy
- Universal Input Voltage 19...264 V AC & 19...30 V DC
- 10 A, SPDT or DPDT Relay Contacts
- 2 LED Status Indicators

Complete Product Details:
http://www.ssac.com/pp1.htm




The TRU Series is a multifunction, knob adjustable, universal time delay relay. As a universal replacement part, it can reduce inventory costs; replacing up to 1000 competitive time delay relay part numbers.

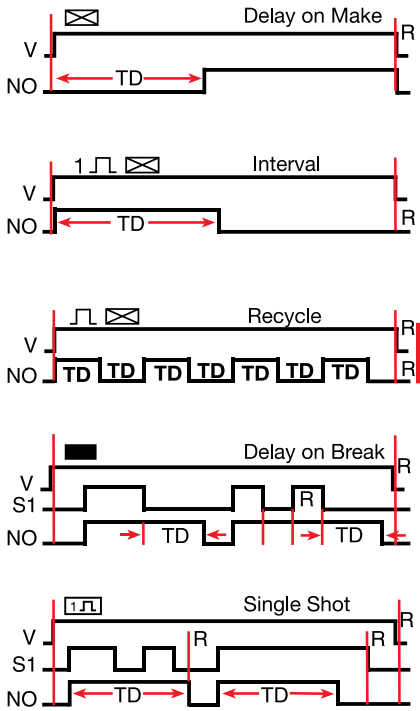
Knob adjustment of the time delay

Easy, fast slide switch selection of 1 of 6 of the most popular functions

Positive switch selection of the time range and seconds or minutes.

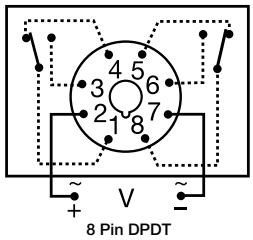
**Universal Replacement Part**
Replaces up to 1000 part numbers

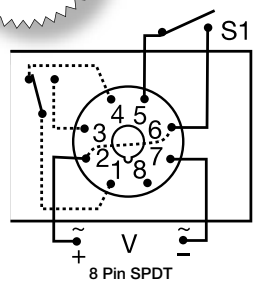
## Function




V = Voltage S1 = Initiate Switch
R = Reset TD = Time Delay
NO = Normally Open Contact
t = Incomplete Time Delay

## Connection

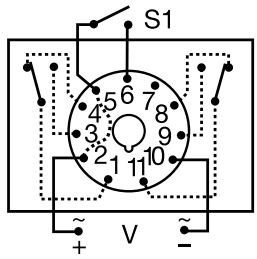



A six position slide switch selects the function. 8 Pin DPDT base wiring has 3 popular functions. All six functions are available in the 8 pin SPDT and 11 pin DPDT versions.

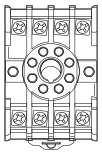
**3 Popular Functions:**

- Delay On Make
- Interval
- Recycling



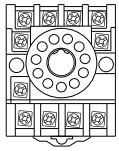

Dashed lines are internal connections.
Relay contacts are isolated.

## Mounting and Connection Accessory



Octal
8 pin socket
P/N: NDS-8

35mm DIN
Rail or Surface
Mounting



Octal
11 pin socket
P/N: NDS-11

See accessory pages

## Technical Data

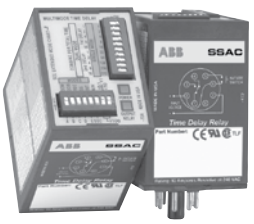
| | |
|---|---|
| **Time Delay** | |
| Range: Switch Selectable | 0.1 s ... 1000 m in 6 ranges--0.1 ... 10, 1 ... 100 or 10 ... 1000 s; 0.1 ... 10, 1 ... 100 or 10 ... 1000 m |
| Adjustments – Multiplier: – Time Setting: | 4 position DIP switch selects x0.1, x1, x10, and s or m Onboard knob adjustment with 1 ... 100 reference dial |
| Repeat Accuracy | +/- 0.1% or +/-20 ms, whichever is greater |
| **Output** | |
| Rating | 10 A resistive at 120/240 V AC & 28 V DC; 1/3 hp at 120/240 V AC |
| **Mechanical** | |
| Package | 3.44 x 2.39 x 1.78 in. (87.3 x 60.7 x 45.2 mm) |
| Mounting | Surface or 35mm DIN rail, requires accessory 8 or 11 pin socket |

## Ordering Table

| Part Number | Voltage | Functions | Connection |
|---|---|---|---|
| TRU1 | 19 ... 264 V AC; 19 ... 30 V DC | 3 | 8 pin DPDT |
| TRU2 | | 6 | 8 pin SPDT |
| TRU3 | | 6 | 11 pin DPDT |

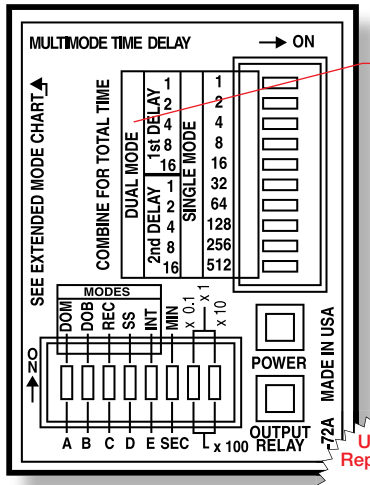
# Multifunction, Multirange
## TRDU Series Switch Adjustable Time Delay Relay (10A SPDT or DPDT)





- Multifunction – 21 Timing Functions
- Multirange – 0.1 s ... 1,705 h in 8 Ranges
- Switch Selectable Function, Time Delay, & Ranges
- Microcontroller +/-0.1% Repeat Accuracy
- 24 or 120V AC; 24 V DC Input Voltages
- 10 A, Isolated SPDT or DPDT Output Contacts

Complete Product Details:
http://www.ssac.com/pp1.htm



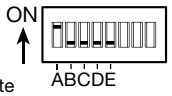

Dual Functions Replace up to 3 Separate Timers

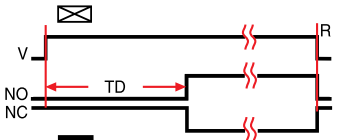
Universal Replacement Part Replaces up to 100 part numbers

The TRDU Series is a versatile universal time delay relay with twenty-one switch selectable single and dual functions. The dual functions replace up to three timers required to accomplish the same function. The TRDU replaces hundreds of part numbers, thereby, reducing your inventory cost.

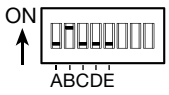
## Single Functions

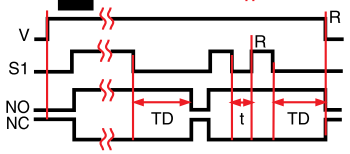
*** Delay On Make**



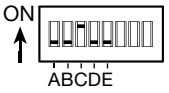



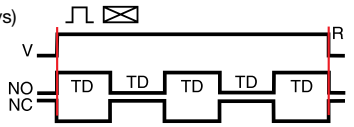

**Delay On Break**



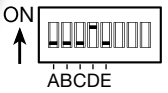



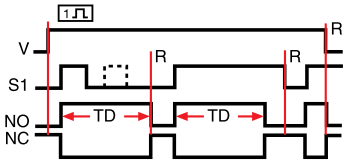

*** Recycle**
(ON Time First, Equal Delays)



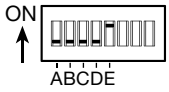



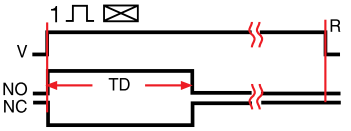

**Single Shot**




*** Interval**

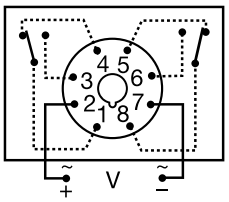


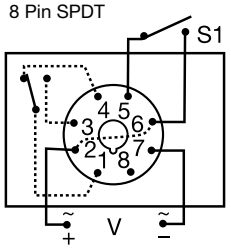

V = Voltage S1 = Initiate Switch
NO = Normally Open
NC = Normally Closed

## Connection

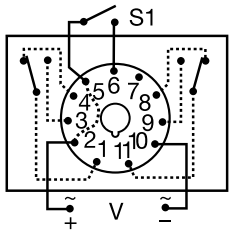
8 Pin DPDT




8 Pin SPDT




11 Pin DPDT

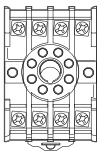



Relay contacts are isolated.
Dashed lines are internal connections.

## Technical Data

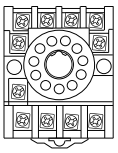
| | |
|---|---|
| **Time Delay** | |
| Range: Switch Selectable | Single Functions: 0.1 s ... 1,705 h in 8 ranges<br>Dual Functions: 0.1 s ... 3,100 m each in 8 ranges |
| Adjustments | Three switches are provided to set secs/mins & multipliers of x0.1, x1, x10, or x100 |
| Repeat Accuracy | +/-0.1% or 20 ms, whichever is greater |
| Timing Functions | Five switches are provided to set one of twenty-one single or dual functions |
| **Output** | |
| Rating | 10 A resistive at 120/240 V AC & 28 V DC; 1/3 hp at 120/240 V AC |
| **Mechanical** | |
| Package | 3.1 x 2.39 x 1.78 in. (78.7 x 60.7 x 45.2 mm) |
| Mounting | Surface or 35mm DIN rail, requires accessory 8 or 11 pin socket |

## Mounting and Connection Accessory



Octal
8 pin socket
P/N: NDS-8

35mm DIN
Rail or Surface
Mounting



Octal
11 pin socket
P/N: NDS-11

See accessory pages

## Ordering Table

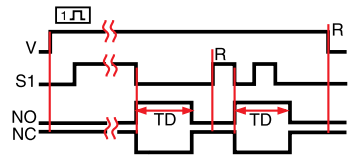
| Part Number | Input Voltage | Base Connection |
|---|---|---|
| TRDU24A2 | 24 V AC/DC | 8 Pin SPDT |
| TRDU24A3 | | 11 Pin DPDT |
| TRDU120A1 | 120 V AC | 8 Pin DPDT |
| TRDU120A2 | | 8 Pin SPDT |
| TRDU120A3 | | 11 Pin DPDT |

# Multifunction, Multirange
## TRDU Series Switch Adjustable Function Diagrams

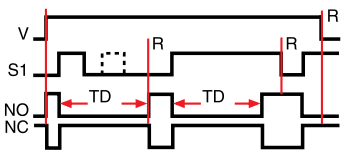


### Single Functions

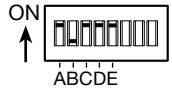
**Trailing Edge Single Shot**

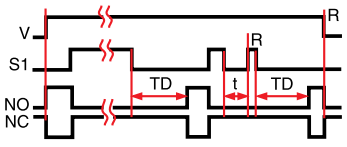




**Inverted Single Shot**

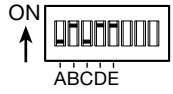



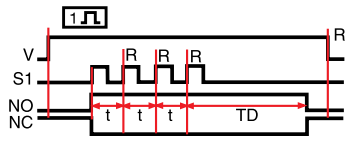

**Inverted Delay On Break**



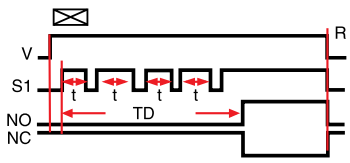




**Retriggerable Single Shot**



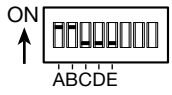



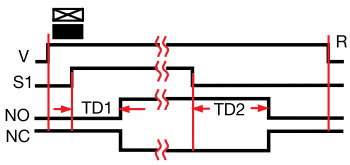

**Accumulative Delay On Make**

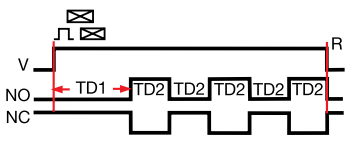

### Dual Functions

**Delay On Make Delay On Break**

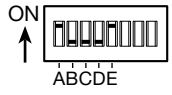


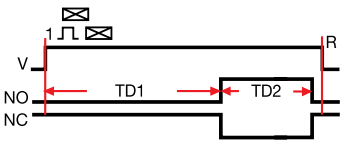




*** Delay On Make Recycle (ON Time First)**

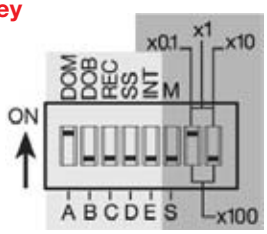




*** Delay On Make Interval**




### Key

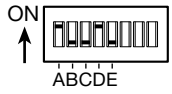


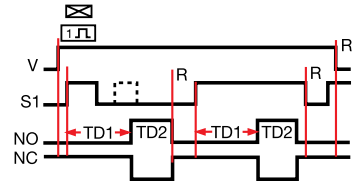

5 Switches for Function Selection
3 Switches for Time Delay Range

DOM = Delay On Make
DOB = Delay On Break
REC = Recycle
SS = Single Shot
INT = Interval
M = Minutes
S = Seconds

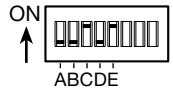
### Dual Functions (continued)

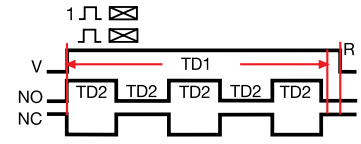
**Delay On Make Single Shot**



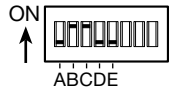



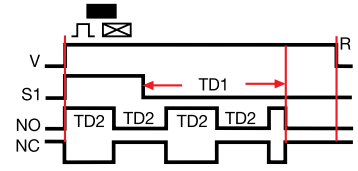

*** Interval Recycle (ON Time First)**



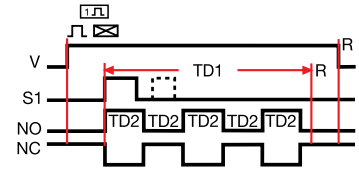




**Delay On Break Recycle (ON Time First)**

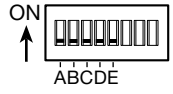


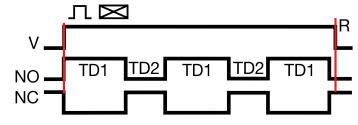




**Single Shot Recycle (ON Time First)**

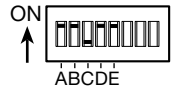



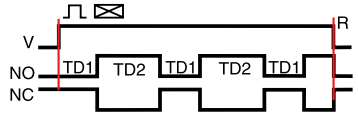

*** Recycle (ON Time First) Both Times Adjustable**



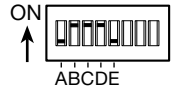



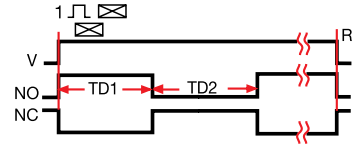

*** Recycle (OFF Time First) Both Times Adjustable**



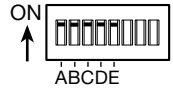



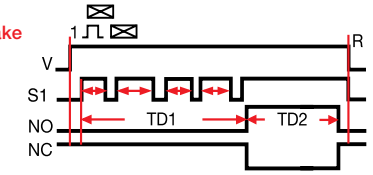

*** Interval Delay On Make**




**Accumulative Delay on Make Interval**




* 9 Functions included in the 8 pin DPDT models

| | | | |
|---|---|---|---|
| V = | Voltage | R = | Reset |
| S1 = | Initiate Switch | TD,TD1,TD2 = | Complete Time Delay |
| NC = | Normally Closed Contact | NO = | Normally Open Contact |
| t = | Partial Time Delay | —\\— = | Undefined time |

**NOTE:**
The time delay range is the same for both functions when dual functions are selected.

# Dedicated Timers
## TDM, TDI, TDS, TDB Digi-Set Series
## Time Delay Relay

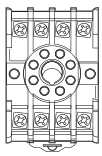

TEN YEAR 10 WARRANTY

7

- Single Function Timers
- Switch Settable Time Delays
- +/-0.1% Repeat Accuracy
- Delays from 100 ms ... 2.8 h in 3 Ranges
- AC and DC Input Voltages
- Isolated 10 A Relay Contacts
- Plug-In Connection & Mounting
- LED Indication

Complete Product Details:
http://www.ssac.com/pp1.htm

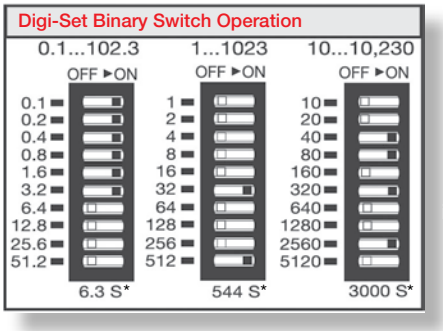
### Mounting and Connection Accessory



Octal
8 pin socket
P/N: **NDS-8**

35mm DIN
Rail or Surface
Mounting

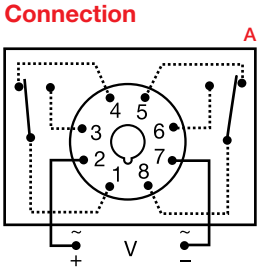
See accessory pages




* The selected time delay is the sum of the delays of all switches in the ON position

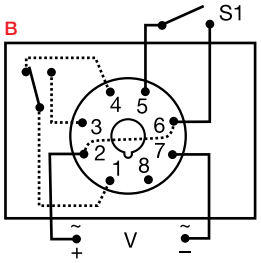
The TD Series of time delay relays are our most popular series; providing accurate and reliable performance with a 10 year warranty. The delay is adjusted by ten binary DIP switches, which allow selection of the time delay the first time and every time.

### Connection




Relay contacts are isolated.

Dashed lines are internal connections.



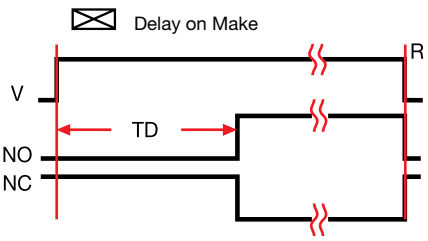

8 Pin Octal

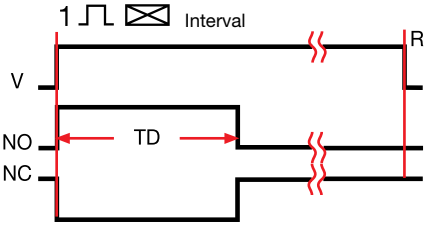
SPDT

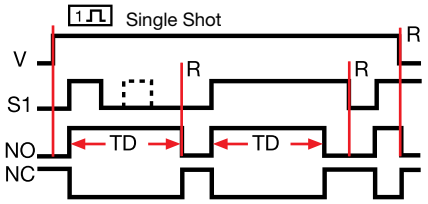
### Technical Data

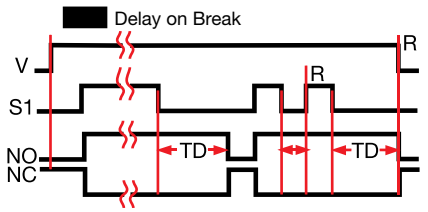
| | |
|---|---|
| **Time Delay** | |
| Ranges | 0.1 ... 102.3 s in 0.1 s increments<br>1 ... 1023 s in 1 s increments<br>10 ... 10,230 s in 10 s increments |
| Repeat Accuracy | +/- 0.1% or 20 ms, whichever is greater |
| **Indication** | |
| Indicator | LED glows during timing; relay is energized |
| **Output** | |
| Rating | 10 A resistive at 120/240 V AC & 28 V DC;<br>1/3 hp at 120/240 V AC |
| **Mechanical** | |
| Package | 3.2 x 2.4 x 1.8 in. (81.3 x 60.7 x 45.2 mm) |
| Mounting | Requires accessory 8 pin (Octal) socket |

### Functions




S1 = Initiate Switch V = Voltage R = Reset
NO = Normally Open NC = Normally Closed
TD = Time Delay —⌇— = Undefined time

### Ordering Table

| Part Number | Voltage | Function | Time Range | Connection |
|---|---|---|---|---|
| TDB120AL | 120 V AC | Delay on Break | 1 ... 1023 s | B |
| TDI120AL | | Interval | | A |
| TDM120AL | | Delay on Make | | A |
| TDML120AL | | Delay on Make | 0.1 ... 102.3 s | A |
| TDMH120AL | | Delay on Make | 10 ... 10230 s | A |
| TDS120AL | | Single Shot | 1 ... 1023 s | B |
| TDB24AL | 24 V AC | Delay on Break | | B |
| TDM24AL | | Delay on Make | | A |
| TDM12DL | 12 V AC | Delay on Make | | A |
| TDML12DL | | Delay on Make | 0.1 ... 102.3 s | A |

*Call for 230 V AC, 110 V DC and combinations not listed*

TD1pp 01.04.08

# Dedicated Timers
## TDR Recycling / CT-ERD Delay on Make Timers
## Time Delay Relays

- Switch Settable Time Delays - Both Times Adjustable
- 0.1 s ... 2.8 h in 3 Ranges
- +/-0.1% Repeat Accuracy
- +/-2% Setting Accuracy
- 10 A DPDT Isolated Relay Contacts
- Octal Plug-in Base Connection

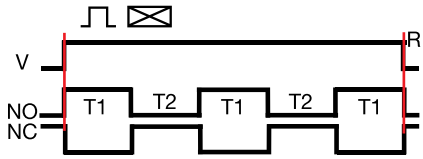
Complete Product Details:
http://www.ssac.com/pp1.htm

### TDR Series - Plug-in Digi Set Recycling Timer

The TDR Series is and octal plug-in recycling time delay relay with full 10A DPDT contacts. It provides separate adjustment of ON and OFF time delays with two ten position DIP switches. Switch adjustment ensures accurate adjustment of the time delay the first time and every time. An accessory 8 pin socket required for mounting and connection.

(see accessory pages)

### Function

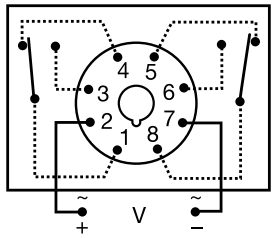



V = Voltage R = Reset T1 = ON Time
T2 = OFF Time NO = Normally Open
NC = Normally Closed

### Technical Data

| | |
|---|---|
| **Output** | |
| Rating | 10 A resistive at 120/240 V AC & 28 V DC; 1/3 hp at 120/240 V AC |
| **Mechanical** | |
| Package | 3.2 x 2.39 x 1.78 in. (81.3 x 60.7 x 45.2 mm) |
| Mounting and Connection | Surface or 35mm DIN rail mounting |

### Connection



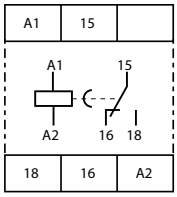

Relay contacts are isolated.
Dashed lines are internal connections.

### Ordering Table

| Part Number | Voltage | Sequence | ON Time | OFF Time |
|---|---|---|---|---|
| TDR4A11 | 120 V AC | ON Time First | 0.1 to 102.3 s | 0.1 to 102.3 s |
| TDR4A22 | | | 1 to 1023 s | 1 to 1023 s |
| TDR4A33 | | | 10 to 10230 s | 10 to 10230 s |

- Delay on Make, (ON delay) Function
- 7 Time Ranges 0.05 s ... 100 h
- SPDT (c/o) Relay Contact
- 2 LED Indicators
- Universal Voltage 24 ... 240 V AC; ... 48 V DC
- 6A SPDT (c/o) Contact

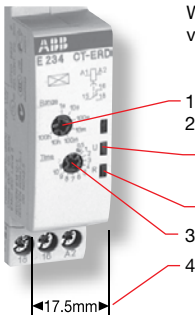
### Connection




A1-A2 – Supply Voltage
15-16/18 – Isolated SPDT (c/o) Contacts

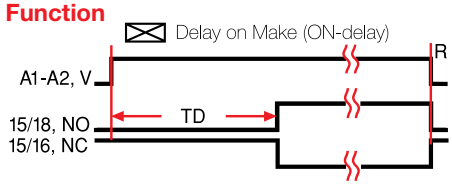
### CT-ERD - 17.5 mm, 35 mm DIN Rail Mount, Delay on Make Timer

The CT-ERD series provides more load switching capacity, 6 amp, in a thinner 35mm DIN mount package. Timing begins when control supply voltage is applied. The green LED flashes during timing. When the time delay is complete, the output relay energizes and the green LED glows. If control supply voltage is interrupted, the output relay de-energizes and the time delay is reset.




1 Time Range Selector Switch
2 LEDs for Status Indication
U - Green LED: Control Supply Voltage Applied & timing
R - Yellow LED: Output Relay Energized
3 Time Delay Adjustment
4 Space Saving Package

### Function




### Technical Data

| | | | | |
|---|---|---|---|---|
| **Time Ranges** | 7 time ranges 0.05 s - 100 h | 1.) 0.05-1 s<br>2.) 0.5-10 s<br>3.) 5-100 s | 4.) 0.5-10 min<br>5.) 5-100 min | 6.) 0.5-10 h<br>7.) 5-100 h |
| **Output** | | | | |
| | AC12 (resistive) at 230 V | 6 A | | |
| | AC15 (inductive) at 230 V | 3 A | | |
| **Mechanical** | Dimensions (W x H x D) | 17.5 mm x 70 mm x 58 mm (0.69 x 2.76 x 2.28 inches) | | |
| | Mounting | DIN3 rail, snap-mounting (no tools required) | | |
| Protection | enclosure / terminals | IP50 / IP20 | | |

### Ordering Table

| Series | Part Number | Voltage |
|---|---|---|
| CT-ERD.12 | 1SVR 500 100 R0000 | 24-48 V DC, 24-240 V AC |

# Multifunction Timers
## CT-MFD Series DIN Rail Mounting
## Time Delay Relay SPDT (c/o) or DPDT (2 c/o)

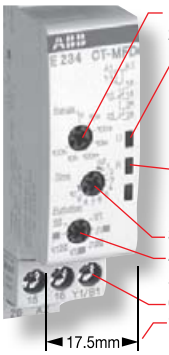


**CT-MFD.12**

**CT-MFD.21**

- 7 Switch Selectable Functions
- 7 Switch Selectable Time Ranges (0.05 s...100 h)
- SPDT or DPDT (2 c/o) contacts
- Universal Voltage 12...240V AC/DC; 3 Ranges
- Status Indication - 2 LEDs

Complete Product Details:
http://www.ssac.com/pp1.htm




1 Time Range Selection
2 LEDs for Status Indication
U - Green LED:
Input Voltage Applied
Timing
R - Yellow LED:
Output Relay Energized
3 Time Delay Adjustment
4 Function Selector
5 SPDT or DPDT (2 c/o) Contacts
6 IP20 Screw Terminals
7 Space Saving Package

The CT-MFD is a universal voltage, multifunction, DIN rail mount, SPDT or DPDT time delay relay. It includes 7 switch selectable popular functions and 7 switch selectable time delay ranges. The time delay is adjustable with an onboard trimmer. Featuring fast installation in control panels; snap onto DIN 3 rail and connect with IP20 screw terminals. LED indication shows input voltage applied, timing, and output energized.

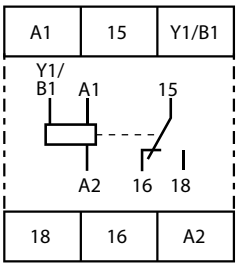
### Switch Selectable Time Ranges:

1 .....0.05-1 s
2 .....0.5-10 s
3 .....5-100 s
4 .....0.5-10 min
5 .....5-100 min
6 .....0.5-10 h
7 .....5-100 h

### Function Selection Chart (see time diagrams)

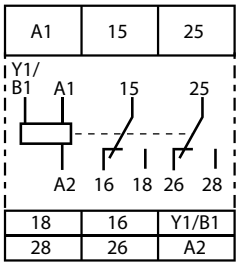
1.....Delay on Make (ON-delay)
2.....Interval (Impulse ON)
3.....Flasher/Recycling ON First
4.....Flasher/Recycling OFF First
5.....Delay on Break (OFF-delay)
6.....Single Shot (Pulse Former)
7.....Trailing Edge Interval (Impulse OFF)

## Connection




**CT-MFD.12**

| | |
|---|---|
| A1-A2 | Input Voltage: 24-48 V DC or 24-240 V AC |
| 15-16/18 | 1 SPDT (c/o) Contact |
| A1-Y1/B1 | Initiate Switch S1 Input |




**CT-MFD.21**

| | |
|---|---|
| A1-A2 | Input Voltage: 12-240 V AC/DC |
| 15-16/18 | 1 SPDT (c/o) Contact |
| 25-26/28 | 1 SPDT (c/o) Contacts |
| A1-Y1/B1 | Initiate Switch S1 Input |

## Technical Data

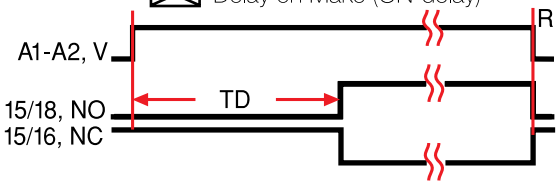
| Timing | CT-MFD.12 | CT-MFD.21 |
|---|---|---|
| Repeat Accuracy (constant parameters) | < +/- 0.5% | |
| **Mechanical** | | |
| Dimensions (W x H x D) | .69 x 2.76 x 2.28 in. (17.5 x 70 x 58 mm) | .69 x 3.15 x 2.28 in (17.5 x 80 x 58 mm) |
| Mounting | 35mm DIN Rail, No Tools Required | |
| Degree of Protection | Enclosure IP50 Terminals IP20 | |

## Ordering Table

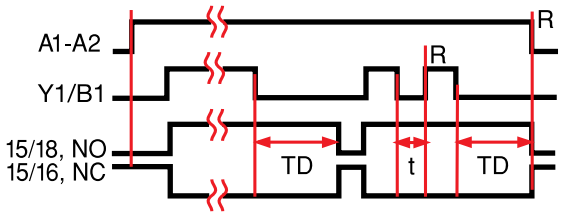
| Series | Part Number | Input Voltage | Output Form | Output Rating (res./ind.) |
|---|---|---|---|---|
| CT-MFD.12 | 1SVR 500 020 R0000 | 24-48 V DC, 24-240 V AC | SPDT (c/o) | 6A / 3A |
| CT-MFD.21 | 1SVR 500 020 R1100 | 12-240 V AC/DC | DPDT (2 c/o) | 5A / 2A |

## CT-MFD Function Diagrams

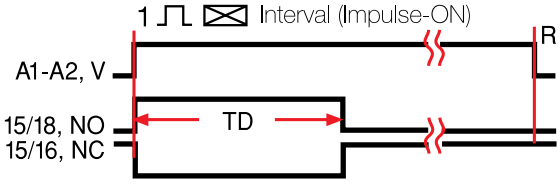
Delay on Make (ON-delay)



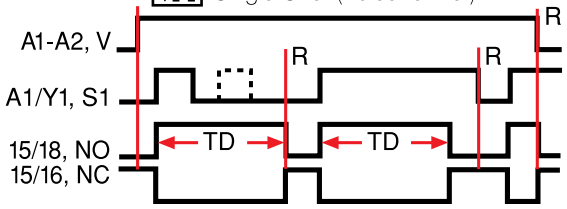

Delay on Break (OFF-delay)



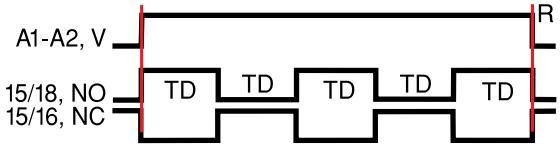

1 Interval (Impulse-ON)



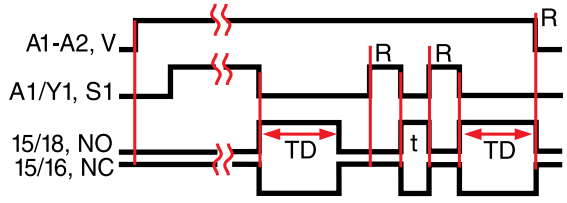

1 Single Shot (Pulse former)



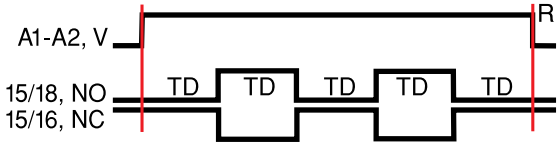

Recycling - On First (Flasher)




1 Trailing Edge Interval (Impulse -OFF)




Recycling - OFF First (Flasher)




**Legend**

| | |
|---|---|
| V = Voltage | NO = Normally Open |
| TD = Time Delay | NC = Normally Closed |
| R = Reset | S1 = Initiate Switch |
| t = incomplete TD | ≀≀ = Undefined Time |

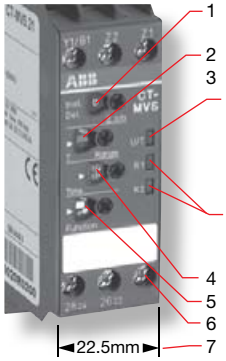
7

MFDFpp 01.08.08

# Multifunction Timers
## CT-MVS Series
## Relay Output, 22.5 mm, 35 mm DIN Rail Mount

- Multifunction 10 Selectable Functions
- 10 Switch Selectable Time Ranges (0.05 s...300 h)
- 2 SPDT (2 c/o) contacts
- Selectable Instantaneous Contact
- Universal Voltage 24...240V AC/DC
- Status Indication - 3 LEDs

Complete Product Details:
http://www.ssac.com/pp1.htm



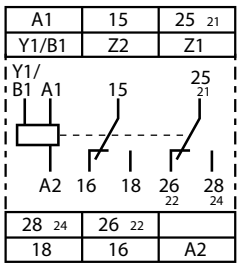

## Description

Multi-function timer, 22.5 mm width on Din Rail, 11 selectable functions, 10 selectable time ranges, universal input voltage of 24 to 240 V AC and DC. Screwdriver adjustable time delay and switch selectable function and time range. Select output as either DPDT (2 c/o) timed contacts or SPDT (c/o) timed and SPDT (c/o) instantaneous contact. The time delay can be externally adjusted by connecting an accessory 50K ohm potentiometer.

### Switch Selectable Time Ranges:

1 .....0.05-1 s
2 .....0.15-3 s
3 .....0.5-10 s
4 .....1.5-30 s
5 .....5-100 s
6 .....15-300 s
7 .....1.5-30 min
8 .....15-300 min
9 .....1.5-30 h
10 .....15-300 h

## Connection




A1-A2 Input Voltage: 24-240 V AC/DC
15-16/18 1 SPDT (c/o) Contact
25-26/28 1 SPDT (c/o) Contact
21-22/24 1 SPDT (c/o) as an Instantaneous Contact
A1-Y1/B1 Initiate Switch S1 Input
Z1-Z2 Remote Potentiometer Connection

### Function Selection Chart (see time diagrams)

1 – Delay on Make (ON-delay)
2 – Interval (Impulse ON)
3 – Flasher/Recycling ON or OFF First
4 – Delay on Break (OFF-delay)
5 – Trailing Edge Interval (Impulse OFF)
6 – Star Delta Starting (Interval/ON Delay)
7 – Delay on Make / Delay on Break (ON-delay / OFF-delay)
8 – Single Shot (Pulse Former)
9 – Accumulative Delay on Make (ON-delay)
10 – ON/OFF Test Function without time delays

## Technical Data

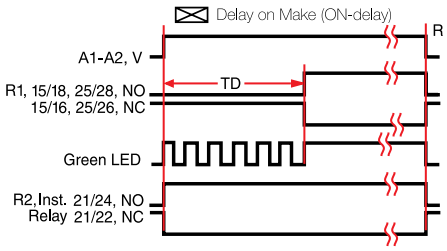
| | |
|---|---|
| **Timing** | |
| Repeat Accuracy (constant parameters) | < +/- 0.2% |
| **Output** | |
| AC12 (resistive) at 230 V | 4 A |
| AC15 (resistive) at 230 V | 3 A |
| **Mechanical** | |
| Dimensions (W x H x D) | .89 x 3.07 x 3.94 in. (22.5 x 78 x 100 mm) |
| Mounting | 35mm DIN Rail, no tools required |
| Degree of Protection | Enclosure IP50 Terminals IP20 |

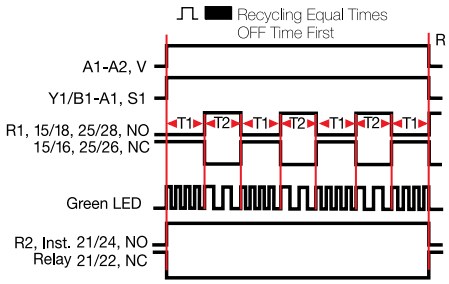
## Ordering Table

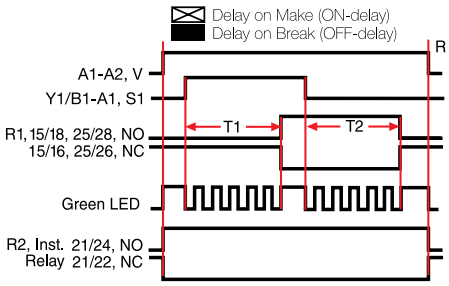
| Series | Part Number | Input Voltage |
|---|---|---|
| CT-MVS.21 | 1SVR 630 020 R0200 | 24-240 V AC/DC |

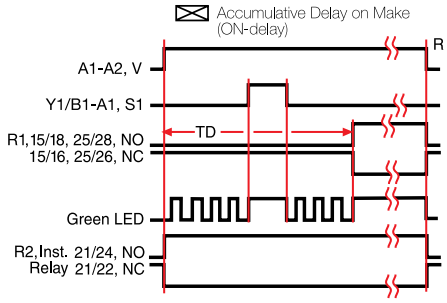
MVSpp 01.10.08

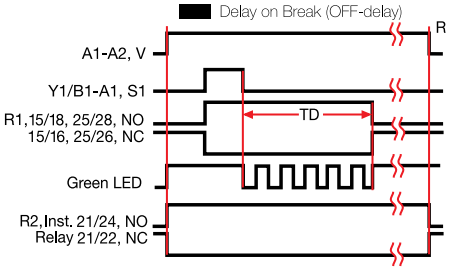
## CT-MVS Function Diagrams

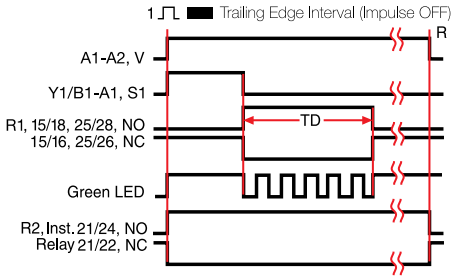


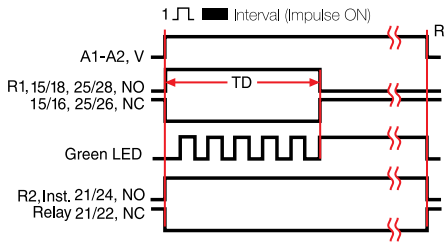



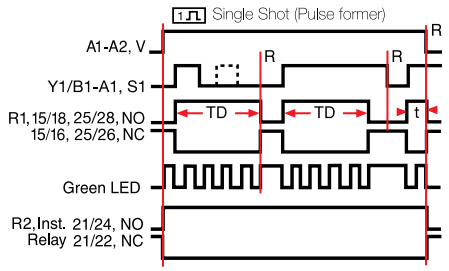



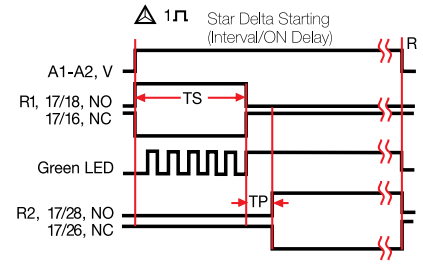



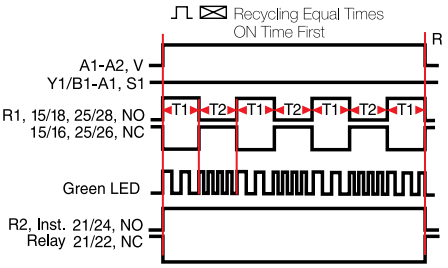




### Legend

| | |
|---|---|
| V = Voltage | NO = Normally Open |
| TD = Time Delay | NC = Normally Closed |
| R = Reset | S1 = Initiate Switch |
| T1 = First Delay | T2 = Second Delay = T1 |
| TP = 50ms Pause Delay | t = Incomplete Time Delay |
| R1 = Wye Start Relay | R2 = Delta Run Relay |

≀≀ = Undefined Time

# OFF Delay Timers
## CT-AHD and CT-ARS Series
## Relay Output, 35mm DIN Rail Mounting

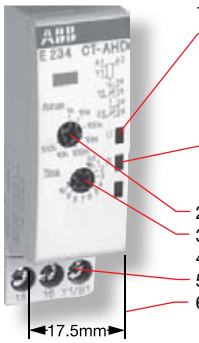


**CT-AHD.12**

- Delay on Break (OFF delay) Function
- 7 Switch Selectable Time Ranges (0.05 s...100 h)
- SPDT ( c/o) contact
- Universal Voltage 24...240V AC; ...48V DC
- Status Indication - 2 LEDs

Complete Product Details:
http://www.ssac.com/pp1.htm

### CT-AHD - 17.5mm, DIN Rail Mounting, Delay on Break Timer

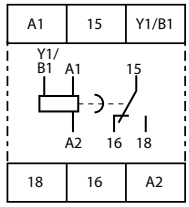



1 LEDs for Status Indication
U - Green LED:
Input Voltage Applied
Timing
R / R1 / R2 - Yellow LED:
Output Relay Energized
2 Time Range Selection
3 Time Delay Adjustment
4 SPDT (c/o) Contact
5 IP20 Screw Terminals
6 Space Saving Package

**Switch Selectable Time Ranges:**

| | |
|---|---|
| 1 .....0.05-1 s | 5 .....5-100 min |
| 2 .....0.5-10 s | 6 .....0.5-10 h |
| 3 .....5-100 s | 7 .....5-100 h |
| 4 .....0.5-10 min | |

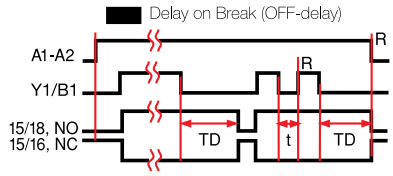
**Connection**




**CT-AHD.12**

| | |
|---|---|
| A1-A2 | Input Voltage: 24-48 V DC, 24-240 V AC |
| 15-16/18 | SPDT (c/o) Contact |
| A1-Y1/B1 | Initiate Switch |

**Function**




A1-A2 = Voltage
TD = Time Delay
R = Reset
t = Incomplete Time Delay
NO = Normally Open
NC = Normally Closed
Y1/B1 = Initiate Switch
= Undefined Time

**Technical Data**

| | |
|---|---|
| **Timing** | |
| Repeat Accuracy (constant parameters) | < +/- 0.5% |
| **Mechanical** | |
| Dimensions (W x H x D) | .69 x 2.76 x 2.28 in. (17.5 x 70 x 58 mm) |
| Mounting | 35mm DIN Rail, No Tools Required |
| Degree of Protection | Enclosure IP50 Terminals IP20 |

**Ordering Table**

| Series | Part Number | Input Voltage | Output Rating (res./ind.) |
|---|---|---|---|
| CT-AHD.12 | 1SVR 500 110 R0000 | 24-48 V DC, 24-240 V AC | 6A / 3A |

**CT-ARS.22**

- True Delay on Break Function
- Operates on Loss of Power
- 7 Switch Selectable Time Ranges (0.05 s...10 m)
- DPDT (2 c/o) contacts
- Universal Voltage 24...240V AC; ...48V /DC
- Status Indication - 2 LEDs

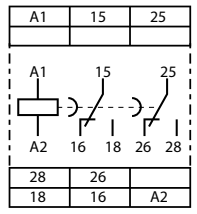
### CT-ARS - 22.5mm, DIN Rail Mounting, True Delay on Break Timer


1 LEDs for Status Indication
U - Green LED:
Input Voltage Applied
Timing
R / R1 / R2 - Yellow LED:
Output Relay Energized
2 Time Range Selection
3 Time Delay Adjustment
4 DPDT (2 c/o) Relay Contacts
5 IP20 Screw Terminals
6 Compact Package

**Switch Selectable Time Ranges:**

| | |
|---|---|
| 1 .....0.05-1 s | 5 .....5-100 s |
| 2 .....0.15-3 s | 6 .....15-300 s |
| 3 .....0.5-10 s | 7 .....0.5-10 min |
| 4 .....1.5-30 s | |

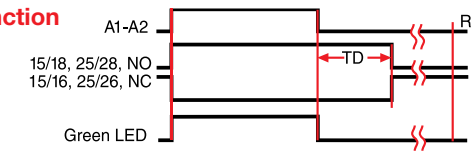
**Connection**




**CT-ARS.22**

| | |
|---|---|
| A1-A2 | Input Voltage: 24-48 V DC, 24-240 V AC |
| 15-16/18 | SPDT (c/o) Contact |
| 25-26/28 | SPDT (c/o) Contact |

**Function**




A1-A2 = Voltage
TD = Time Delay
R = Reset
NO = Normally Open
NC = Normally Closed
= Undefined Time

**Technical Data**

| | |
|---|---|
| **Timing** | |
| Repeat Accuracy (constant parameters) | < +/- 0.2% |
| Typical Charge Time | 200 ms |
| Initial Charge Time | 5 min. |
| **Mechanical** | |
| Dimensions (W x H x D) | .89 x 3.07 x 3.94 in. (22.5 x 78 x 100 mm) |
| Mounting | 35mm DIN Rail, No Tools Required |
| Degree of Protection | Enclosure IP50 Terminals IP20 |

**Ordering Table**

| Series | Part Number | Input Voltage |
|---|---|---|
| CT-ARS.22 | 1SVR 630 120 R3300 | 24-48 V DC, 24-240 V AC |

ARSpp 01.02.08

# Accurate General Purpose Timers
## KSD1, KSD2, KSDB, KSDS Series
## Solid State Output Timing Modules

KSD1

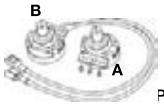

KSD2

KSDB, KSDS

- Adjustable Delays from 0.1 s ... 10 min in 3 Ranges
- +/-0.5% Repeat Accuracy
- +/-5% Factory Calibration
- 1 A Solid State Output
- Encapsulated

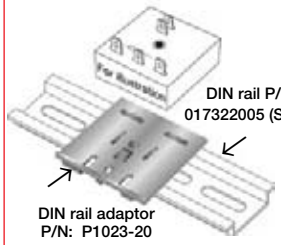
Complete Product Details:
http://www.ssac.com/pp1.htm

## Accessories




100 K Ohm External adjust potentiometer P/Ns: P1004-95 (f g A) P1004-95-X (f g B)

Versa-knob P/N: P0700-7

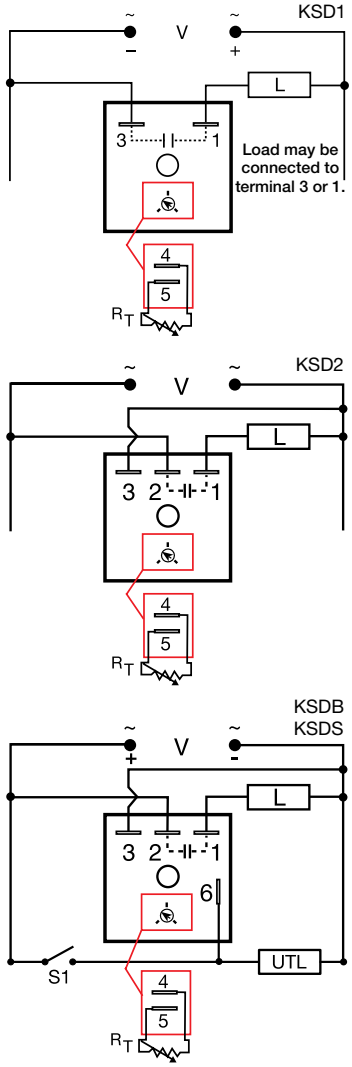


DIN rail P/Ns: 017322005 (Steel)

DIN rail adaptor P/N: P1023-20

See accessory pages

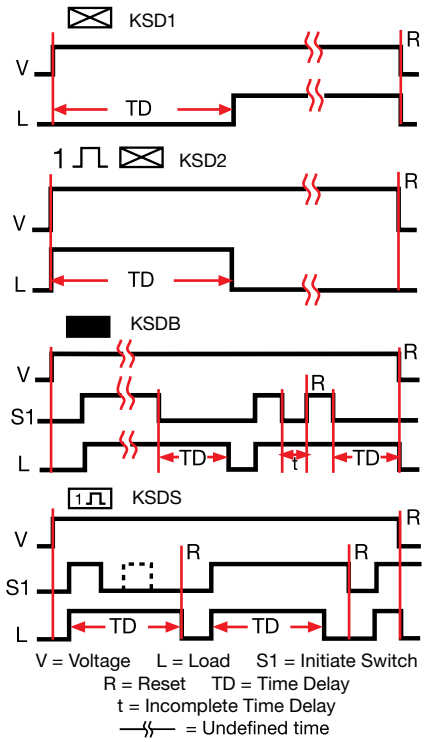
## Connection




These timing modules are designed for general purpose commercial and industrial applications where a small, cost effective, reliable solid state timer is required. The output is rated 1 A steady and 10 A inrush typically provides 100 million operations. The modules are totally solid state and encapsulated to protect the electronic circuitry.

A knob is supplied for adjustable units, or RT terminals for 4 & 5 for external adjustment. Select a 100K ohm potentiometer for full time range adjustment. The untimed load UTL is optional. Dashed lines are internal connections.

## Function




V = Voltage L = Load S1 = Initiate Switch
R = Reset TD = Time Delay
t = Incomplete Time Delay
—⌇— = Undefined time

## Technical Data

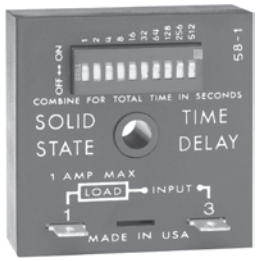
| | |
|---|---|
| **Output** | |
| Maximum Load Current | 1 A steady state, 10 A inrush at 60°C |
| Minimum Holding Current | (KSD1 only) ≤ 40 mA |
| OFF State Leakage Current | (KSD1 only) ≅7 mA at 230 V AC<br>(all others) ≅5 mA at 230 V AC |
| **Mechanical** | |
| Mounting | Surface mount with one #10 (M5 x 0.8) screw |
| Package | 2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connect terminals |

## Ordering Table

| Part Number | Time Delay | Adjustment | Function | Voltage | Accuracy |
|---|---|---|---|---|---|
| KSD1420 | 0.1...10 S | External | Delay on Make (ON delay) | 120 V AC | 0.5% or 20mS |
| KSD1421 | 1...100 S | | | | 0.5% |
| KSD1423 | 0.1...10 M | | | | |
| KSD1430 | 0.1...10 S | Onboard Adjust | | | 0.5% or 20mS |
| KSD1431 | 1...100 S | | | | 0.5% |
| KSD1433 | 0.1...10 M | | | | |
| KSD2420 | 0.1...10 S | External | Interval (Single pulse) | | 0.5% or 20mS |
| KSD2421 | 1...100 S | | | | 0.5% |
| KSD2423 | 0.1...10 M | | | | |
| KSD2430 | 0.1...10 S | Onboard Adjust | | | 0.5% or 20mS |
| KSD2431 | 1...100 S | | | | 0.5% |
| KSD2433 | 0.1...10 M | | | | |
| KSDB420 | 0.1...10 S | External | Delay on Break (OFF delay) | | 0.5% or 20mS |
| KSDB421 | 1...100 S | | | | 0.5% |
| KSDB423 | 0.1...10 M | | | | |
| KSDB430 | 0.1...10 S | Onboard Adjust | | | 0.5% or 20mS |
| KSDB431 | 1...100 S | | | | 0.5% |
| KSDB433 | 0.1...10 M | | | | |
| KSDS420 | 0.1...10 S | External | Single Shot (One shot) | | 0.5% or 20mS |
| KSDS421 | 1...100 S | | | | 0.5% |
| KSDS423 | 0.1...10 M | | | | |
| KSDS430 | 0.1...10 S | Onboard Adjust | | | 0.5% or 20mS |
| KSDS431 | 1...100 S | | | | 0.5% |
| KSDS433 | 0.1...10 M | | | | |

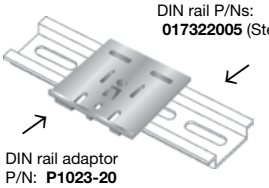
# Delay On Make
## TDU / TMV Series
## Universal Voltage Solid State Timing Modules






- 2 Universal Voltage Ranges From 24 ... 240 V AC/DC
- Switch Selectable Delays From 0.1 s ... 2.8 h in 3 Ranges or Factory Fixed
- +/-0.5% Repeat Accuracy
- 1 A Steady - 10 A Inrush
- Totally Solid State and Encapsulated

Complete Product Details:
http://www.ssac.com/pp1.htm



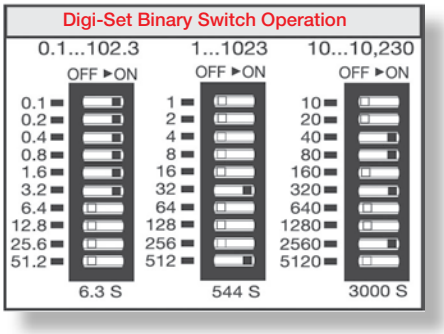
DIN rail P/Ns:
**017322005** (Steel)

DIN rail adaptor
P/N: **P1023-20**

See accessory pages


- Operates From 24 ... 240 V AC/DC
- Knob or External Adjust Time Delays
- Delays from 0.1 ... 8 m
- Totally Solid State - Encapsulated
- 1 A Steady - 10 A Inrush
- Two Terminal Series Connection with Load

## TDU Series - Switch Adjustable, Universal Voltage Timers




The TDU is an encapsulated solid state delay on make timer that combines digital timing circuitry with universal voltage operation. It offers DIP switch adjustment allowing accurate selection of the time delay over the full time delay range. Encapsulation protects against humidity, vibration, and dust making it suitable for outdoor equipment installations. This series is an excellent choice for OEM equipment where fast, positive adjustment, low cost and long life are important..

### Ordering Table

| Part Number | Input Voltage | Time Range (seconds) | Repeat Accuracy | Tolerance |
|---|---|---|---|---|
| TDUL3000A | 24 ... 120 AC/DC | 0.1 ... 102.3 | +/-0.5% or 20 ms whichever is greater | +/-10% |
| TDUL3001A | 100 ... 240 AC/DC | 0.1 ... 102.3 | | |
| TDU3000A | 24 ... 120 AC/DC | 1 ... 1023 | | |
| TDU3001A | 100 ... 240 AC/DC | 1 ... 1023 | | |
| TDUH3000A | 24 ... 120 AC/DC | 10 ... 10230 | | |
| TDUH3001A | 100 ... 240 AC/DC | 10 ... 10230 | | |

## Specifications for TDU and TMV

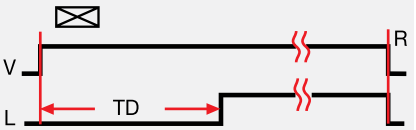
### Operation - TDU / TMV

Upon application of input voltage, the time delay begins. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

### Technical Data - TDU / TMV

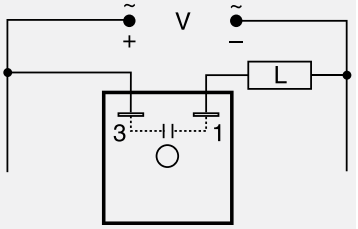
| | |
|---|---|
| **Output** | |
| Type | Solid state |
| Form | Normally Open, open during timing |
| Life Span | 100 million operations typical |
| Maximum Load Current | 1 A steady state, 10 A inrush at 60°C |
| Minimum Holding Current | 40 mA |
| **Mechanical** | |
| Mounting | Surface mount with one #10 (M5 x 0.8) screw |
| Package | 2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm) |
| Protection | Encapsulated Circuitry |
| Termination | 0.25 in. (6.35 mm) male quick connect terminals |

### Function - TDU / TMV




V = Voltage R = Reset TD = Time Delay
L = Load

### Connection - TDU / TMV




Dashed lines are internal connections.
Load may be connected to terminal 3 or 1.

## TMV Series - Knob Adjustable, Universal Voltage Timers


The TMV series is a knob adjustable, universal voltage delay on make timer. Encapsulation protects against humidity, vibration, and dust making it suitable for outdoor equipment installations. Because of the large number of applications, it is our most popular 1 amp solid state timing module. Designed to connect in series with a relay coil, contactor coil, solenoid, lamps, small motor, etc., to delay their energization, prevent short cycling or to sequence on various loads.

**Universal timing module** - One part number can be used for all the popular voltages and time delays.

### Ordering Table

| Part Number | Input Voltage | Time Range (minutes) | Adjustment | Repeat Accuracy | Tolerance |
|---|---|---|---|---|---|
| TMV8000 | 24 ... 240 V AC/DC | 0.1 ... 8 M | Knob | +/- 2% | ≤ +/- 10% |

TDU5pp 01.08.08

# Flashing and Recycling Modules
## FS100 / RS Series
## 1A Solid State Modules

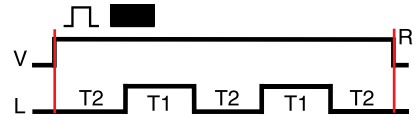
- Fixed Flash Rate at 75 Flashes Per Minute
- 1 or 2 A Output
- 24 or 120 V AC are Available
- Small Size: 1.5 x 0.94 in. (38 x 23.9 mm)

Complete Product Details:
http://www.ssac.com/pp1.htm

## FS100 Series - Fixed Flash Rate - Low Cost

The FS100 Series may be used to control inductive, incandescent or resistive loads. This series offers a 1 A (fullwave) or a 2 A (halfwave) steady state, 10 A inrush solid state output. These totally solid state flashers are encapsulated to protect against, humidity, vibration and dust and they typically deliver 100 million flashes. Ideal for OEM applications where low cost and long life are important.

### Function

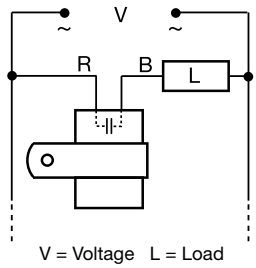



V = Voltage R = Reset L = Load
T1 = ON Time T2 = OFF Time

### Technical Data

| Mechanical | |
|---|---|
| Mounting | Removable mounting bracket, use one #8 (M4 x 0.7) screw |
| Connection/Wires | 18 AWG (0.82mm2) wires 6 in. (15.2cm) |
| Package | 1.5 x 0.94 in. (38.1 x 23.9 mm) |

### Connection

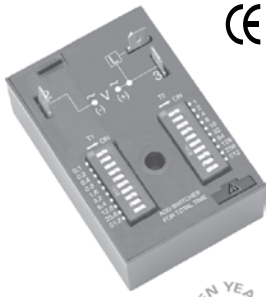



V = Voltage L = Load
R = Red Wire B = Black Wire

### Ordering Table

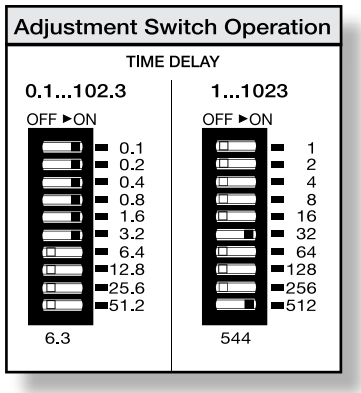
| Part Number | Input | Output Rating Steady / Inrush | Output Type | Load Type * |
|---|---|---|---|---|
| FS126 | 120 V AC | 1 A / 10 A | AC, Fullwave | A |
| FS126RC | | | | B |
| FS127 | | 2 A / 10 A | AC, Halfwave | A |
| FS146 | 24 V AC | 1 A / 10 A | AC, Fullwave | |

* Load Type: A - Incandescent & Resistive B - Incandescent, Resistive & Inductive



- Accurate, Reliable, Life Cycle Timer; 100 Million Cycles Typical
- Switch Settable Time Delays - Both Times Adjustable
- +/-0.1% Repeat Accuracy
- +/-2% Setting Accuracy
- 0.1 s ... 1023 h in 4 Ranges
- 12 ... 230 V in 5 ranges
- 1 A Solid State Output
- Totally Solid State and Encapsulated

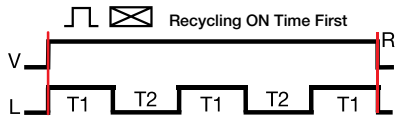
## RS Series - Solid State Recycling Timer - Switch Adjustable




The RS Series is a solid state, encapsulated, recycling timer designed for tough industrial environments. It is used by many testing labs as a life cycle tester; by others as a cycle controller. The RS Series has separate DIP switch adjustments for the ON delay and the OFF delay. These make possible accurate adjustment the first time and every time.

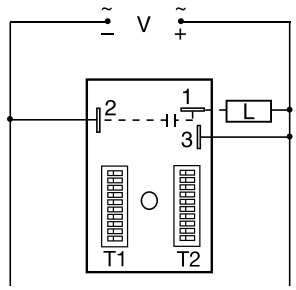
Add the value of switches in the ON position for the total time delay.

### Function




V = Voltage L = Load R = Reset
T1 = ON Time T2 = OFF Time

### Connection




Dashed lines are internal connections.

### Technical Data

| Output | |
|---|---|
| Maximum Load Current | 1 A steady state, 10 A inrush at 60°C |
| **Mechanical** | |
| Mounting | Surface mount with one #10 (M5 x 0.8) screw |
| Package | 3 x 2 x 1.5 in (76.7 x 51.3 x 38.1 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connect terminals |

### Ordering Table

**RS Series**

**X Input**
- 1 - 12 V DC
- 2 - 24 V AC
- 3 - 24 V DC
- 4 - 120 V AC
- 6 - 230 V AC

**X Operating Sequence**
- A - ON Time First
- B - OFF Time First

**X T1 ON Time**
- 1 - 0.1 ... 102.3 s in 0.1 s increments
- 2 - 0.1 ... 102.3 m in 0.1 m increments
- 3 - 1 ... 1023 m in 1 m increments
- 4 - 1 ... 1023 h in 1 h increments

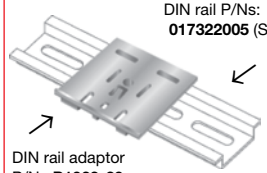
**X T2 OFF Time**
- 1 - 0.1 ... 102.3 s in 0.1 s increments
- 2 - 0.1 ... 102.3 m in 0.1 m increments
- 3 - 1 ... 1023 m in 1 m increments
- 4 - 1 ... 1023 h in 1 h increments

†**Note:** Grayed options are available in standard lead time.

**Example P/N:**

**RS4A23** = 120V AC operation, ON time first, T1 - ON time range 2, T2 - OFF time range 3
**RS6B14** = 239V AC operation, OFF time first, T1 - ON time range 1, T2 - OFF time range 4

## Mounting Accessory



DIN rail P/Ns:
**017322005** (Steel)

DIN rail adaptor
P/N: **P1023-20**

See accessory pages

3 Phase Voltage Monitor

# Universal 3 Phase Voltage Monitor
## HLMU Series (DPDT)
## Universal Voltage Motor Protector

ANSI Device #27/47/59

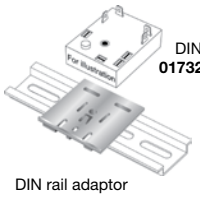
c UL us LISTED

TEN YEAR 10 WARRANTY

- Protects Against: Phase Loss, Phase Reversal, Over, Under & Unbalanced Voltages, Over/Under Frequency
- Encapsulated Circuitry
- DPDT Isolated 10 A Contacts
- LED Indicates Relay Status, Faults, & Time Delays
- Universal Line Voltage 200 ... 480 V AC in One Unit
- Compact, Encapsulated Design
- Finger-Safe Terminal Blocks, up to 12 AWG
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

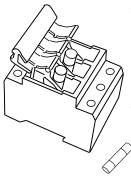
Complete Product Details:
http://www.ssac.com/pp1.htm

### Mounting and Connection Accessories



DIN rail P/Ns:
**017322005** (Steel)

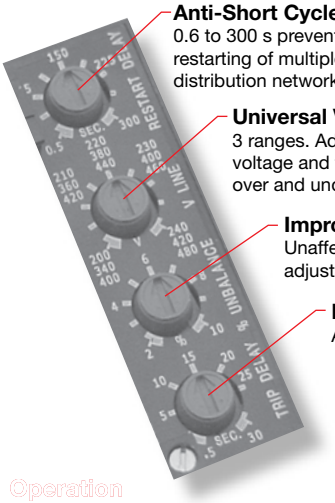
DIN rail adaptor
P/N: **P1023-20**



3-Pole Fuse Block
Mounts on 35mm
DIN Rail
P/N: FH3P

2 Amp Midget Fuse
P/N: P0600-11

See accessory pages



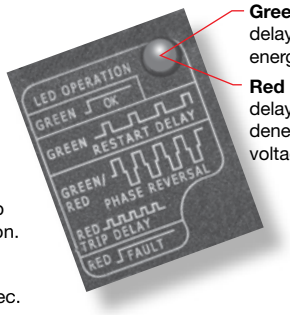

**Anti-Short Cycle & Staggered Restarting**
0.6 to 300 s prevents rapid cycling. Allows staggered restarting of multiple systems on a common power distribution network.

**Universal Voltage Operation**
3 ranges. Adjust to the motor's operating voltage and the unit automatically sets the over and under voltage trip points.

**Improved Phase Loss Protection**
Unaffected by regenerated voltages, knob adjustable, 2 to 10%, unbalance protection.

**Prevents Nuisance Tripping**
Adjustable trip delay from 1 to 30 Sec.

**New: LED Indicates Phase Reversal**
*LED status indicator blinks red/green on phase reversal.*




**Green** indicates restart delay or output relay energized

**Red** indicates trip delay or output denergized due to a voltage fault

| | | | |
|---|---|---|---|
| Trip Delay | Red | ON/OFF | 120 FPM |
| Restart Delay | Green | | 60 FPM |
| Phase Reversal | Red/Green | Alternate | 120 FPM |

FPM = Flashes per minute

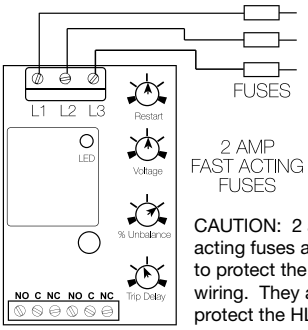
### Operation

Upon application of line voltage, the output is de-energized and the restart delay begins. If all the three phase voltages are within the acceptable range, the output energizes at the end of the restart delay. The microcontroller circuitry automatically senses the voltage range, and selects the correct operating frequency (50 or 60hz). The over and under voltage trip points are set at approximately +/- 10% of the adjusted line voltage. When the measured value of any phase voltage exceeds the acceptable range limits (lower or upper) the trip delay begins. At the end of the trip delay the output relay de-energizes. Under, over, and unbalanced voltages plus over or under frequency must be sensed for the complete trip delay before the unit trips. The unit trips in 200 ms when phase loss or reversal are sensed. The unit will not energize if a fault is sensed as the line voltage is applied. Both Delta and Wye systems can be monitored; no connection to neutral is required.

Reset: Reset is automatic upon correction of the voltage or frequency fault or phase sequence.

**R= Restart Delay on fault correction.** The restart delay begins when line voltage is reapplied or when a voltage fault is corrected. This option is normally selected when staggered restarting of multiple motors on a power system is required.

### Connection




CAUTION: 2 amp max. fast acting fuses are recommended to protect the equipment's wiring. They are not required to protect the HLMU.

L1, L2, L3 = Line Voltage Input
NO = Normally Open Contact NC = Normally Closed Contact
C = Common, Transfer Contact
**Note:** Relay contacts are isolated, 277 V AC max.

### Technical Data

| | |
|---|---|
| **Sensing/Protection** | |
| Phase Loss | ≥ 25% Unbalance |
| Response Time | ≤200ms |
| Over/Under Frequency Protection | Trip ±4%; Reset ±3%; 50 or 60 Hz |
| **Output** | |
| Rating | 10 A resistive at 240 V AC; 8 A resistive at 277 V AC; N.O-1/4 hp at 120 V AC; 1/3 hp at 240 V AC; |
| **Mechanical** | |
| Mounting | Surface mount with one #10 (M5 x 0.7) screw |
| Package | 3 x 2 x 1.5 in. (76.7 x 51.3 x 41.7 mm) |
| Termination | Screw terminal connection for up to 12 AWG (3.3 mm2) wire |
| Degree of Protection | Terminals IP20 |

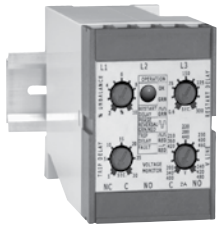
### Ordering Table

| Part Number | Line Voltage | Output Form | Adj. Unbalance | Adj. Trip Delay | Adj. Restart |
|---|---|---|---|---|---|
| HLMUDRAAA | 200 to 480 V AC | DPDT | 2 to 10% | 1 to 30 S | 0.6 to 300 S |

HLMU1pp 01.17.08

# Universal 3 Phase Voltage Monitor
## DLMU Series (SPDT & N.O.)
## Universal Voltage Motor Protector

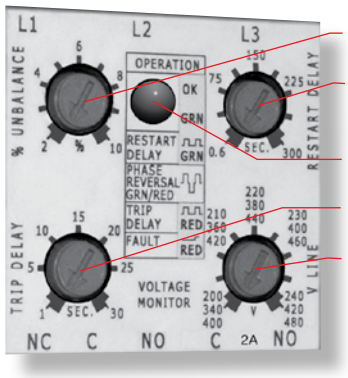
3 Phase Voltage Monitor



ANSI Device #27/47/59

- Protects Against: Phase Loss, Phase Reversal, Over, Under and Unbalanced Voltages, Over/Under Frequency
- 35 mm DIN Rail or Surface Mounting
- SPDT Isolated 10 A Relay Contacts
- N.O. Isolated 2A Relay Contact
- LED Indicates, Relay, Faults, & Time Delays
- Universal Line Voltage 240 ... 480 V AC in One Unit
- Finger-safe Terminal Blocks, up to 12 AWG
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Complete Product Details:
http://www.ssac.com/pp1.htm




**Improved Phase Loss Protection**
Adjustable, 2 to 10%, unbalance protection.

**Anti-Short Cycle & Staggered Restarting**
0.6 to 300 s prevents rapid cycling. Allows staggered restarting of multiple systems on a common power distribution network.

**LED Indicates Phase Reversal**
LED status indicator blinks red/green on phase reversal.

**Prevents Nuisance Tripping**
Adjustable trip delay from 1 to 30 Sec.

**Universal Voltage Operation**
In 3 ranges. Adjust to the motor's operating voltage and the unit automatically sets the over and under voltage trip points.

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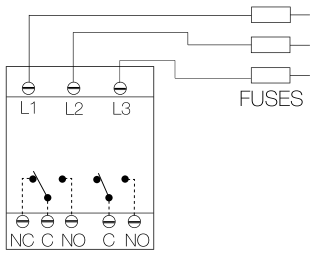
## Operation

Upon application of line voltage, the output is de-energized and the restart delay begins. If all the three phase voltages are within the acceptable range, the output energizes at the end of the restart delay. The microcontroller circuitry automatically senses the voltage range, and selects the correct operating frequency (50 or 60hz). The over and under voltage trip points are set at approximately +/- 10% of the adjusted line voltage. When the measured value of any phase voltage exceeds the acceptable range limits (lower or upper) the trip delay begins. At the end of the trip delay the output relay de-energizes. Under, over, and unbalanced voltages plus over or under frequency must be sensed for the complete trip delay before the unit trips. The unit trips in 200 ms when phase loss or reversal are sensed. The unit will not energize if a fault is sensed as the line voltage is applied. Both Delta and Wye systems can be monitored; no connection to neutral is required.

**Reset:** Reset is automatic upon correction of the voltage or frequency fault or phase sequence.

## Connection




CAUTION: 2 amp max. fast acting fuses are recommended to protect the equipment's wiring. They are not required to protect the DLMU.

Dashed lines are internal connections.

L1, L2, L3 = Line Voltage Input
NO = Normally Open Contact NC = Normally Closed Contact
C = Common, Transfer Contact
**Note:** Relay contacts are isolated, 277 V AC max.

### R= Restart Delay on fault correction

The restart delay begins when line voltage is reapplied or when a voltage fault is corrected. This option is normally selected when staggered restarting of multiple motors on a power system is required.

## Technical Data

| | |
|---|---|
| **Phase Loss** | |
| Response Time | ≤200ms |
| Trip Point | >=25% Unbalance |
| Over/Under Frequency Trip / Reset | Trip +/- 4%; Reset +/- 3%; 50 or 60 Hz |
| **Output** | |
| SPDT (c/o) Rating | 10 A resistive at 240 V AC; 8 A resistive at 277 V AC; N.O-1/4 hp at 120 V AC; 1/3 hp at 240 V AC |
| N. O. SPST Rating | 2 A resistive at 240 V AC |
| **Mechanical** | |
| Mounting | Surface mount with 2 #8 (M4 x 0.7) screw or snap on 35mm DIN Rail |
| Package | 4.33 x 2.95 x 1.97 in. (110 x 75 x 50 mm) |
| Termination | Screw terminals with captive wire clamps for up to #14 AWG (2.5 mm2) wire |
| Degree of Protection | Terminals IP20 with protective covers installed |

## LED Flashing Table

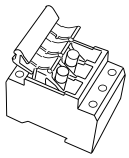
| | | | |
|---|---|---|---|
| Trip Delay | Red | ON/OFF | 120 FPM* |
| Restart Delay | Green | | 60 FPM* |
| Phase Reversal | Red/Green | Alternate | 120 FPM* |

*FPM = Flashes per minute

## Ordering Table

| Part Number | Line Voltage | Output Form | Adj. Unbalance | Adj.Trip Delay | Adj. Restart |
|---|---|---|---|---|---|
| DLMUDRAAA | 200 to 480 V AC | SPDT & NO | 2 to 10% | 1 to 30 S | 0.6 to 300 S |

## Accessories



3-Pole Fuse Block
P/N: FH3P
35mm DIN Rail Mounting

2 Amp Midget Fuse
P/N: P0600-11

See accessory pages

DLMUpp 01.18.08

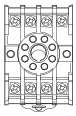
# 3 Phase Voltage Monitor
## PLMU Series (SPDT)
## Universal Voltage Plug-in Monitor

ANSI Device #27/47/59

- Protects Against: Phase Loss, Phase Reversal, Overvoltage, Undervoltage, & Unbalanced Voltages
- Octal Plug-in with SPDT Isolated 10 A Contacts
- Operates from 200 ... 480 V AC
- LED Indicator Glows Green when Voltages are Acceptable, Red for Faults
- Simple 3-Wire Connection for Delta or Wye Systems
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Complete Product Details:
http://www.ssac.com/pp1.htm

### Mounting and Connection Accessory

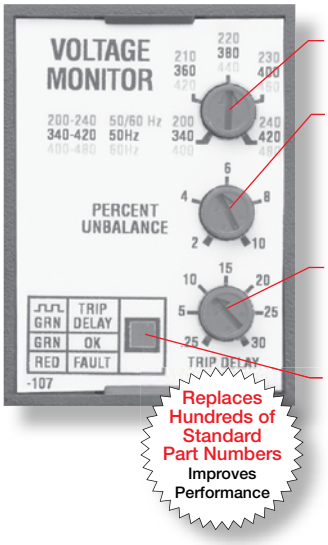


35 mm DIN or Surface Mounting

Octal 8 pin socket
P/N: OT08PC

Must be rated for 600 V operation

See accessory pages




**Universal Operating Voltage**
200 - 480 V AC; 50 & 60 Hz

**Improved Phase Loss Protection**
Unbalance sensitivity assures improved phase loss protection not affected by regenerated voltages; knob adjustable 2 to 10% unbalance protection.

**Prevents Nuisance Tripping**
Adjustable 0.25 to 30 s trip delay prevents nuisance tripping.

Bicolor LED indicates relay status, delays, faults, and phase reversal.

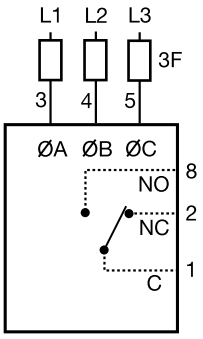
Universal voltage operation and standard base connection allows the PLMU to replace hundreds of competitive part numbers.

The PLMU Series continuously measures the voltage of each of the three phases to provide protection for three phase motors and sensitive loads. Its microcontroller senses under and over voltage, voltage unbalance, phase loss, and phase reversal. Protection is provided even when regenerated voltages are present.

### Operation

Upon application of power, a 0.6 s random start delay begins and the PLMU measures the voltage levels and line frequency and selects the voltage range. The output relay is energized and the LED glows green when all voltages are acceptable and the phase sequence is correct. LED flashes green during trip delay, glows red when output de-energizes. Undervoltage, overvoltage, and voltage unbalance must be sensed for continuous trip delay before the relay de-energizes. Re-energization is automatic upon fault correction. The output relay will not energize if a fault condition is sensed as three phase input voltage is applied. Line voltage is selected with the knob, setting the over and under voltage trip points. Voltage range is automatically selected by the insert as last sentence: Both Delta and Wye systems can be monitored; no connection to neutral is required.

### Connection




2 amp fast acting fuses recommended to protect the equipment. They are not required to protect the PLMU.

F = Fuses
ØA = Phase A = L1
ØB = Phase B = L2
ØC = Phase C = L3
NO = Normally Open
NC = Normally Closed
C = Common, Transfer Contact

Relay contacts are isolated; 277V AC max.

Dashed lines are internal connections.

### Technical Data

| | |
|---|---|
| **Line Voltage** | |
| Line Voltage | 200 ... 480 V AC +/-15%; 50 ... 60 Hz +/-2 Hz |
| **Output** | |
| Rating | 10 A resistive @ 240 V AC; 1/4 hp @ 125 V AC; 1/3 hp @ 250 V AC; max. voltage 277 V AC |
| **Mechanical** | |
| Mounting & Connection | Requires an accessory plug-in socket rated 600 V AC |
| Package | 3.03 x 2.39 x 1.78 in. (77.0 x 60.7 x 45.2 mm) |

### Ordering Table

| Part Number | Voltage Unbalance | Trip Delay |
|---|---|---|
| PLMU11 | Adjustable 2 ... 10% | Adjustable 0.25 ... 30 s |

# 3 Phase Voltage Monitor
## WVM Series 10A SPDT
## Motor Protector with 10 Fault Memory

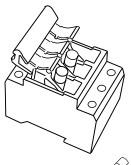
3 Phase Line Monitor

ANSI Device #27/47/59

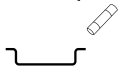
- Protects Against: Phase Loss & Reversal; Over, Under & Unbalanced Voltages; Short Cycling
- 10 Fault Memory & Status Displayed on 6 LED Readout
- Switch Selectable Automatic Restart, Delayed Automatic Restart, & Manual Reset
- Isolated 10 A SPDT Relay Contacts
- Part Instrument Part Control
- Pays For Itself During One Single Phasing Event
- Universal Voltage Sensing Design Protects any Size Motor. From Fractional to 1200 Hp.

Complete Product Details:
http://www.ssac.com/pp1.htm

## Accessories

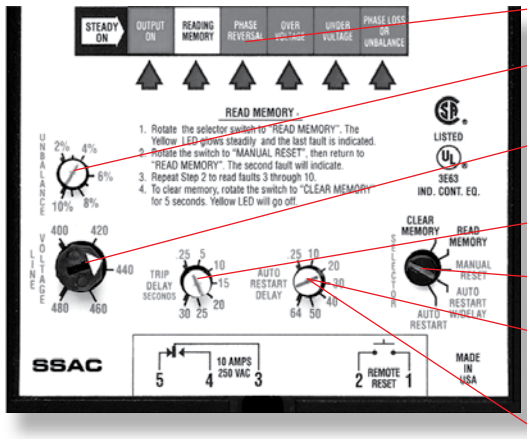


3-Pole Fuse Block
35 mm DIN Rail Mounting
P/N: FH3P



2 Amp Midget Fuse
P/N: P0600-11

See accessory pages




**6 LED Status Panel**
Displays current line status and faults in memory.

**Improved Phase Loss Protection**
Unaffected by regenerated voltages, plus adjustable, 2 to 10%, unbalance protection.

**Adjust to the Motor's Operating Voltage**
The unit automatically sets the over and under voltage trip points.

**Prevents Nuisance Tripping**
Adjustable Trip Delay 0.25 to 30 Seconds

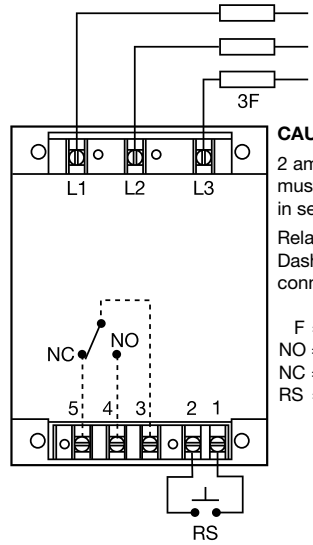
**Switch Selectable Reset Method**
Automatic with or without Restart Delay, or Manual Reset

**A True Random Restart Delay**
3 to 15 s delays the restart of protected motors until after momentary brownouts caused by lighting and heating loads have passed and the voltage stabilizes.

**Anti-Short Cycling & Staggered Restarting**
Adjustable Restart Delay 0.25 s to 64 m prevents rapid cycling. Allows staggered restarting of multiple systems on a common power distribution system.

The WVM Series provides protection against premature equipment (motor) failure caused by voltage faults on the 3 Phase Line. The WVM's microcontroller design provides reliable protection even if regenerated voltages are present. It combines dependable fault sensing with a 10 fault memory and a 6 LED status display. Part instrument, part control, the WVM protects your equipment when you're not there and displays what happened when you return. The WVM is fully adjustable and includes time delays to prevent nuisance tripping and improve system operation. Time delays include a 0.25 to 30 s adjustable trip delay, an adjustable 0.25 to 64 m (in 3 ranges) restart delay, plus a unique 3 to 15 s true random start delay. The random start delay prevents voltage sags caused by simultaneous restarting of numerous motor loads after a power outage.

## Connection




**CAUTION:**
2 amp max fast acting fuses must be installed externally in series with each input. (3)

Relay contacts are isolated. Dashed lines are internal connections.

F = Fuses
NO = Normally Open
NC = Normally Closed
RS = Optional Remote Reset Switch

## Technical Data

| | | |
|---|---|---|
| Phase Loss | ≥ 15% unbalance | |
| Response Time | ≤ 200 ms | |
| True Random Start Delay | 3 ... 15 s | |
| Fault Memory | | |
| Capacity | Stores last 10 faults | |
| Status Indicators | 6 LEDs provide existing status & memory readout | |
| Output | | |
| Rating | 10 A resistive @ 250 V AC; | 6 A inductive (0.4 PF) at 250 V AC |
| Mechanical | | |
| Termination | Screw terminals with captive wire clamps for up to #12 AWG ( 3.2 mm2) wire | |
| Package Size | 6.9 x 4.4 x 2.4 in (175.3 x 111.8 x 2.4 mm) | |

## Ordering Table

| Part Number | Line Voltage | Output Form | Adj. Unbalance | Adj. Trip Delay | Adj. Restart |
|---|---|---|---|---|---|
| WVM911AH | 400 to 480 V AC | SPDT | 2 to 10% | 0.25 to 30 S | 0.25 to 64M |
| WVM911AL | | | | | 0.25 to 64S |

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WVMpp 01.17.08

3 Phase Line Monitor

# Phase Sequence Monitors
## CM-PFS Series
## Universal Voltage DPDT Relay Output

- Monitoring of three-phase supply voltage for phase sequence
- Fast response time
- Universal voltage range 3 x 200…500 V 50/60 Hz
- DPDT contacts
- LED for status indication

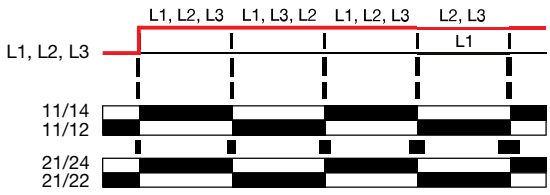
Complete Product Details:
http://www.ssac.com/pp1.htm

### CM -PFS Universal Voltage Phase Reversal Monitor

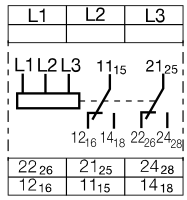

The CM-PFS phase sequence monitor is used to monitor three-phase supply voltages for incorrect phase sequence. The output relay energizes and the yellow LED turns on if all phases are present in the correct phase sequence (clockwise rotating field).

The relay de-energizes and the yellow LED turns off if incorrect phase sequence or complete loss of one phase is detected. If used with motors which continue running on only two phases, the CM-PFS detects phase loss if the regenerated voltage is less than 60% of the nominal voltage. For applications where a regenerated voltage greater than 60% is expected, we recommend using our phase unbalance monitors.

### Function




### Connection




L1-L2-L3 Measuring circuit 3 x 200…500 V AC 50/60 Hz

$11_{15}$-$12_{16}$ /$14_{18}$, $21_{25}$-$22_{26}$/$24_{28}$ Output contacts

### Technical Data

| | | |
|---|---|---|
| Output 11-12/14, 21-22/24 Rated switching voltage max. | | Relay, 2 SPDT (c/o) contacts 250 V AC |
| Rated switching current | AC 12 (resistive) | 4 A (at 230 V) |
| | AC 15 (inductive)) | 3 A (at 230 V) |
| General Data Mounting to DIN rail | | 35 mm DIN Rail Mounting, no tools required |

### Ordering Table

| Part Number | Series | Line Voltage |
|---|---|---|
| 1SVR 430 824 R 9300 | CM-PFS | 200…500 V AC 50/60 Hz |

PFSpp 01.17.08

# Voltage Monitoring Relays
## CM-ESS.1 and CM-ESS.2 Series
## Single Phase AC/DC DIN Relay Mount

**CM-ESS.1**

**CM-ESS.2**

- 3 ... 600 V AC or DC Voltage Monitoring in 4 Ranges
- RMS Measuring
- Each Unit Includes 4 Measuring Ranges
- Selectable Over or Under Voltage
- Hysteresis Adjustable 3 ... 30%
- CM-ESS.2: Adjustable Trip Delay $T_v$ 0.1-30 s
- Universal 24 ... 240V AC/DC Voltage
- CM-ESS.1: SPDT (c/o) Contact CM-ESS.2: 2 SPDT (2 c/o) Contacts
- 22.5 mm Width
- 3 LEDs for Status Indication

Complete Product Details:
http://www.ssac.com/pp1.htm


| Position | 2 | 1 |
|---|---|---|
| ON | | V |
| OFF | | V |

**DIP Switch Functions**

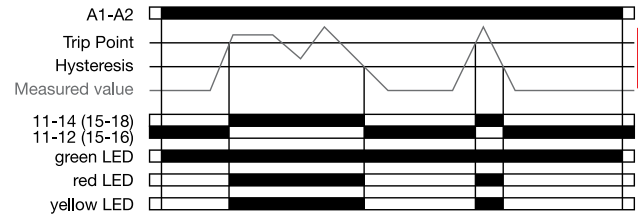
1 - ON OFF Delay
- OFF ON Delay

**CM-ESS.1** and **CM-ESS.2** are used for over or under voltage monitoring in single-phase AC and/or DC systems. The voltage to be monitored (measured value) is applied to terminals B-C. The output relay is normally de-energized.

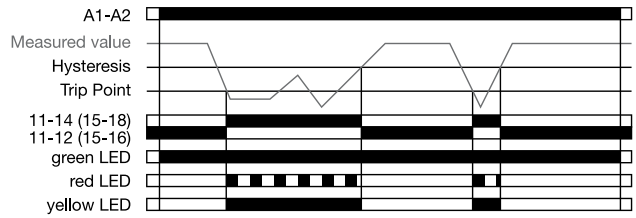
If the monitored RMS voltage exceeds/drops below the adjusted threshold value, the output relay(s) energize(s): on the CM-ESS.1 immediately. The CM-ESS.2 changes state after the set trip delay $T_v$. If the monitored RMS voltage exceeds/drops below the threshold value plus/minus the adjusted hysteresis, the output relay(s) de-energize(s).

The hysteresis is adjustable within a range of 3 to 30 % of the threshold value.

**Overcurrent monitoring**



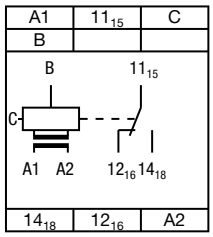

**Undercurrent monitoring**



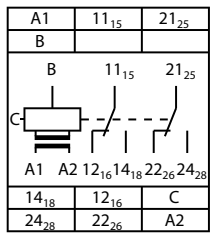

**Note:** CM-ESS.2 has second set of SPDT contacts.
See the on-line data sheet for a complete set of function diagrams.

## Connection Diagrams

**CM-ESS.1**




**CM-ESS.2**




| A1-A2 | Input Voltage |
|---|---|
| B-C | Measuring Ranges<br>3-30 V; 6-60 V; 30-300 V; 60-600 V |
| $11_{15}$ - $12_{16}$ / $14_{18}$ | Output Contacts |
| $21_{25}$ - $22_{26}$ / $24_{28}$ | |

## Technical Data

| | |
|---|---|
| **Measuring Circuit** | |
| Repeat Accuracy (constant parameters) | +/- 0.07% of Full Scale |
| **Output** | |
| AC12 (resistive) at 230 V | 4 A |
| AC15 (inductive) at 230 V | 3 A |
| **Mechanical** | |
| Dimensions W x H x D | .89 x 3.93 x 3.07 in. (22.5 x 100 x 78 mm) |
| Mounting | 35 mm DIN Rail, no tools required |
| Degree of Protection | Enclosure IP50 / Terminals IP20 |

## Ordering Table

| Series | Part Number | Input Voltage - 50/60 Hz | Trip Delay $T_v$ | Sensing Range | Output Form |
|---|---|---|---|---|---|
| CM-ESS.1 | 1SVR 430 830 R0300 | 24-240 V AC/DC | Without | 3-30 V; 6-60 V<br>30-300 V; 60 600 V | SPDT (c/o) |
| | 1SVR 430 831 R0300 | 110-130 V AC | | | |
| CM-ESS.2 | 1SVR 430 830 R0400 | 24-240 V AC/DC | Adjustable<br>0 or 0.1 - 30 s | | 2 SPDT (2 c/o) |
| | 1SVR 430 831 R0400 | 110-130 V AC | | | |

# Voltage Window Monitoring Relays
## CM-EFS.2 Series
## Single Phase AC/DC, DIN Rail Mounting

- 3...600 V DC/AC Voltage Monitoring in 4 Ranges
- RMS Measuring
- Each Unit Includes 4 Measuring Ranges: 3-30 V; 6-60 V; 30-300 V; 60-600 V
- Over and Under Voltage Monitoring
- ON or OFF Delay Selectable
- Selectable Normally Open or Normally Closed Output
- Selectable Latching Function
- Adjustable Trip Points for $V_{min}$ and $V_{max}$
- Fixed Hysteresis of 5%
- Adjustable Trip Delay $T_V$ 0.1-30 s
- Select 2 SPDT (c/o) to Transfer Together or Separate Outputs for Over and Under Voltage
- 22.5 mm Width
- 3 LEDs for Status Indication

Complete Product Details:
http://www.ssac.com/pp1.htm

1 Trip Point Adjustment >U - undervoltage
2 Trip Point Adjustment >U - Overvoltage
3 U: Red LED - Over / Under Voltage
4 R: Yellow LED - Relay Status
5 U/T: Green LED - Input Voltage,Timing
6 Adjustable Trip Delay $T_V$
7 Selectable Measuring Range
8 DIP Switches (see functions)

| Position | 4 | 3 | 2 | 1 |
|---|---|---|---|---|
| ON ↑ | 2x1 c/o | | closed | |
| OFF | 1x2 c/o | | open | |

**DIP Switch Functions**

1 - ON = OFF Delay
- OFF = ON Delay

2 - ON Normally Energized
OFF Normally De-energized

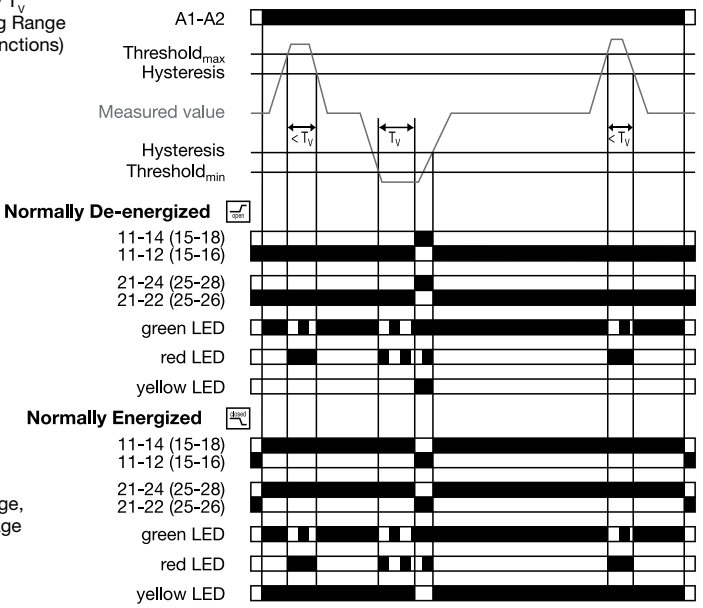
3 - ON Latching Function Activated
OFF Latching Function Not Activated

4 - ON DPDT (2 c/o) Both Relays Transfer at the Same Time
OFF 1 SPDT (c/o) Transfers on Overvoltage, 1 SPDT (c/o) Transfer on Undervoltage

The voltage window monitoring relay CM-EFS.2 can be used for the simultaneous monitoring of over (>U) and under (<U) voltages in single-phase AC and/or DC systems. A true RMS sensing method is used. The 2 SPDT (2 c/o) output relays can be set to transfer together or operate as separate outputs for over and under voltage. The voltage to be monitored (measured value) is applied to terminals B-C. Normally de-energized or normally energized operation as well as an adjustable ON or OFF trip delays can be selectable.

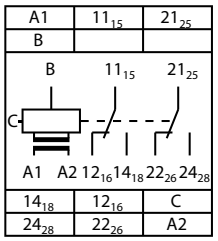
When the latching function is selected, after the output trips, it remains transferred until the input voltage is removed. See on-line data sheet for further details.

## Function




See Data Sheet for A Complete Set of Function Diagrams

## Connection




| A1-A2 | Input Voltage |
|---|---|
| B-C | Measuring Range: 3-30 V; 6-60 V; 30-300 V; 60-600 V |
| $11_{15}$ - $12_{16}$ / $14_{18}$ | Output Contacts |
| $21_{16}$ - $22_{26}$ / $24_{28}$ | |

## Technical Data

| | |
|---|---|
| **Measuring Circuit** | |
| Repeat Accuracy (constant parameters) | +/- 0.07% of Full Scale |
| **Output** | |
| AC12 (resistive) at 230 V | 4 A |
| AC15 (inductive) at 230 V | 3 A |
| **Mechanical** | |
| Dimensions W x H x D | .89 x 3.93 x 3.07 in. (22.5 x 100 x 78 mm) |
| Mounting | 35 mm DIN Rail, No Tools Required |
| Degree of Protection | Enclosure IP50 / Terminals IP20 |

## Ordering Table

| Series | Part Number | Input Voltage - 50/60 Hz | Adjustable Trip Delay $T_V$ | Sensing Range | Output Form |
|---|---|---|---|---|---|
| CM-EFS.2 | 1SVR 430 750 R0400 | 24-240 V AC/DC | 0 or 0.1-30 s | AC/DC: 3-30 V; 6-60 V 30-300 V; 60 600 V | SPDT (c/o) |

EFSpp 01.14.08

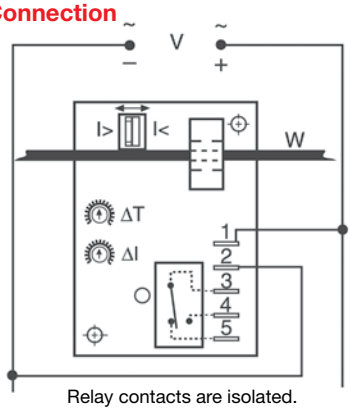
# AC Current Sensing - Indication
## ECS / LCS / LPM Series
## Current Sensor - Current Indicator

- Toroidal Through Hole Wiring
- 0.5...20 A Adjustable Trip Point
- Adjustable Trip Delay
- 10 A SPDT Isolated Output Contacts
- 5% Trip Point Hysteresis (Dead Band)

Complete Product Details:
http://www.ssac.com/pp1.htm

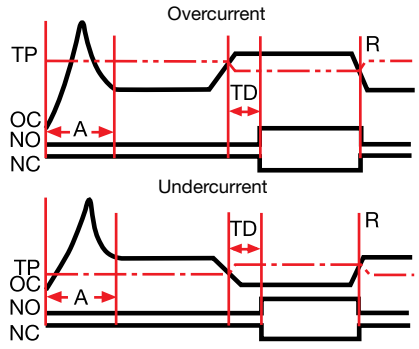
The ECS Series of Single Phase AC Current Sensors is a universal, overcurrent or undercurrent sensing control. Its built-in toroidal sensor eliminates the inconvenience of installing a stand-alone current transformer. Includes onboard adjustments for current sensing mode, trip point, and trip delay. Detects over or under current events like locked rotor, loss of load, an open heater or lamp load, or proves an operation is taking place or has ended.

### Connection




Relay contacts are isolated.
Dashed lines are internal connections.
V = Voltage I> = Overcurrent I< = Undercurrent
W = Insulated Wire Carrying Monitored Current

### Function




TP = Trip Point R = Reset OC = Monitored Current
NO = Normally Open Contact NC = Normally Closed Contact A = Sensing Delay On Start Up
TD = Trip Delay

### Technical Data

| | |
|---|---|
| **Sensor** | |
| Maximum Allowable Current | Steady – 50 A turns; Inrush – 300 A turns for 10 s |
| **Output** | |
| Rating | 10 A resistive at 240 V AC; 1/4 hp at 125 V AC; 1/2 hp at 250 V AC |
| **Mechanical** | |
| Mounting | Surface mount with two #6 (M3.5 x 0.6) screws |
| Termination | 0.25 in. (6.35 mm) male quick connect terminals (5) |

### Ordering Table

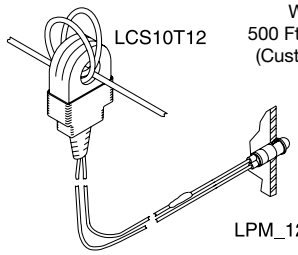
| Part Number | Input Voltage | Adjustable Set Point | Adjustable Trip Delay | Delay on Start |
|---|---|---|---|---|
| ECS40BC | 120 V AC | 0.5…5 A AC | 0.5…20 sec | Fixed 1 sec |
| ECS41BC | | 2...20 A AC | | |

- Low Cost Go/No Go Indication
- May Be Connected To Wires Up To 500 Feet (152.4 m) Long
- Remote Monitoring of Currents Up To 50 A
- Green or Red LED Indicator Available

### LCS and LPM Current Flow Indication

The LCS10T12 connected to the LPM12 or LPMG12 indicator is a low cost, easy to use, go/no go indication system for the remote monitoring of current flow. The LCS10T12 is installed on an adequately insulated wire of the monitored load. Its 12 in. (30.4 cm) leads are connected to the LPM12 or LPMG12 panel mount indicator. When current flows through the monitored wire the LED indicator glows.

### Connection




Wire Length:
500 Ft. (152.4 m) Max.
(Customer Supplied)

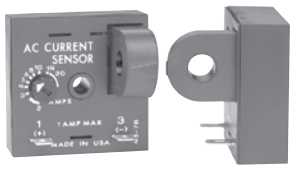
### Technical Data

| | | | | | |
|---|---|---|---|---|---|
| **Monitored Current** | 2 ... 50 A AC | | | | |
| Current Range | Wire Passes | Min. Current | Max. Current | Max. Inrush | Max. Wire Dia. |
| | 1 | 5 A | 50 A | 120 A | 0.355 in. (9.0 mm) |
| | 2 | 2.5 A | 25 A | 60 A | 0.187 in. (4.7 mm) |
| | 3 | 1.7 A | 16.6 A | 40 A | 0.15 in. (3.8 mm) |
| **Maximum Current** | 50 ampere-turns continuous | | | | |
| **Mechanical** | | | | | |
| Sensor Hole | 0.36 in. (9.14 mm) for up to #4 AWG (21.1 mm2) THHN wire | | | | |

### Ordering Table

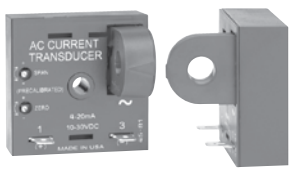
| Part Number | Description |
|---|---|
| LCS10T12 | AC Current Sensor |
| LPM12 | Red LED Indicator |
| LPMG12 | Green LED Indicato |

# AC Current Sensor, PLC Interface Module
## TCS / TSCA Series
## AC Current Sensor / Current Transducer




- Direct Connection to a PLC Digital Input Module
- 3 ... 50 V DC, 24 ... 240 V AC in 2 Ranges
- 1 A Steady - 10 A Inrush
- Adjustable Set Points – 2 ... 20 A
- Normally Open or Closed Solid State Output
- Complete Isolation Between Sensed Current & Control Circuit

Complete Product Details:
http://www.ssac.com/pp1.htm




- Monitors 0 ...50 A in 4 Ranges
- Loop Powered from 10 ... 30 V DC
- Linear Output from 4 ... 20 mA
- Zero and Span Adjustments
- Complete Isolation Between Sensed Current and Control Circuit

See accessory pages

## TCS Series, Current Sensor

The TCS Series is a low cost method of GO/NO GO current detection. It includes a solid state output to sink or source current when connected directly to a standard PLC digital input module.

Normally Open: When a current equal to or greater than the actuate current is passed through the toroidal sensor, the output closes. When the current is reduced to 95% the output opens.
Normally Closed: When the current through the toroid is equal to or greater than the actuate current, the output opens. When the current is reduced below 95% the output closes.

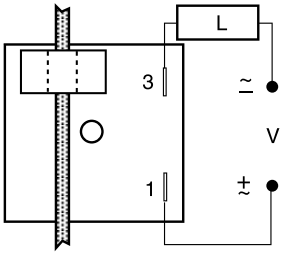
### Technical Data

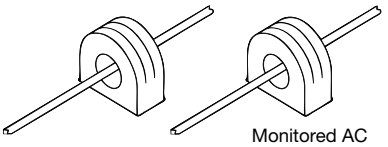
| | |
|---|---|
| **Sensor** | |
| Current to Actuate | 2 ... 20 A, Guaranteed Range |
| Reset Current | ≅ 95% of the actuate current |
| **Mechanical** | |
| Package | 2 x 2 x 1.75 in. (50.8 x 50.8 x 44.5 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connect terminals (2) |
| Sensor Hole | 0.36 in. (9.14 mm) for up to #4 AWG (21.1 mm2) THHN wire |

### Ordering Table

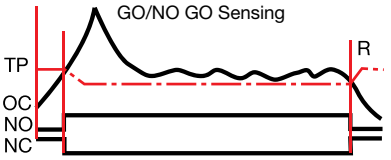
| Part Number | Output Volts | Adjustable Set Point | Output Form |
|---|---|---|---|
| TCSGAA | 3…50 VDC | 2...20 A AC | Normally Open |
| TCSGAB | 3…50 VDC | | Normally Closed |
| TCSHAA | 24…240 VAC | | Normally Open |
| TCSHAB | 24…240 VAC | | Normally Closed |

### Connection




### Function



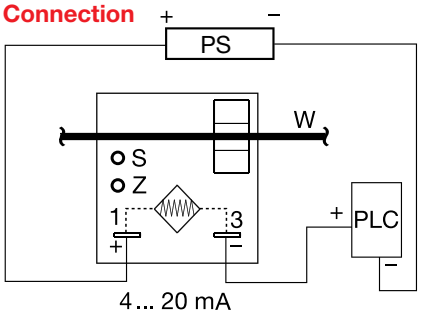

L = Load V = Voltage PS = Power Supply
PLC = PLC Digital Input Module R = Reset
TP = Trip Point OC = Monitored Current
NO = Normally Open Output
NC = Normally Closed Output

## TCSA Series, AC Current Transducer


Span and Zero adjustments are provided for minor calibration adjustments in the field (if required).

The TCSA Series is a loop powered, linear output current transducer that provides an output that is directly proportional to the RMS AC current passing through the onboard toroid. The TCSA provides a 4 to 20 mA output. The 0 to 5 A range allows the use of external current transformers so loads up to 1200 AC amps can be monitored.

### Connection




PS = Power Supply Z = Zero Adjust
S = Span Adjust W = Insulated Wire Carrying Monitored Current
PLC = PLC Analog Input or Meter Input

### Technical Data

| | |
|---|---|
| **Sensor** | |
| Factory Calibration | +/-0.5% of full scale |
| Repeat Accuracy | +/-0.25% of full scale under fixed conditions |
| **Mechanical** | |
| Package | 2 x 2 x 1.75 in. (50.8 x 50.8 x 44.5 mm) |
| Termination | 0.25 in. (6.35 mm) male quick connect terminals |

### Ordering Table

| Part Number | Current Range | Loop Voltage Range |
|---|---|---|
| TCSA5 | 0 ... 5 A | 10 ... 30 V DC |
| TCSA10 | 0 ... 10 A | |
| TCSA20 | 0 ... 20 A | |
| TCSA50 | 0 ... 50 A | |

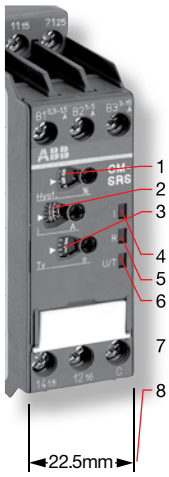
# Current Monitoring Relays
## CM-SRS.1 and CM-SRS.2 Series
## Single-phase AC/DC DIN Rail Mounting

**CM-SRS.1**

**CM-SRS.2**

- Monitoring of DC and AC Currents
- RMS Measuring
- Each Unit Includes 3 Measuring Ranges
- Selectable Over or Under Current Monitoring
- Adjustable Hysteresis 3 ... 30%
- **CM-SRS.2**: Adjustable Trip Delay 0.1 ... 30s
- Universal 24 ... 240V AC/DC Voltage
- **CM-SRS.1**: SPDT (c/o) Contacts
- **CM-SRS.2**: 2 SPDT (2 c/o) Contacts
- 22.5 mm Width
- 3 LEDs for Status Indication

Complete Product Details:
http://www.ssac.com/pp1.htm



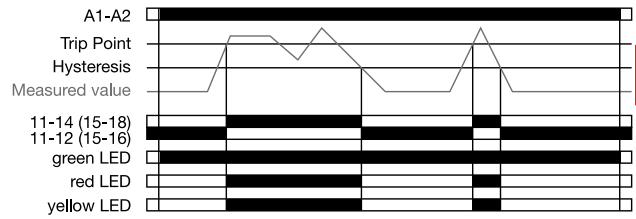

1 Hysteresis Adjustment
2 Trip Point Adjustment
3 Adjustment of the Tripping Delay $T_v$
4 I: Red LED - Over/Under Current
5 R: Yellow LED - Relay Status
6 U/T: Green LED Input Voltage, Timing
7 DIP Switches (see DIP switch functions)
8 Compact Package

**CM-SRS.1** and **CM-SRS.2** current monitoring relays can be used for overcurrent or undercurrent monitoring in single-phase AC and/or DC systems. These devices feature monitoring of true RMS values. The current to be monitored (measured value) is applied to terminals B1/B2/B3-C.

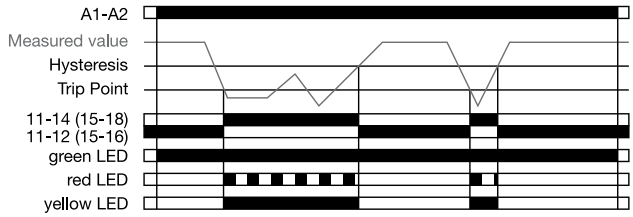
If the measured value exceeds or drops below the selected trip point value, the output relay(s) energize: on the CM-SRS.1 immediately, on the CM-SRS.2 after the trip delay $T_v$. The relay de-energizes when the current returns to an acceptable level. The adjustable hysteresis prevents rapid cycling.

The hysteresis is adjustable 3 to 30% of the threshold value.

**Overcurrent monitoring**




**Undercurrent monitoring**



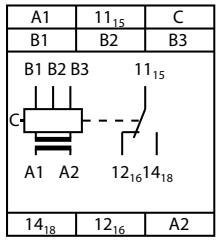

**DIP Switch Functions**

1 - ON Undercurrent Monitoring
- OFF Overcurrent Monitoring

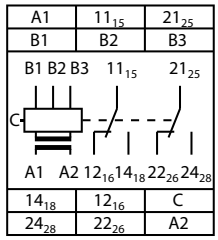
| Position | 2 | 1 |
|---|---|---|
| ON ↑ | | |
| OFF | | |

## Connection Diagrams

**CM-SRS.1**




**CM-SRS.2**




Note: CM-SRS.2x has second set of SPDT contacts. See on-line data sheet for the complete function diagrams

| | |
|---|---|
| A1-A2 | Input Voltage |
| B1-C | Measuring Range 1: 3-30 mA or 0.3-1.5 A |
| B2-C | Measuring Range 2: 10-100 mA or 1-5 A |
| B3-C | Measuring Range 3: 0.1-1 A or 3-15 A |
| $11_{15}$ - $12_{16}$ / $14_{18}$ | Output Contacts |
| $21_{25}$ - $22_{26}$ / $24_{28}$ | |

## Technical Data

| | |
|---|---|
| **Measuring Circuit** | B1 / B2 / B3 - C |
| Repeat Accuracy (constant parameters) | +/- 0.07% of Full Scale |
| **Output** | |
| AC12 (resistive) at 230 V | 4 A |
| AC15 (inductive) at 230 V | 3 A |
| **Mechanical** | |
| Dimensions W x H x D | .89 x 3.93 x 3.07 in. (22.5 x 100 x 78 mm) |
| Mounting | 35 mm DIN Rail Mounting, No Tools Required |
| Degree of Protection | Enclosure IP50 / Terminals IP20 |

## Ordering Table

| Series | Part Number | Input Voltage - 50/60 Hz | Trip Delay $T_v$ | Sensing Range | Output Form |
|---|---|---|---|---|---|
| CM-SRS.11 | 1SVR 430 840 R0200 | 24-240 V AC/DC | Without | 3-30 mA; 10-100 mA; 0.1-1A | SPDT (c/o) |
| | 1SVR 430 841 R0200 | 110-130 V AC | | | |
| CM-SRS.12 | 1SVR 430 840 R0300 | 24-240 V AC/DC | Without | 0.3-1.5 A; 1-5 A; 3-15 A | SPDT (c/o) |
| | 1SVR 430 841 R0300 | 110-130 V AC | | | |
| CM-SRS.21 | 1SVR 430 840 R0400 | 24-240 V AC/DC | Adjustable 0 or 0.1-30 s | 3-30 mA; 10-100 mA; 0.1-1A | 2 SPDT (2 c/o) |
| | 1SVR 430 841 R0400 | 110-130 V AC | | | |
| CM-SRS.22 | 1SVR 430 840 R0500 | 24-240 V AC/DC | Adjustable 0 or 0.1-30 s | 0.3-1.5 A; 1-5 A; 3-15 A | 2 SPDT (2 c/o) |
| | 1SVR 430 841 R0500 | 110-130 V AC | | | |

# Current Window Monitoring Relay
## CM-SFS.2 Series
## Single-Phase AC/DC DIN Rail Mounting



- 3 mA ... 15 A Current Monitoring in 6 Ranges
- Monitoring of DC and AC Currents
- RMS Measuring
- Each Device Includes 3 Measuring Ranges
- Over and Under Current Monitoring
- ON or OFF Delay Selectable
- Selectable Normally Open or Normally Closed Output
- Latching Function Selectable
- Adjustable Trip Points for $I_{min}$ and $I_{max}$
- Adjustable Hysteresis of 5 %
- Start-up delay TS Adjustable 0; 0.1-30 s
- Adjustable Trip Delay 0.1-30 s
- Select 2 SPDT (c/o) Transfer Together or Separate Outputs for Over and Under Current
- 22.5 mm width
- 3 LEDs for status indication

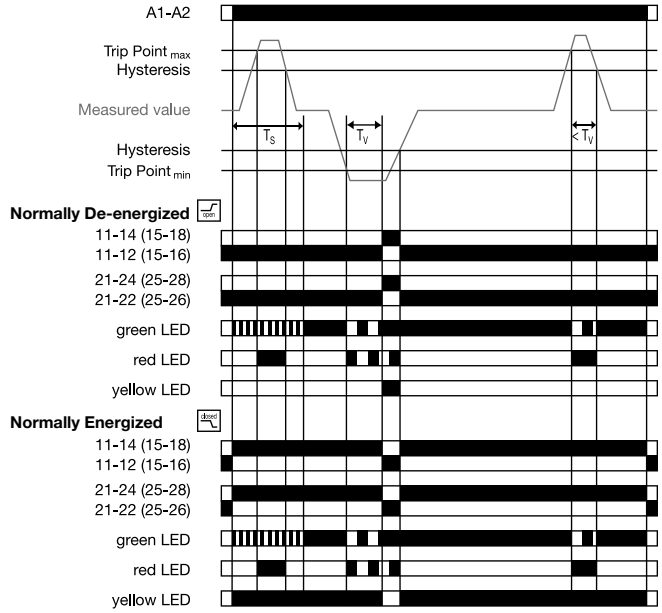
Complete Product Details:
http://www.ssac.com/pp1.htm


1 Trip Point Adjustment for Overcurrent
2 Threshold Value Adjustment for Undercurrent
3 I: Red LED - Over/Under Current
4 R: Yellow LED - Relay Status
5 U/T: Green LED - Input Voltage, Timing
6 Trip Delay Adjustment
7 Start-up Delay Adjustment
8 DIP switches (see Functions)
9 Compact Package

The current window monitoring relays CM-SFS.2 can be used for the simultaneous monitoring of over and under current in single-phase AC and/or DC systems. A true RMS sensing method is used. The 2 SPDT (2 c/o) output relays can be set to transfer together or operate as separate outputs for over and under current. The current to be monitored is connected to terminals B1/B2/B3-C. Normally de-energized or normally energized output as well as an adjustable ON or OFF trip delays and a latching output after a fault trip, are selectable.

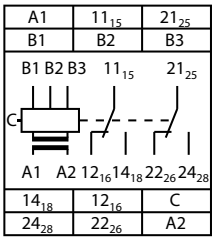
When the latching function is selected, the output relays remain latched until the input voltage is removed. (see On-Line Data Sheet for details)

## Function

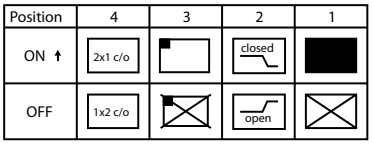



**NOTE**: See Data Sheet for A Complete Set of Function Diagrams

## Connection




| | |
|---|---|
| A1-A2 | Input Voltage |
| B1-C | Measuring Range 1: 3-30 mA or 0.3-1.5 A |
| B2-C | Measuring Range 2: 10-100 mA or 1-5 A |
| B3-C | Measuring Range 3: 0.1-1 A or 3-15 A |
| $11_{15}$ - $12_{16}$ / $14_{18}$ | Output Contacts |
| $21_{16}$ - $22_{26}$ / $24_{28}$ | |




**DIP Switch Functions**

1 - ON = OFF Delay (Function Shown)
- OFF = ON Delay

2 - ON Normally Energized
OFF Normally De-energized

3 - ON Latching Function Activated
OFF Latching Function Not Activated

4 - ON = DPDT (2 c/o) Both Relays Transfer at the Same Time
OFF = 1 SPDT (c/o) Transfers on Overvoltage, 1 SPDT (c/o) Transfer on Undervoltage

## Technical Data

| | |
|---|---|
| **Measuring Circuit** | |
| Repeat Accuracy (constant parameters) | +/- 0.07% of full scale |
| **Output** | |
| AC12 (resistive) at 230 V | 4 A |
| AC15 (inductive) at 230 V | 3 A |
| **Mechanical** | |
| Dimensions W x H x D Inches (mm) | .89 x 3.93 x 3.07 in. (22.5 x 100 x 78 mm) |
| Mounting | 35 mm DIN Rail, No Tools Required |
| Degree of Protection | Enclosure IP50 / Terminals IP20 |

## Ordering Table

| Series | Part Number | Input Voltage - 50/60 Hz | Trip Delay $T_v$ | Sensing Range | Output Form |
|---|---|---|---|---|---|
| CM-SFS.21 | 1SVR 430 760 R0400 | 24-240 V AC/DC | Adjustable 0 or 0.1-30 s | 3-30 mA; 10-100 mA; 0.1-1A | 2 SPDT (2 c/o) |
| CM-SFS.22 | 1SVR 430 760 R0500 | | | 0.3-1.5 A; 1-5 A; 3-15 A | |

SFSpp 01.16.08

# Liquid Level Control - Alternating Relay
## LLC5 / ARP Series
## Octal Plug-in – Relay Output

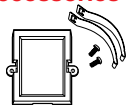
Pump & Level Controls

- Dual Probe Level Control for Conductive Liquids
- Onboard Knob Adjust Sensing up to 100KΩ
- Select Fill or Drain Operation
- LED Indicator Reduces Adjustment Time
- 5 A SPDT Isolated Contacts

Complete Product Details:
http://www.ssac.com/pp1.htm

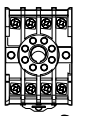
- Provides Equal Run Time for Two Motors
- Alternating or Electrically Locked Operation
- Low Profile Selection Switch
- 10 A Relay Contacts
- LED Status Indication
- Industry Standard Base Connection

### Mounting and Connection Accessories



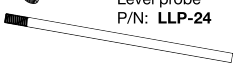
Panel mount kit
P/N: **BZ1**

**35mm DIN rail or surface mounting**



Octal
8 pin socket
P/N: **NDS-8**

Electrode
P/N: **PHST-38QTN**



Level probe
P/N: **LLP-24**

See accessory pages

### LLC5 Series Plug-in, Dual Probe, Liquid Level Control

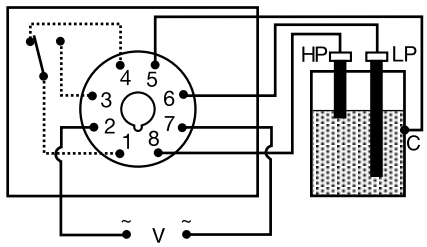
The LLC5 provides dual probe conductive liquid level control in a convenient octal plug-in package. Transformer isolated AC voltage on the probes prevents electrolytic plating. Less than 1 mA of current is used to sense the presence of conductive liquid between the probes and common. The sensitivity adjustment eliminates false tripping caused by floating debris and foaming agents.

### Operation

**Drain (Pump Down Mode):** When the liquid level rises and touches the high level probe, the output relay energizes and remains energized until the liquid level falls below the low level probe.

**Fill (Pump Up Mode):** When the liquid level falls below the low level probe, the output relay energizes and remains energized until the liquid level rises and touches the high level probe.

### Connection




Connect common to conductive tank.
HP = High Level Probe LP = Low Level Probe
C = Probe Common V = Voltage

Dashed lines are internal connections.
Accessory sensing probes are required.

7

### Technical Data

| | |
|---|---|
| **Output** | |
| Rating | 5 A resistive at 240 V AC; 1/10 hp at 240 V AC |
| **Mechanical** | |
| Mounting and Connection | 35mm or surface mounting, requires an accessory 8 pin (Octal) socket |
| Package | 3.2 x 2.39 x 1.78 in. (81.3 x 60.7 x 45.2 mm) |

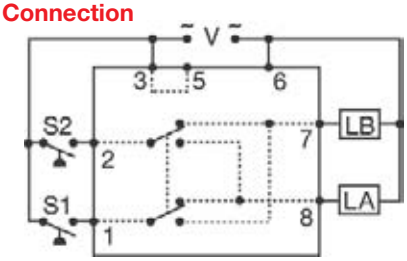
### Ordering Table

| Part Number | Voltage | Function | Adjustable Range (ohms) |
|---|---|---|---|
| LLC54AA | 120 VAC | Drain | 0...100 K |
| LLC54BA | | Fill | |

### ARP Series Plug-in, Alternating and Duplexing Relay

The ARP Series is used in systems where equal run time for two motors is desirable. The selector switch allows selection of alternation or either load for continuous operation. The LED's indicate the status of the internal relay and which load is selected to operate. This versatile series may be front panel mounted (BZ1 accessory required) or 35 mm DIN rail mounted with an accessory socket.

### Connection




V = Voltage LA = Load A LB = Load B
S1 = Primary Control Switch S2 = Lag Load Switch
Dashed lines are internal connections.

**Note:** S1 and S2 must be rated for the Load (LA & LB) voltage and current.

**DPDT 8 Pin Cross Wired**

Duplexing (Cross Wired): Duplexing models operate the same as alternating relays and when both the Control (S1) and Lag Load (S2) Switches are closed, Load A and Load B energize simultaneously.

The DPDT 8-pin, cross wired option, allows extra system load capacity through simultaneous operation of both motors when needed. Relay contacts are not isolated.

### Technical Data

| | |
|---|---|
| **Output** | |
| Rating | 10 A resistive at 120/240 V AC and 28 V DC; 1/3 hp at 120/240 V AC |
| **Mechanical** | |
| Mounting and Connection | 35mm or surface mounting, requires an accessory 8 pin (Octal) socket |
| Package | 3.2 x 2.39 x 1.78 in. (81.3 x 60.7 x 45.2 mm) |

### Ordering Table

| Part Number | Voltage | Function | Adjustment |
|---|---|---|---|
| ARP43S | 120 VAC | Cross Wired Duplexor | Selector Switch |

# Liquid Level - Motor Winding Temperature Monitors
## CM-ENS UP/DOWN / CM-MSS
## SPDT (c/o) Relay Output



- Monitoring and control of conductive liquids
- Selectable function “fill” or “drain”
- Adjustable sensitivity 5 - 100 KΩ
- 1 SPDT (c/o)
- 2 LED‘s for status indication

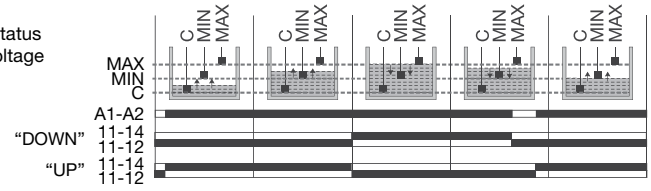
Complete Product Details:
http://www.ssac.com/pp1.htm


**The CM-ENS UP/DOWN monitors levels of conductive liquids**, and is used for liquid level control in pump systems.

The CM-ENS senses the difference in the resistance of the liquid and air, to determine the liquid level. The output relay’s function fill (UP) or drain (DOWN) is switch selectable. If the “UP” function is selected, the output relay is energized until the liquid touches the upper probe. If the “DOWN” function is selected, the output relay energizes until the liquid level falls below the Min probe.

1 Function Selector Switch:
UP - Fill
DOWN - Drain
2 Adjustable Sensitivity from 5 to 100K ohms
3 R: Yellow LED - Relay Status
4 U: Green LED - Input Voltage
5 Compact Package

### Function

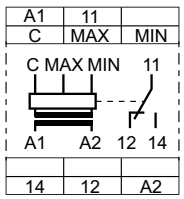



When using a metal tank the C electrode is not required. In this case the cable can be connected directly to the metal surface of the tank.

### Technical Data

| | |
|---|---|
| **Output** | |
| Rating - AC12 (resistive) 230 V | 4 A |
| Rating - AC15 (inductive) 230 V | 3 A |
| **Mechanical** | |
| Dimensions | 3.94x3.07x0.89 in (100x78x22.5mm) |
| Degree of Protection | Enclosure IP50 / Terminals IP20 |

### Connection




A1 - A2 Input voltage
C Ground reference electrode
MAX Maximum level
MIN Minimum level
11-12/14 Output contacts

### Ordering Table

| Part Number | Series | Input Voltage |
|---|---|---|
| 1SVR 430 851 R0200 | CM-ENS UP/DOWN | 110-130 V AC |

c UL us LISTED

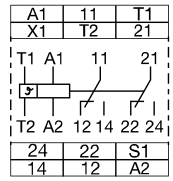
- 1 PTC Circuit
- Automatic or Manual Reset
- Broken Wire Detection
- Remote Reset Terminals
- 2 SPDT (2 c/o) Contacts
- 2 LED’s for Status Indication
- 22.5 mm wide enclosure,
- 35mm DIN Rail Mounting

### CM-MSS (2) Thermistor Motor Protection Relay - 1 PTC Sensor Circuit

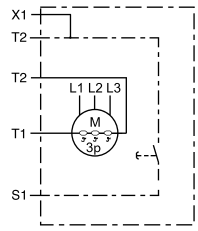

The CM-MSS (2) is designed to protect motor windings from overheating and failure by sensing the temperature with an embedded PTC thermistor. Selection of the protection relay is independent of motor size, Hp rating, insulation class and starting method. The three or more PTC winding sensors are connected in series with terminals T1 and T2. When the total resistance exceeds 1.5 K ohms the output de-energizes and latches (non-volatile). The unit is reset with the onboard or an accessory external reset switch. Automatic reset is selected by adding a jumper from X1 to T1.

1 Manual Reset Button
2 F: Red LED - Fault Tripped
3 U: Green LED - Input Voltage Applied
4. 2 SPDT (2 c/o) Output Contacts
5. Compact package

### Connection




A1 - A2 Input Voltage
T1 - T2 Sensor Circuit
S1 - T2 Remote Reset
X1 - T2 Jumper = Automatic Reset
11 -12/14 Output Contacts
21 - 22/24 Normally Engergized




M Motor

### Technical Data

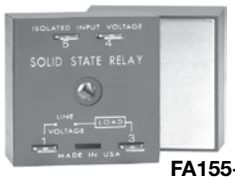
| | |
|---|---|
| **Output** | |
| Rating | Res. 4 A / Ind. 3 A |
| **Mechanical** | |
| Dimensions | 3.94 x 3.07 x 0.89 in. (100 x 78 x 22.5 mm) |
| Degree of Protection | Enclosure IP50 / Terminals IP20 |

### Ordering Table

| Part Number | Series | Input Voltage |
|---|---|---|
| 1SVR 430 811 R9300 | CM-MSS | 24 V AC |
| 1SVR 430 811 R0300 | | 110 130 V AC |

# Tower and Obstruction Lighting Controls
## Controls for Incandescent and LED Lamps
## Flashers, Photo Control, Alarm Relays


**FS155-30T**




**FA155-2**

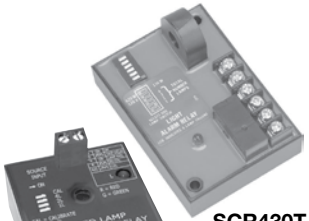
### Flasher — Solid State Beacon Flasher

| Part Number | Voltage | Note | Description |
|---|---|---|---|
| FS155-30RF | 120 V AC | 2500 W (200 A Inrush Maximum) Meets FAA-AC No. 150/5345-43E | Beacon Flasher for High RF Installations |
| FS-155-30T | | | Beacon Flasher for FM, TV, Chimneys, Bridges, Smoke Stacks, and Low RF Applications |
| FA155-2 | | 2500 W (200 A Inrush Maximum) | Auxiliary Unit for Synchronous Flashing of Additional Beacons |
| FA155 | | | Auxiliary Unit Provides Alternate Operation for Constant Line Loading |

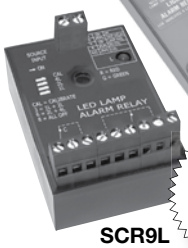
**PCR10**

### Photo Control — Accurate Dusk to Dawn Control

| Part Number | Voltage | Note | Description |
|---|---|---|---|
| PCR10 | 120 V AC | Meets FAA-AC No. 150/5345-43E | Precision Photo Control Calibrated to FAA and FCC Specifications for Tower and Obstruction Lighting. Two SPST N.O. 20 A Contacts. Without Cast Aluminum Housing. |



**SCR430T**



Monitors 1 to 8 LED Beacons or LED Side Lamps

**SCR9L**

### Lamp Alarm Relays — Senses Lamp Failure

| Part Number | Voltage | Note | Description |
|---|---|---|---|
| SCR430T | 120 V AC | Meets FAA-AC No. 150/5345-43E | Universal Light Alarm Relay; Senses the Failure of One Lamp Out of 1, 2, 3, or 4 Lamps; 116 or 620 W, 120 V AC Incandescent Lamps; SPDT - 10 A Isolated Alarm Contacts. |
| SCR9L | 120/230 V AC | | Universal LED Lamp Alarm Relay; Senses the Failure of 1 Lamp out of 1 to 8 Lamps; Works with LED Beacons or Side Lamps; 1 SPDT & 1 SPNO Alarm Contacts. |

**FB120A**

Monitors 1 to 8 LED Beacons; Monitors Flasher Operation

**FB9L**

### Beacon Alarm Relay — Senses Lamp Failure and Flasher Failure

| Part Number | Voltage | Note | Description |
|---|---|---|---|
| FB120A | 120 V AC | Meets FAA-AC No. 150/5345-43E | Flasher and Incandescent Beacon Lamp Alarm Relay; Senses Failure of Incandescent Beacon Lamps and Beacon Flasher; Two Line Voltage Alarm Outputs; SPDT - 10 A Isolated Alarm Contacts |
| FB9L | 120/230 V AC | | Universal LED Beacon Lamp & Flasher Alarm Relay; Senses failure of 1 lamp out of 1 to 8 LED Beacons; 1 SPDT & 1 SPNO Alarm Contacts; 0.5A Solid State Bypass Relay Output |

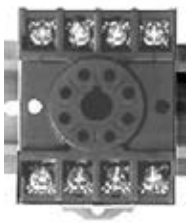
Complete Product Details:
http://www.ssac.com/pp1.htm

7

TWRpp 01.04.08

# Accessories
## Mounting and Connection Sockets





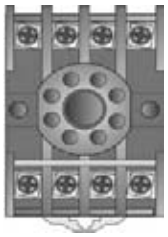
### DIN Rail or Surface Mount Sockets

8 Pin Octal Socket (600 VAC)

**P/N:** OT08PC

8 pin 35 mm DIN rail or surface mount socket. OT08PC is rated at 10 A at 600 V AC and has pressure clamp terminals. Select this socket for use with plug in three phase voltage monitors. For use with AWG 12 to 22 (3.2 to 0.33 mm$^2$) wire sizes. Hold-down clips not available.

Dimensions:
1.60 W x 2.1 l x .97 h in. (40.6 x 53.3 x 24.6 mm)

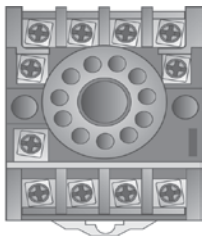


### 8 Pin Octal Socket (300 VAC)

**P/N:** NDS-8

May be surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. A spring mechanism allows easy removal. Screw terminals with captive wire clamps accept up to two #14 AWG (2.45 mm$^2$) wires. Rated 10 A at 300 V AC. Uses PSC8 hold-down clips.

Dimensions:
1.60 W x 2.03 x .85 h in. (40.6 x 51.6 x 21.6 mm)



### 11 Pin Magnal Socket

**P/N:** NDS-11

May be surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. A spring mechanism allows easy removal. Screw terminals with captive wire clamps accept up to two #14 AWG (2.45 mm$^2$) wires. Rated 10 A at 300 V AC. Uses PSC11 hold-down clips.

Dimensions:
1.80 W x 2.03 x 1.25 h in. (45.7 x 51.6 x 31.8 mm)

### Hold-Down Clips

**P/N:** PSC8
PSC11

Securely mounts plug in controls in any position. Also provides protection against vibration. Select the PSC8 for use with NDS-8 or the PSC11 for use with NDS-11 sockets. Comes in sets of two.

### Surface Mount Sockets

8 Pin Octal Socket (600 VAC)

**P/N:** P1011-6

8 pin surface mount socket with binder head screw terminals. Rated 10 A at 600V AC. Select this socket for use with plug in three phase voltage monitors. When used with TDM, TDB, TDS Series timers the combination is UL Listed. Uses PSCRB8 hold-down brackets.

### Hold-Down Brackets

**P/N:** PSCRB8

Designed for use with P1011-6 socket. Securely mounts 8 pin plug-in controls in any position, and provides protection against vibration. Comes in sets of two.

Dimensions:
2.0 W x 2.25 x .63 h in. (50.8 x 57.2 x 15.9 mm)

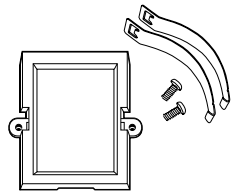
Complete Product Details:
http://www.ssac.com/pp1.htm





1SXU000023C0202

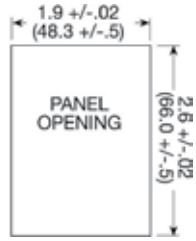
# Accessories
## Mounting Methods, Timer Adjustments and Dials



### Front Panel Mount Kit

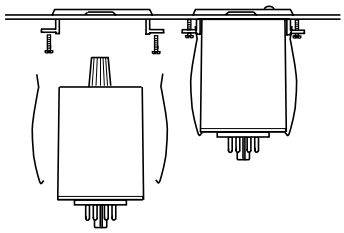
P/N: **BZ1**

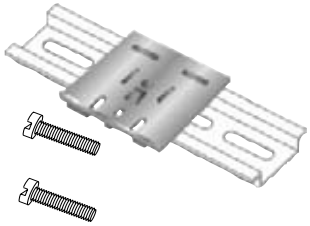
Provides an easy method of through-the-panel mounting of 8 or 11 pin plug-in timers, flashers, and other controls. May be mounted in panels up to 0.125 in. (3.2 mm) thick. Includes two clamps and two screws.




Inches (Millimeters)

Illustrates panel opening size required to mount BZ1.

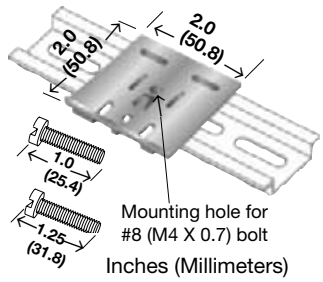




### DIN Rail Mount Adaptor

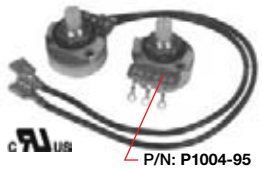
P/N: **P1023-20**

Allows any 2 x 2 in. (50.8 x 50.8 mm) or 2 x 3 in. (50.8 x 76.2 mm) module to be mounted on a 35 mm DIN type rail. Comes complete with mounting hardware for 0.75 in. (19 mm) and 1 in. (25.4 mm) thick modules.




Inches (Millimeters)

P/N: P1004-95-X



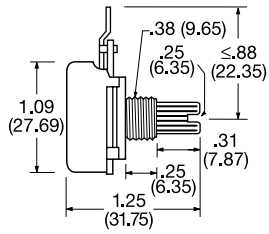

### Versa-Pot

Panel mountable, industrial potentiometer recommended for remote time delay adjustment. The shaft is slotted for screwdriver adjustment and serrated for slip-proof finger adjustment. Accepts Versa-Knob or Lock Shaft. May be ordered with two 8 in. (20.3 cm) wires soldered to pot (clockwise increase) and female quick connect terminals on other ends by adding suffix -X to end of part number.

### Ordering Table

| Part Number | Value (Ohms) | With Wire Leads |
|---|---|---|
| P1004-95 | 100 K | No |
| P1004-95-X | | Yes |

Complete Product Details:
http://www.ssac.com/pp1.htm




Inches (Millimeters)

### Technical Data

| | |
|---|---|
| Rating | 0.25W at 55°C |
| Taper | Linear |
| Shaft Rotation | 300° +/-5° |
| Tolerance | +/-10% |

### Versa-Knob

P/N: **P0700-7**

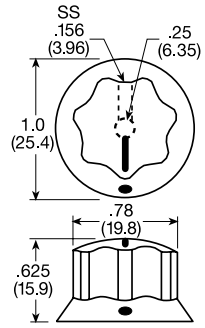
Versa-Knob is designed for 0.25 in (6.35 mm) shaft of Versa-Pot or Q-Pot. Semi-Gloss industrial black finish.


### Time Adjustment Dials

Dials for use with remote Versa-Pot. Reverse screen printed on clear plastic to avoid damage to printed image.

### Ordering Table

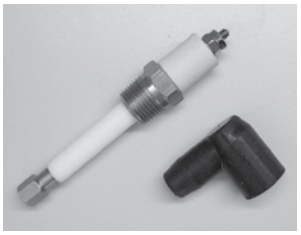
| Part Number | Range | Increments |
|---|---|---|
| P0400-82 | 0.1 ... 10s | 1s |
| P0400-26 | 0.1 ... 10m | 1m |
| P0400-27 | 0 ...10 | Reference Dial |




SS = Set Screw
Inches (Millimeters)

7

# Accessories
## Liquid Level Probes and Probe Holders

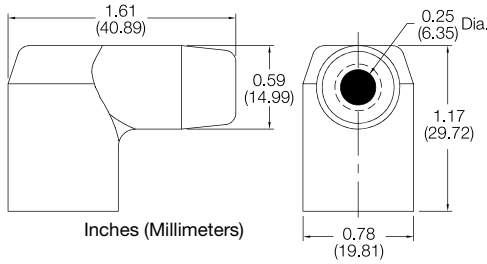


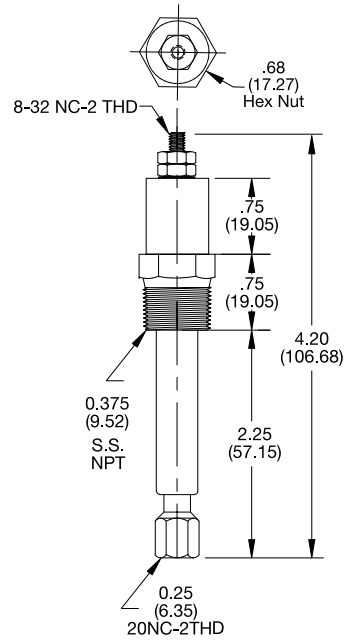
### Liquid Level Control Electrodes

Designed for use with all conductive liquid level controls. Composed of insulators and metal parts made of number 300 series stainless steel. These internally conductive probe holders are designed for a maximum steam pressure of 240 PSI.

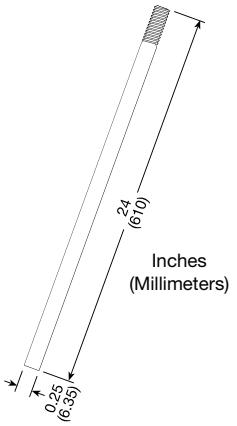
### Ordering Table

| Part Number | Description |
|---|---|
| PHST-38QTN | Probe Holder (UL Recognized) |
| P0700-409 | Protective Boot |




Inches (Millimeters)



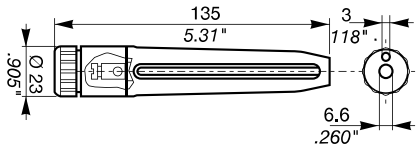

### Liquid Level Probe

**P/N:** LLP-24

Threaded stainless steel probe measuring 24 in. (61 cm) long. Designed for use with WCC-1138 and WCC-1138-3 liquid level control electrodes.

### Suspension Electrode

Steel electrode (X 12 CR Mo S 17) with sleeve (Lupulen 6011 L) suitable up to 60°C max. Attaches to an insulated wire suspended from the top of the holding tank. Length of wire determines the sensing location.




### Ordering Table

| Part Number | Units per pack | Weight (kg/oz) |
|---|---|---|
| 1SVR 402 902 R 0000 | 1 | 0.053/1.855 |

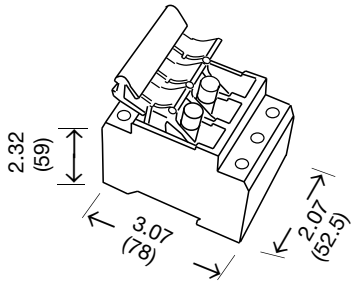
FH3P does not include P0600-11 fuses

### Three Phase Fuse Block/Disconnect

Three phase fuse block disconnect designed for use with HRC midget fuses rated up to 25 A at 500 V AC. Snap onto 35mm DIN rail.

### Midget Fuse

Fast acting fuse for use with voltage monitors. Rated 2 A at 500 V AC. 1.5 x .41 in. (38.1 x 10.4 mm)




### Ordering Table

| Part Number | Description |
|---|---|
| FH3P | 3 Pole Fuse Block |
| P0600-11 | Midget Fuse |

Complete Product Details:
http://www.ssac.com/pp1.htm

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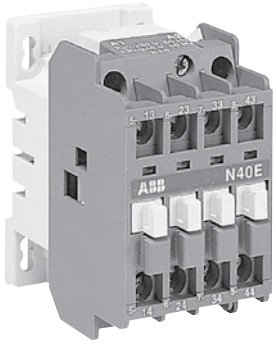
LLCACCpp 01.04.08

# Control relays
## Type N, NE, NL & TNL

**Control relays**
Type N, NE, NL & TNL
Positive safety
AC/DC operated






### Description

There are many applications where safety is very critical and it is important to use electrical equipment which ensures that dangerous machine movement cannot occur when a fault is detected with the moving contacts during the cycle which the fault is indicated.

Regulations and standards have been written to ensure that safety is maintained:

- United States — ANSI B11.19-1990, ANSI B11.20-1991
- Germany — SÜVA, ZH1/457
- France — INRS
- United Kingdom — BIA
- Switzerland — SA

The ABB Type N & NL 4 and 8 pole relays are designed with “Positive Guided” contacts and fulfill the regulations or standards shown.

The relays can provide positive safety for the N.O. and N.C. contacts which assure that the N.O. contacts will not close before any N.C. contact opens. Therefore, if one of the contacts weld due to abnormal conditions in the control circuit, the other contacts will also remain in the same position as when the welding occurred. This means that the open contacts must maintain an air distance 0.5mm when the coil is energized at 110% Vc or when it is de-energized.

UL File No: E39231 (N & NL)

# General information
## Type N, AC operated

## Description

- AC operated with laminated magnetic circuit.
- 2 versions: 4 pole or 8 pole. The width of 8 pole devices is identical to that of 4 pole devices; only the depth is increased.
- Side by side mounting possible.
- Self cleaning auxiliary contacts.
- Alone or by itself or with a 4 pole CA5 auxiliary contact block, these devices offer “positive safety” between their auxiliary contacts.

## Application

Type N control relays are used for switching auxiliary circuits and control circuits.



Holes for screw mounting (screws not supplied). Distances between holes according to EN50 002.

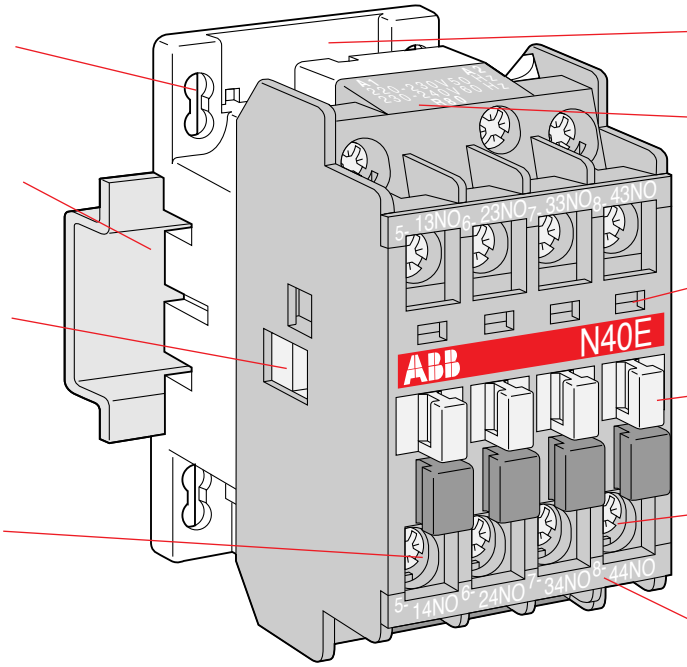
Quick mounting on 35 x 7.5mm DIN mounting rail according to IEC715 and EN50 022.

Location of side mounted accessories: mounting on right or left hand side.

Terminals delivered in open position with captive screws (screws of unused terminals should be tightened).

Screwdriver guidance for all screws makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 – Part. 100 and offer IP 20 degree of protection according to IEC947-1.




Location of surge suppressors

Clear marking of coil voltages and frequencies.

Location of function marker.

Stops for attaching front mounted accessories.

All terminal screws: Posidrive (+, -) N° 2

Terminal marking according to IEC947-5-1 and EN50 011.

## Catalog number explanation

**N 40E–84**

**Frame type**

**Contact configuration**

**Coil voltage**
(see coil voltage chart below)

### Coil voltage selection chart

| Hz | Relay type | Volts | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12 | 24 | 48 | 110 | 120 | 125 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 500 | 600 |
| 60 | N | | 81 | 83 | 84 | 84 | | 34 | 36 | 80 | 42 | | 86 | 86 | 51 | 53 | 55 |
| 50 | N | | 81 | 83 | 84 | | | | 80 | | | 85 | 86 | | | 55 | |
| DC | NE, NL | 80 | 81 | 83 | 86 | | 87 | | 88 | 89 | | | | | | | |

# General information
## Type NE, DC operated

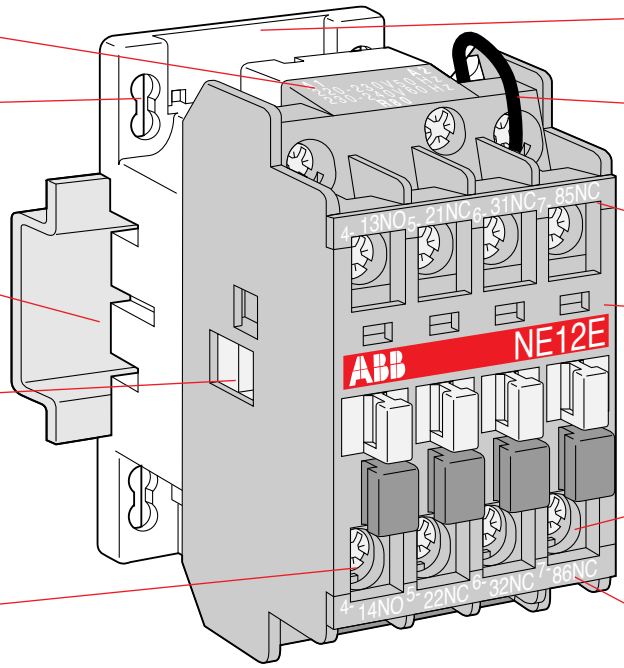


## Description

- Contactor relays with laminated magnet circuit and double-winding coil fed from a DC supply via a built-in N.C. lagging auxiliary contact.
- 1-stack version with three built-in auxiliary contacts.
- Self-cleaning auxiliary contacts
- Alone or fitted with a 4-pole CA5 auxiliry contact block, these devices offer mechanically linked contacts.
- Side by side mounting possible.

## Application

NE... contactor relays are used for switching auxiliary circuits and control circuits.




Clear marking of the coil voltage

Hole for screw mounting (screws not supplied). Distances between holes according to EN50 002.

Quick mounting on 35 x 7.5mm mounting rail according to IEC 715 and EN 50 022.

Location of side mounted accessories: mounting on right or left hand side.

Terminals delivered in open position with captive screws (screws of unused terminals should be tightened).

Screwdriver guidance for all screws makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 – Part. 100 and offer IP 20 degree of protection according to IEC947-1.

Location of surge suppressor.

Electrical connection between the coil and the N.C. lagging auxiliary contact.

N.C. lagging auxiliary contact path.

Location of function marker.

Stops for attaching front-mounted accessories.

All terminal screws:
Posidrive (+, -) N° 2

Terminal marking according to IEC947-5-1 and EN50 011.

## Catalog number explanation

**NE 12E–84**

**Frame type**

**Contact configuration**

**Coil voltage**
(see coil voltage chart below)

### Coil voltage selection chart

| Hz | Relay | Volts | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | type | 12 | 24 | 48 | 110 | 120 | 125 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 500 | 600 |
| 60 | N | | 81 | 83 | 84 | 84 | | 34 | 36 | 80 | 42 | | 86 | 86 | 51 | 53 | 55 |
| 50 | N | | 81 | 83 | 84 | | | | 80 | | | 85 | 86 | | | 55 | |
| DC | NE, NL | 80 | 81 | 83 | 86 | | 87 | | 88 | 89 | | | | | | | |

# General information
## Type NL & TNL, DC operated

### Type NL

### Description

- Magnetic circuit variants: NL types: d.c. operated with solid magnetic circuits.
- 2 versions: 4 pole or 8 pole

  The width of 8 pole devices is identical to that of 4 pole devices; only the depth is increased.
- Bifurcated auxiliary contacts.
- Alone or mounted with a 4 pole CA5 auxiliary contact block, these devices offer “positive safety” between their auxiliary contacts.

### Application

Type NL control relays are used for switching auxiliary circuits and control circuits.

### Type TNL

### Description

- Magnetic circuit variants
  – NL types: D.C. operated with solid magnetic circuits.
  – TNL types: D.C. operated with solid magnetic circuit and large coil voltage range.
- 2 versions
  – 4-pole/1-stack or 8-pole/2-stack
  – The width of 8-pole devices is identical to that of 4 pole devices; only the depth is increased.
- Double sharp auxiliary contacts.
- Alone or mounted with a 4-pole CA 5 auxiliary contact block, these devices offer "positive safety" between their auxiliary contacts.

### Application

Type NL and TNL control relays are used for switching auxiliary circuits and control circuits.

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Location of surge suppressors.

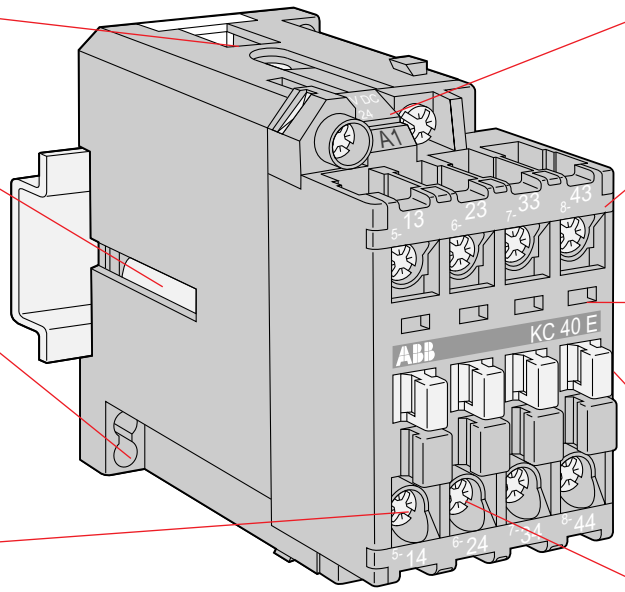
Quick mounting on 35 x 7.5mm or 35 x 15mm DIN mounting rail according to IE715 and EN50022.

Holes for screw mounting (screws not supplied). Distances between holes according to EN50002.

Terminals delivered in open position with captive screws (screws of unused terminal should be tightened).

Screwdriver guidance for all screws makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 – Part. 100.




Clear marking of coil voltages.

Terminal marking according to IEC947-5-1 and EN50 011.

Location of function marker and surge suppressor.

Stops for attaching front mounted accessories.

All terminal screws:
M 3.5, posidrive (+,-) N° 2

## Catalog number explanation

**(T)NL 44E–84**

**Frame type**

**Contact configuration**

**Coil voltage**
(see coil voltage chart below.)

### Coil voltage selection chart

| Hz | Relay | Volts | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | type | 12 | 24 | 48 | 110 | 120 | 125 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 500 | 600 |
| 60 | N | | 81 | 83 | 84 | 84 | | 34 | 36 | 80 | 42 | | 86 | 86 | 51 | 53 | 55 |
| 50 | N | | 81 | 83 | 84 | | | | 80 | | | 85 | 86 | | | 55 | |
| DC | NE, NL | 80 | 81 | 83 | 86 | | 87 | | 88 | 89 | | | | | | | |

# Type N & NL
## AC & DC operated

N40E-1

NE12E-1



## A.C. operated

| Contact configuration N.O. | N.C. | Catalog number | List price |
|---|---|---|---|
| 4 | 0 | N40E-84 | |
| 3 | 1 | N31E-84 | **$ 60** |
| 2 | 2 | N22E-84 | |
| 4 | 4 | N44E-84 | |
| 5 | 3 | N53E-84 | |
| 6 | 2 | N62E-84 | **120** |
| 7 | 1 | N71E-84 | |
| 8 | 0 | N80E-84 | |

## Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. All DC operated catalog numbers include a 110VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the first digit after the last dash in the catalog number.

Ex.: A 240V coil is required for an N80 control relay: N80E-80

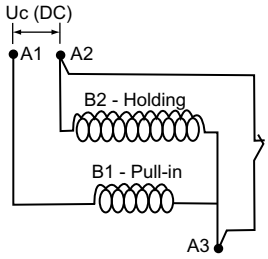
## Coil voltage selection chart

| Hz | Relay type | Volts 12 | 24 | 48 | 110 | 120 | 125 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 500 | 600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60 | N | | 81 | 83 | 84 | 84 | | 34 | 36 | 80 | 42 | | 86 | 86 | 51 | 53 | 55 |
| 50 | N | | 81 | 83 | 84 | | | | 80 | | | 85 | 86 | | | 55 | |
| DC | NE, NL | 80 | 81 | 83 | 86 | | 87 | | 88 | 89 | | | | | | | |

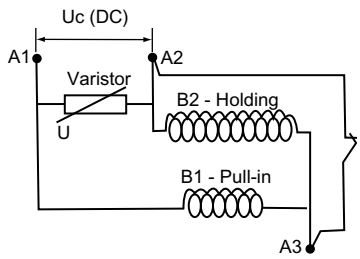
## D.C. operated

| Contact configuration N.O. | N.C. | Catalog number | List price |
|---|---|---|---|
| 4 | 0 | NL40E-86 | |
| 3 | 1 | NL31E-86 | **$ 72** |
| 2 | 2 | NL22E-86 | |
| 4 | 4 | NL44E-86 ① | |
| 5 | 3 | NL53E-86 ① | |
| 6 | 2 | NL62E-86 ① | **144** |
| 7 | 1 | NL71E-86 | |
| 8 | 0 | NL80E-86 | |
| 1 | 2 | NE12E-86 | |
| 2 | 1 | NE21E-86 | **72** |
| 3 | 0 | NE30E-86 | |
| 4 | 3 | NE43E-86 ① | |
| 5 | 2 | NE52E-86 ① | |
| 6 | 1 | NE61E-86 ① | **144** |
| 7 | 0 | NE70E-86 ① | |

## Block diagrams for NE... contactor relay coil supply




Coil supply Uc <110 VDC




Coil supply via built-in varistor UC ≤ 110 VDC

① NE43 – NE70 and NL44 – NL62 control relays cannot accept any front mounted auxiliary contact blocks.

# Type TNL
## 4 Pole & 8 Pole


TNL22E



### 4 Pole, 1 stack

| Number of contacts 1st stack N.O. | 1st stack N.C. | 2nd stack N.O. | 2nd stack N.C. | Weight | Catalog number | List price |
|---|---|---|---|---|---|---|
| 2 | 2 | – | – | 0.540 | TNL22E-Δ | |
| 3 | 1 | – | – | 0.540 | TNL31E-Δ | **$ 121** |
| 4 | – | – | – | 0.540 | TNL40E-Δ | |

### 8 Pole, 2 stack

| Number of contacts 1st stack N.O. | 1st stack N.C. | 2nd stack N.O. | 2nd stack N.C. | Weight | Catalog number | List price |
|---|---|---|---|---|---|---|
| 4 | – | – | 4 | 0.600 | TNL44E-Δ | **$ 180** |
| 4 | – | 2 | 2 | 0.600 | TNL62E-Δ | |

Δ - Substitute the Δ for the coil voltage code. See the Type TNL Coil voltage Selection chart beneath the photos.

### Coil characteristics

No extra tolerances applicable to the $U_c$ min. ... max. values quoted in the Coil voltage selection table

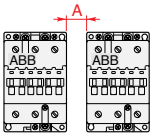
- Coil consumption at $U_c$ max. q = 20 °C: 9 W pull-in/holding
- Replacement coils: consult us (standard coils used on NL control relays are not suitable for TNL control relays).

### Coil voltage selection

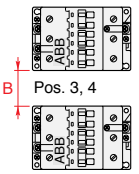
| Min. $U_C$ | Max | Voltage |
|---|---|---|
| 17 | 32 | 51 |
| 24 | 45 | 52 |
| 36 | 65 | 54 |
| 42 | 78 | 58 |
| 50 | 90 | 55 |
| 77 | 143 | 62 |
| 90 | 150 | 66 |
| 152 | 264 | 68 |

### Mounting distance – for coil operating limits $U_c$ min. … $U_c$ max.

| A mm | B mm | Ambient temp. °C | Max. switching frequency Operating cycles/h |
|---|---|---|---|
| 2 | 20 | ≤ 20 | 1200 |
| 5 | 20 | ≤ 55 | 1200 |




Pos.1

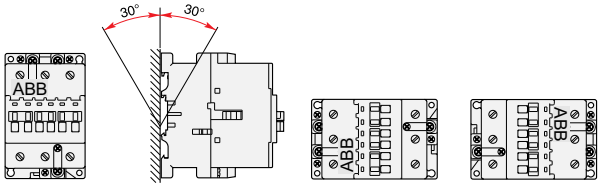



Pos. 3, 4

### Add-on accessories

| Control relays | Max. number of auxiliary contact blocks CA5-10 | CA5-01 | CA5-40 | CA5-31 | CA5-22 | CA5-04 | Timer TP | Mechanical interlock | Label marker |
|---|---|---|---|---|---|---|---|---|---|
| Pos. 1, 3 or 4 TNL 40-E | 4 | 2 | 1 | 1 | 1 | – | – | VBC 30 | BA 5-50 |
| Pos. 1, 3 or 4 TNL 31-E | 4 | 1 | 1 | 1 | – | – | – | VBC 30 | BA 5-50 |
| Pos. 1, 3 or 4 TNL 22-E | 4 | – | 1 | – | – | – | – | VBC 30 | BA 5-50 |
| Pos. 1 ±30° TNL - all types | – | – | – | – | – | – | – | VBC 30 | BA 5-50 |

### Mounting positions




Pos. 1 | Pos. 1 ± 30° | Pos. 3 | Pos. 4

# Accessories
## Type N, NL & TNL


CAL5-11


CA5-10


TP40DA


VE5-1


BA5-50

### Auxiliary contact blocks

| Positioning | Contacts N.O. | Contacts N.C. | Catalog number | List price |
|---|---|---|---|---|
| N, NE, NL, TNL (front mount) | 1 | — | CA5-10 | **$ 15** |
| | — | 1 | CA5-01 | |
| N, NL, NE, TNL (4 pole) | 4 | — | CA5-40N | **30** |
| | 2 | 2 | CA5-22N | |
| | — | 4 | CA5-04N | |
| N, NE, NL, TNL (side mount) | 1 | 1 | CAL5-11 | |

### Pneumatic timers

| | Timing range | Contacts N.O. | Contacts N.C. | Catalog number | List price |
|---|---|---|---|---|---|
| N, NL | On delay 0.1 – 40s | 1 | 1 | TP40DA | **$ 108** |
| N, NL | On delay 10 – 180s | 1 | 1 | TP180DA | |
| NE, TNL | Off delay 0.1 – 40s | 1 | 1 | TP40IA | |
| | Off delay 10 – 180s | 1 | 1 | TP180IA | |

### Interlocks

| Feature | | Contacts N.O. | Contacts N.C. | Catalog number | List price |
|---|---|---|---|---|---|
| N, NE, NL, TNL | Mechanical/electrical | — | 2 | VE5-1 | **$ 45** |
| N, NE, NL, TNL | Mechanical | — | — | VM5-1 | **21** |

### Mechanical latches

| Feature | Catalog number | List price |
|---|---|---|
| N, NL (4 pole only) | WB75A-Δ | **$ 84** |

### Coil voltage selection chart — mechanical latches

| 50 Hz | 60 Hz | Voltage code |
|---|---|---|
| 24 | 24 – 28 | **01** |
| 42 | 42 – 48 | **02** |
| 48 | 48 – 55 | **03** |
| 110 | 110 – 127 | **04** |
| 220 – 230 | 220 – 255 | **06** |
| 230 – 240 | 230 – 277 | **05** |
| 380 – 415 | 380 – 440 | **07** |
| 415 – 440 | 440 – 480 | **08** |

### Identification markers

| Feature | Catalog number | List price |
|---|---|---|
| Pack of 50 | BA5-50 | **$ 15** |

# Accessories
## Type N, NL, NE & TNL

ZA16-84



RV5/50

RC5-1/50

## Coils

| Relay type | Catalog number | List price |
|---|---|---|
| N<br>NE | ZA16-Δ<br>ZAE16-Δ | **$ 24**<br>**24** |

Δ Select the coil voltage from the Control Relay Coil Voltage Selection chart and substitute the letter code for the Δ as the last digit in the catalog number.

### Coil voltage selection chart

| Hz | Relay type | Volts | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12 | 24 | 48 | 110 | 120 | 125 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 500 | 600 |
| 60 | N | | 81 | 83 | 84 | 84 | | 34 | 36 | 80 | 42 | | 86 | 86 | 51 | 53 | 55 |
| 50 | N | | 81 | 83 | 84 | | | | 80 | | | 85 | 86 | | | 55 | |
| DC | NE, NL | 80 | 81 | 83 | 86 | | 87 | | 88 | 89 | | | | | | | |

## Surge suppressors — for Type N control relays

| Feature | Type | Voltage range | Catalog number | List price |
|---|---|---|---|---|
| Varistor | N, NE<br>NL, TNL | 24 – 50 VAC/DC<br>50 – 133 VAC/DC<br>110 – 250 VAC/DC<br>250 – 440 VAC/DC | RV5/50<br>RV5/133<br>RV5/250<br>RV5/440 | **$ 30** |
| RC | N | 24 – 50 VAC<br>50 – 133 VAC<br>110 – 250 VAC<br>250 – 440 VAC | RC5-1/50<br>RC5-1/133<br>RC5-1/250<br>RC5-1/440 | |

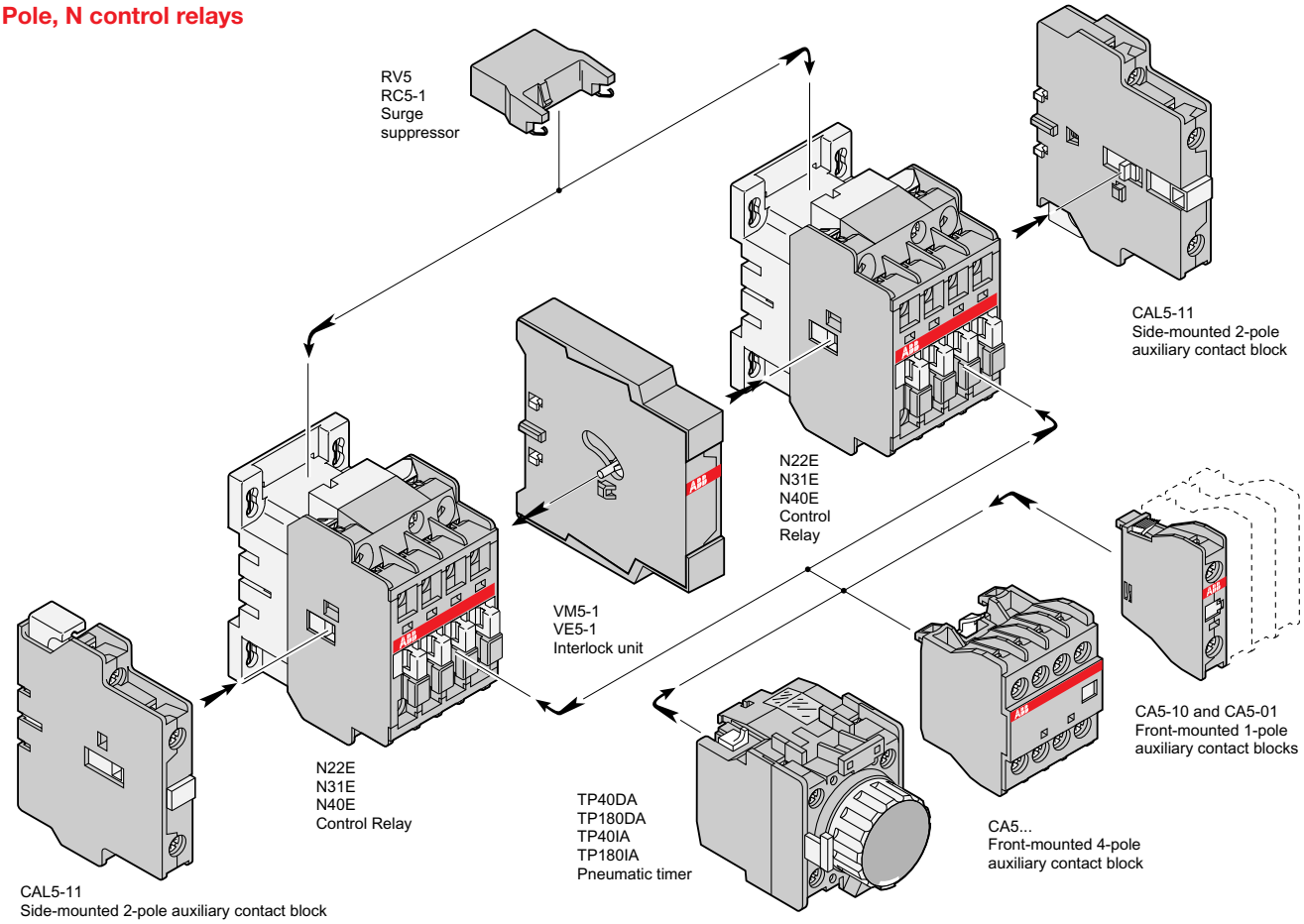
## Technical data

| Type | Control circuit | Opening time growth factor | Residual overvoltage or clipping voltage | Remarks |
|---|---|---|---|---|
| RV5/...<br>ing | | | | Advantages • Good energy absorption & damp- |
| 50 | AC/DC | 1.1 to 1.5 | 132V | • Unpolarized system |
| 133 | AC/DC | 1.1 to 1.5 | 270V | Disadvantages • Clipping from $U_{vdr}$ thus voltage |
| 250 | AC/DC | 1.1 to 1.5 | 480V | front up to this point |
| 440 | AC/DC | 1.1 to 1.5 | 825V | |
| RC5-1/... or RC5-2/...<br>RC-EH300/... | AC | 1.2 to 3 | 2 to 3 x $U_c$ | Advantages • Very fast clipping<br>• Attenuation of steep fronts and therefore, high frequencies<br>• No operating delays |

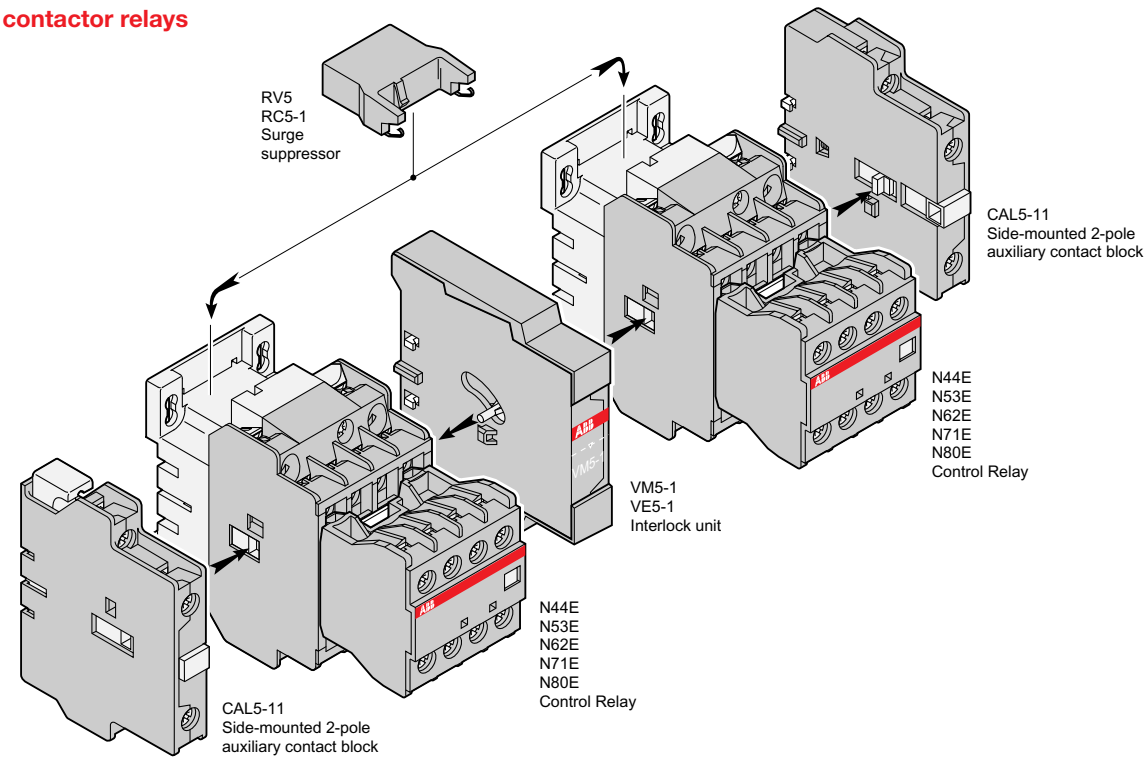
# Accessory mounting information
## Type N, NE, NL & TNL



### 4 Pole, N control relays




### 8 Pole, N contactor relays



# Possible accessory combinations
## Type N, NE, NL, TNL

**Configurations of accessories are different depending on whether front or side mounted.**

| Type | Main poles | Built-in auxiliary contacts | Accessories — Front mounting: Auxiliary contact blocks 1-pole CA5- | | Accessories — Front mounting: Auxiliary contact blocks 4-pole CA5- | | Accessories — Front mounting: TP - A Pneumatic timer block | | Accessories — Side mounting: Auxiliary contact Blocks 2-pole CAL5-11 | | Accessories — Side mounting: Interlock units | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **N** ① | **2** | **2 E** | 1 to 4 **CA5-** 1-pole blocks | or | 1 **CA5-** 4-pole block | or | 1 **TP - A** block | + | 1 to 2 **CAL5-11** blocks | or | 1 **VM/E5-1** block + 1 **CAL5-11** block | |
| **N** ① | **3** | **1 E** | | | | | | | | | | |
| **N** | **4** | **0 E** | | | | | | | | | | |
| **N** | **4** | **4 E** | – | | – | | – | + | 1 to 2 **CAL5-11** blocks | or | 1 **VM/E5-1** block + 1 **CAL5-11** block | |
| **N** | **5** | **3 E** | | | | | | | | | | |
| **N** | **6** | **2 E** | | | | | | | | | | |
| **N** | **7** | **1 E** | | | | | | | | | | |
| **N** | **8** | **0 E** | | | | | | | | | | |
| **NE** ① | **2** | **2 E** | 1 to 4 **CA5-** 1-pole blocks | or | 1 **CA5-** 4-pole block | or | 1 **TP - A** block | + | 1 to 2 **CAL5-11** blocks | or | 1 **VM/E5-1** block + 1 **CAL5-11** block | |
| **NE** ① | **3** | **1 E** | | | | | | | | | | |
| **NE** | **4** | **0 E** | | | | | | | | | | |
| **NE** | **4** | **4 E** | – | | – | | – | + | 1 to 2 **CAL5-11** blocks | or | 1 **VM/E5-1** block + 1 **CAL5-11** block | |
| **NE** | **5** | **3 E** | | | | | | | | | | |
| **NE** | **6** | **2 E** | | | | | | | | | | |
| **NE** | **7** | **1 E** | | | | | | | | | | |
| **NE** | **8** | **0 E** | | | | | | | | | | |
| **NL** ① | **2** | **2 E** | 1 to 4 **CA5-** 1-pole blocks | or | 1 **CA5-** 4-pole block | or | – | or | 1 **CAL5-11** block | or | 1 **VM/E5-1** block + 1 **CAL5-11** block | |
| **NL** ① | **3** | **1 E** | | | | | | | | | | |
| **NL** | **4** | **0 E** | | | | | | | | | | |
| **NL** | **4** | **4 E** | – | | – | | – | or | 1 **CAL5-11** block | or | 1 **VM/E5-1** block + 1 **CAL5-11** block | |
| **NL** | **5** | **3 E** | | | | | | | | | | |
| **NL** | **6** | **2 E** | | | | | | | | | | |
| **NL** | **7** | **1 E** | | | | | | | | | | |
| **NL** | **8** | **0 E** | | | | | | | | | | |
| **TNL** ① | **2** | **2 E** | 1 to 4 **CA5-** 1-pole blocks | or | 1 **CA5-** 4-pole block | or | – | or | 1 **CAL5-11** block | or | 1 **VM/E5-1** block + 1 **CAL5-11** block | |
| **TNL** ① | **3** | **1 E** | | | | | | | | | | |
| **TNL** | **4** | **0 E** | | | | | | | | | | |
| **TNL** | **4** | **4 E** | – | | – | | – | or | 1 **CAL5-11** block | or | 1 **VM/E5-1** block + 1 **CAL5-11** block | |
| **TNL** | **5** | **3 E** | | | | | | | | | | |
| **TNL** | **6** | **2 E** | | | | | | | | | | |
| **TNL** | **7** | **1 E** | | | | | | | | | | |
| **TNL** | **8** | **0 E** | | | | | | | | | | |

# Technical data
## UL & CSA

### AC inductive ratings — NEMA A600

| Voltage | Continuous current | Maximum make | Maximum break |
|---|---|---|---|
| 120V<br>240V<br>480V<br>600V | 10 | 7200VA | 720VA |

### DC inductive ratings — NEMA P300

| Voltage | Continuous current | Maximum make | Maximum break |
|---|---|---|---|
| 120V<br>250V<br>300-600V | 5 | 138VA | 138VA |

### AC coil consumption

| In rush | Sealed |
|---|---|
| 80VA | 8VA |

### DC coil consumption

| In rush | Sealed |
|---|---|
| 7.0W | 7.0W |

### AC operating time

| Pickup | Dropout |
|---|---|
| 10 – 20ms | 10 – 20ms |

### DC operating time

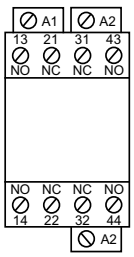
| Pickup | Dropout |
|---|---|
| 30 – 90ms | 10 – 20ms |

### AC mechanical endurance
30 million operations

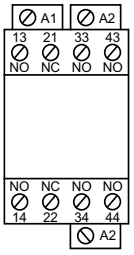
### DC mechanical endurance
30 million operations

# Technical data
## Terminal marking and positioning
## Type N

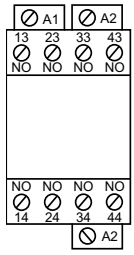
### N control relays
### Pole configuration schematics



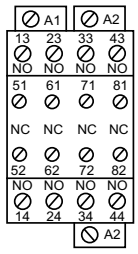

**N22E**




**N31E**

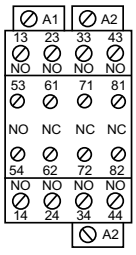



**N40E**

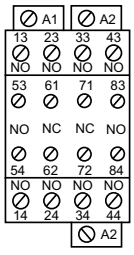



**N44E**

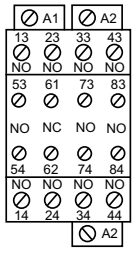




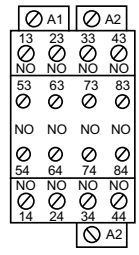

**N53E**



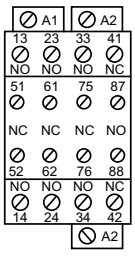

**N62E**



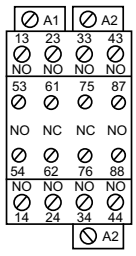

**N71E**




**N80E**

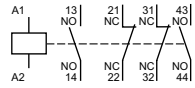



**N33/11**

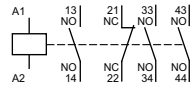



**N51/11**

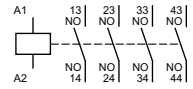
### 4 Pole control relay




**N22E**

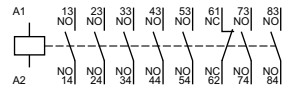



**N31E**

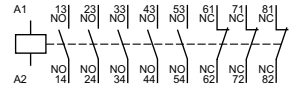



**N40E**

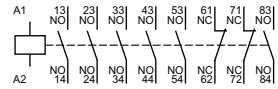
### 4 Pole control relay with 4 pole adder deck



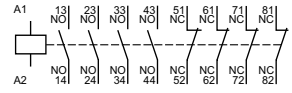

**N71E**



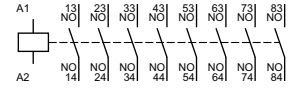

**N53E**



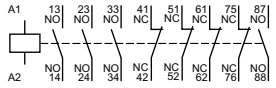

**N62E**



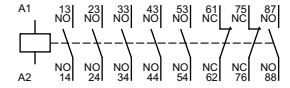

**N44E**




**N80E**

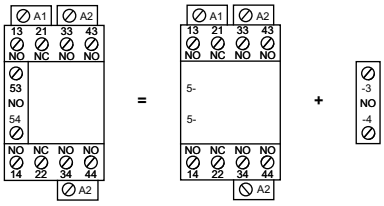



**N31/11**

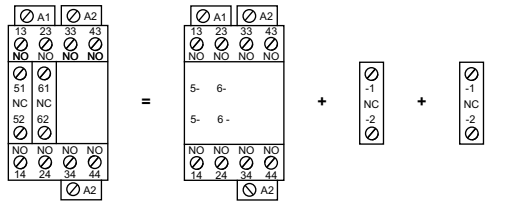



**N51/11**

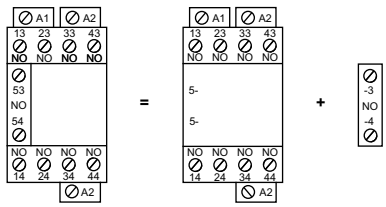
### Other possible contact combinations with auxiliary contacts added by the user



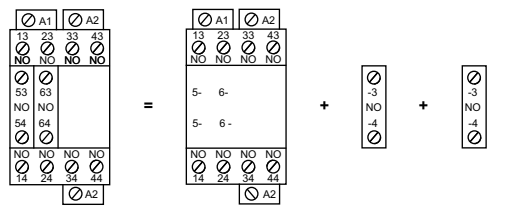

**Combination 41 E = N 31 E + CA5-10**



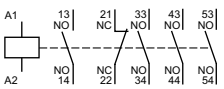

**Combination 42 E = N 40 E + CA5-01 + CA5-01**



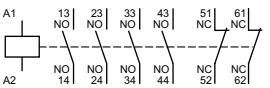

**Combination 50 E = N 40 E + CA5-10**



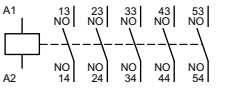

**Combination 60 E = N 40 E + CA5-10 + CA5-10**



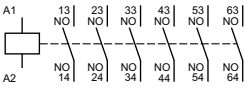

**Combination 41 E**




**Combination 42 E**



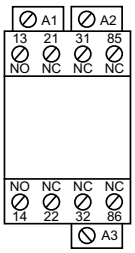

**Combination 50 E**



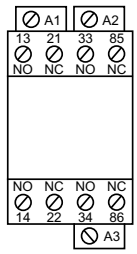

**Combination 60 E**

## NE control relays

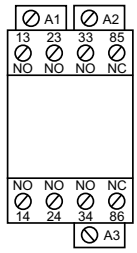
### Pole configuration schematics



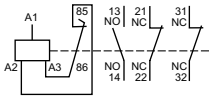

**NE12E**



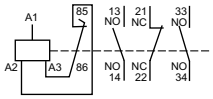

**NE21E**



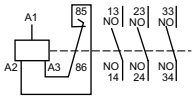

**NE30E**




**NE12E**




**NE21E**

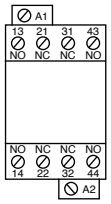



**NE30E**

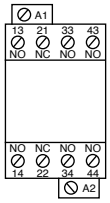
7

# Technical data
## Terminal marking and positioning
## Type NL & TNL

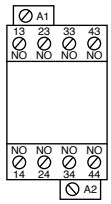
### Standard devices without addition of auxiliary contacts



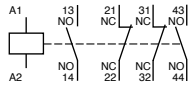

**NL22E**
**TNL22E**



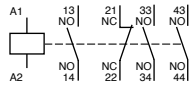

**NL31E**
**TNL31E**




**NL40E**
**TNL40E**

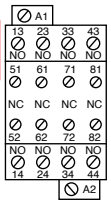



**NL22E**
**TNL22E**

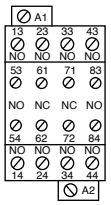



**NL31E**
**TNL31E**

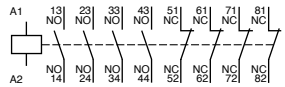

**NL40E**
**TNL40E**



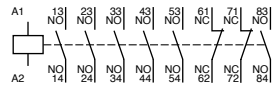

**NL44E**
**TNL44E**




**NL62E**
**TNL62E**

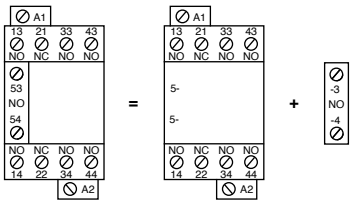



**NL44E**
**TNL44E**

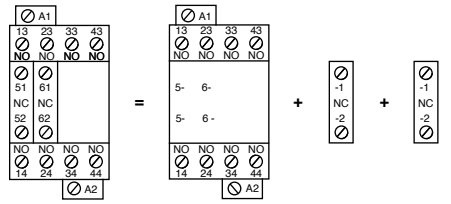



**NL62E**
**TNL62E**

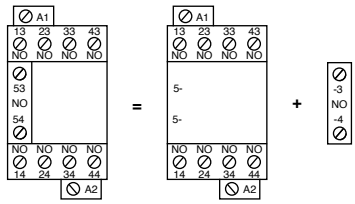
### Other possible contact combinations with auxiliary contacts added by the user



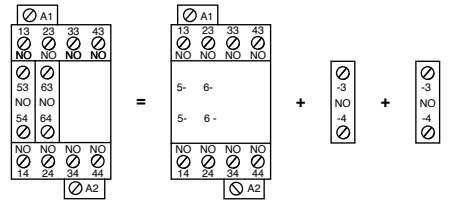

**Combination 41E** = **NL31E TNL31E** + **CA5-10** + **CA5-10**



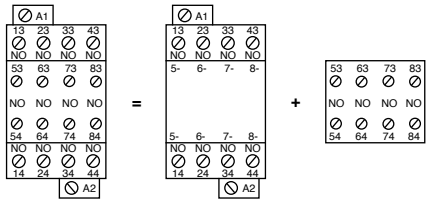

**Combination 42 E** = **NL40E TNL40E** + **CA5-01** + **CA5-01** + **CA5-01** + **CA5-01**



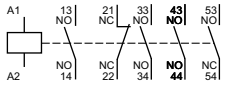

**Combination 50E** = **NL40E TNL40E** + **CA5-10** + **CA5-10**



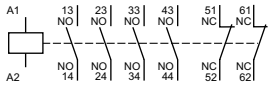

**Combination 60 E** = **NL40E TNL40E** + **CA5-10** + **CA5-10** + **CA5-10** + **CA5-10**



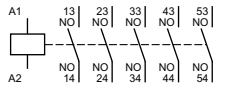

**Combination 80E** = **NL40E TNL40E** + **CA5-40E** + **CA5-40E**



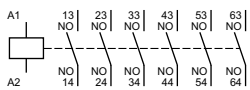

**Combination 41 E**




**Combination 42 E**




**Combination 50 E**




**Combination 60 E**

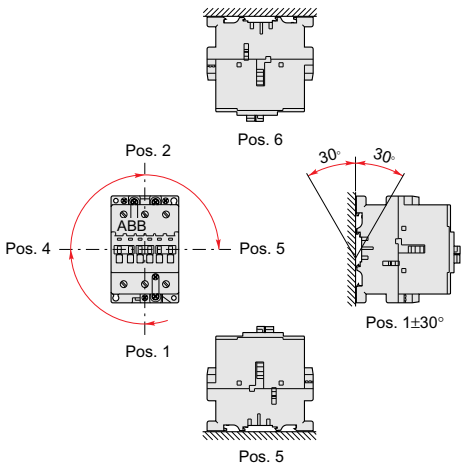

**Combination 80 E**

# Technical data
## IEC

| Type | NE12, NE 21, NE 30 | N22, N31, N40 | N44, N53, N62, N71, N80 | NL22, NL31, NL40 | NL44, NL62 |
|---|---|---|---|---|---|
| **Number of poles** | 3 | 4 | 8 | 4 | 8 |
| **Insulation characteristics** | | | | | |
| **Rated insulation voltage $U_i$** | | | | | |
| acc. to IEC947-5-1 and VDE0110 (Gr. C) **V** | | | 690 | | |
| acc. to UL/CSA **V** | | | 600 | | |
| **Rated impulse withstand voltage $U_{imp}$** | | | | | |
| acc. to IEC947-5-1 **kV** | | | 8 | | |
| **General technical data** | | | | | |
| **Standards** | Devices complying with international standards IEC947-5-1/947-4-1 and European standards EN60 947-5-1/60 947-4-1 Electromagnetic compatibility (EMC) according to amendment A11 to IEC947-1; EN60 947-1 and amendment 2 to IEC947-4-1 | | | | |
| **Air temperature** near contactor | | | | | |
| — for operation in free air: **°C** | -40 to +55 (0.85 – 1.1 $U_c$) / +55 to +70 ($U_c$) | | | | |
| — for storage: **°C** | -60 to +80 | | | | |
| **Climatic withstand** | according to IEC68-2-30 and 68-2-11 – UTE C63-100, Specification II | | | | |
| **Mounting positions** | Positions 1 to 5 - $\theta \leq 55°C$ : 0.85 – 1.1<br>- $\theta = 55$ - 70°C : | | | | |
| (see diagrams below) | Position 6 - $\theta \leq 55°C$ : 0.95 – 1.1<br>- $\theta > 55°C$ : not acceptable | | | unauthorized | |
| **Operating altitude** **m** | $\leq$ 3000 | | | | |
| **Shock withstand** according to IEC 68-2-27 and EN 60068-2-27 Mounting pos. 1 (see below) | 1/2 sinusoidal shock, 11ms: no change in contact position<br>Shock direction: A, C1, C2 : 20 g<br>B1 : 5 g<br>B2 : 15 g | | | | |
| **Mounting** | | | | | |
| — on mounting rail | 35mm according to IEC715 and EN50022 | | | | |
| — with screws (not supplied) | 2 x M4 | | | | |
| **Connection terminals** (delivered in open position, screws of unused terminals must be tightened) | M 3.5 (+,-) posidrive 2 screw with cable clamp | | | | |
| **Connection capacity** | | | | | |
| Rigid solid **1 x AWG** | 16 – 12 | | | | |
| **2 x AWG** | 16 – 12 | | | | |
| **Degree of protection** according to IEC529, IEC947-1 and EN60529 | | | | | |
| — Pole terminals | IP20 | | | IP20 | |
| — Coil terminals | IP20 | | | IP20 | |

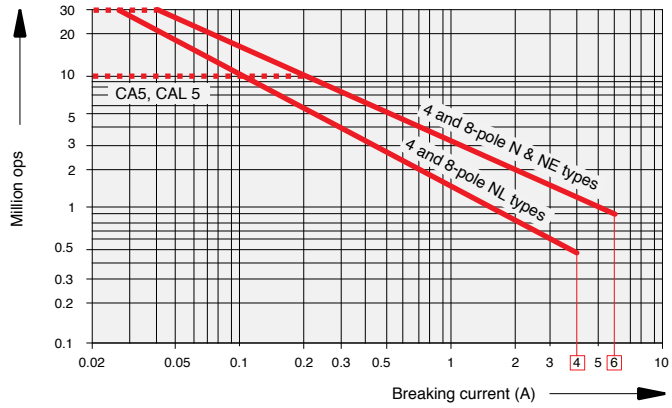


## Mounting positions




**Electrical durability** of contacts
utilization category AC – 15 according to IEC947-5-1
making current: 10 x $I_e$ with cos $\phi$ = 0.7 and $U_e$
breaking current: $I_e$ with cos $\phi$ = 0.4 and $U_e$

The curves opposite show the electrical durability of the control relays as well as the add-on auxiliary contact blocks in relation to the breaking current $I_c$. These curves have been drawn for resistive and inductive loads up to 690V, 40 – 60 Hz.



# Technical data
## IEC

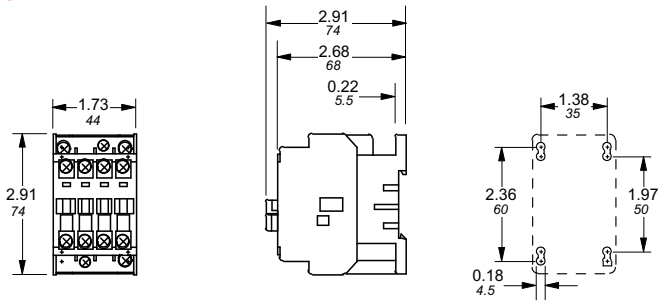
| Type | | | NE12, NE21, NE30 | N22, N31, N40 | N44, N53, N62, N71, N80 | NL22, NL31, NL40 | NL44, NL62 |
|---|---|---|---|---|---|---|---|
| **Number of poles** | | | 3 | 4 | 8 | 4 | 8 |
| **Pole utilization characteristics** | | | | | | | |
| **Rated operational voltage $U_e$** | | V | 690 | | | | |
| **Conventional thermal current in free air $I_{th}$** | | | | | | | |
| according to IEC947-5-1 | $\theta \leq 40°C$ | A | 16 | | | 16 | |
| **Rated operating current $I_e$** | | | | | | | |
| in AC-15 according to IEC947-5-1 | | | | | | | |
| 24 – 127 V 50/60 Hz | | A | 6 | | | 6 | |
| 230 – 240 V 50/60 Hz | | A | 4 | | | 4 | |
| 400 – 415 V 50/60 Hz | | A | 3 | | | 3 | |
| 500 V 50/60 Hz | | A | 2 | | | 2 | |
| 690 V 50/60 Hz | | A | 2 | | | 2 | |
| in DC-13 according to IEC947-5-1 | | | | | | | |
| 24VDC | | A/W | 6/144 | | | 6/144 | |
| 48VDC | | A/W | 2.8/134 | | | 2.8/134 | |
| 72VDC | | A/W | 1/72 | | | 1/72 | |
| 125VDC | | A/W | 0.55/69 | | | 0.55/69 | |
| 250VDC | | A/W | 0.3/75 | | | 0.3/75 | |
| **Field of rated frequencies** | | Hz | 25 – 400 | | | | |
| **Mechanical durability** in operating cycles | | | 10 million | > 20 million | | 30 million | |
| Max. switching frequency | | cycles/h | 3000 | 6000 | | 6000 | |
| **Electrical durability** in operating cycles | | | | | | | |
| Max. switching frequency | | cycles/h | 1200 | | | | |
| Rated making capacity according to IEC947-5-1 | | | 10 x $I_e$ /AC-15 | | | | |
| Rated breaking capacity according to IEC947-5-1 | | | 10 x $I_e$ /AC-15 | | | | |
| **gG (gl) protection fuse** | | A | 10 | | | | |
| **Rated short time withstand current** | | | | | | | |
| at ambient temp. of 40 °C, | 1.0 s | | 100A | | | 50A | |
| in free air, from cold state | 0.1 s | | 140A | | | 100A | |
| **Insulation resistance at 500 VDC** | | | after durability test: 5 MΩ | | | | |
| **Min. switching capacity** | | | | | | | |
| with failure rate below $10^{-6}$ | | | 17V / 5mA | | | 24V / 5mA | |
| **Non overlapping time between N.O. and N.C. contacts** | | ms | ≥ 2 | | | | |
| **Power loss per pole at 6A** | | W | 0.10 | | | 0.15 | |
| **Magnet system characteristics** | | | | | | | |
| **Coil operating limits** $\theta \leq 40°C$ | | | according to IEC 947-5-1 : 0.85 - 1.1 $U_c$ | | | | |
| **Drop out voltage in % of $U_c$** | | | 10 – 30% | roughly 40 – 65% | | roughly 10 – 30% | |
| **Coil consumption** (average value) | | | | | | | |
| — a.c. operation: 50 Hz pull in | | VA | — | 70 | | — | |
| 60 Hz pull in | | VA | — | 80 | | — | |
| 50/60 Hz① pull in | | VA/VA | — | 74/70 | | — | |
| 50/60Hz holding | | VA/W | — | 8/2 | | — | |
| — d.c. operation: cold pull in | | W | 90 | — | | 3 | |
| warm holding | | W | 2 | — | | 3 | |
| **Rated control voltage $U_c$** | | | | | | | |
| — AC operation: 50/60 Hz | | V | — | 20 – 690 | | — | |
| — DC operation: | | VDC | 12 – 250 | — | | 12 – 240 | |
| **Max. permissible short supply interruption** | | | | | | | |
| without opening of contacts | | ms | 2 | 2 | | 2 | |
| **Operating time** | | | | | | | |
| between coil energization and: | | | | | | | |
| — closing of N.O. contact | | ms | 10 – 16 | 10 – 26 | | 100 | |
| — opening of N.C. contact | | ms | 8 — 12 | 7 – 21 | | 20 – 70 | |
| between coil de energization and: | | | | | | | |
| — opening of N.O. contact | | ms | 5 — 14 | 4 – 11 | | 10 – 17 | |
| — closing of N.C. contact | | ms | 11 — 17 | 9 – 16 | | 16 – 27 | |

① 50/60 Hz coils: voltage codes 80 to 88, see page 7.5.

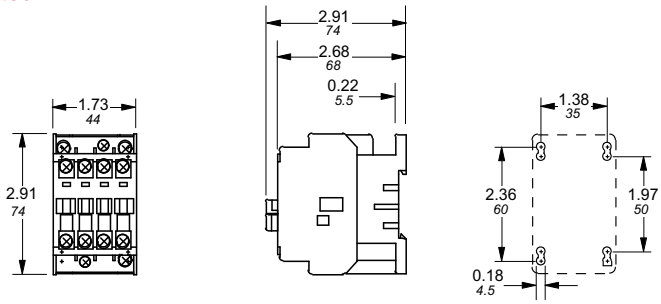
# Approximate dimensions
## Type N, NE, NL, & TNL
## AC & DC operated

00.00 / 00.00 Inches [Millimeters]

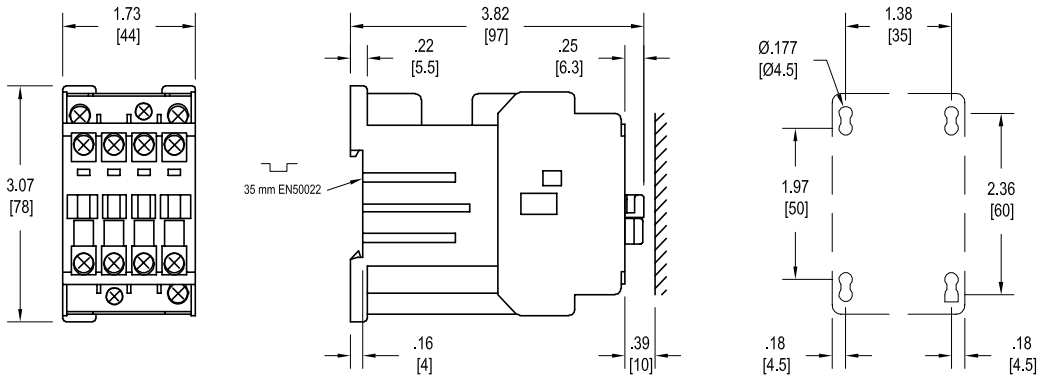
### Type N, 4 Pole, AC operated




### Type NE, 4 Pole, DC operated

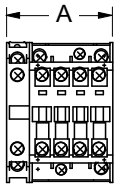



### Type NL, TNL

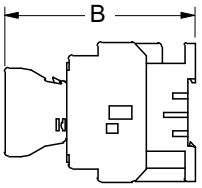


# Approximate dimensions
## Accessories for Type N & NE

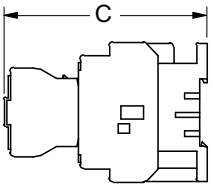
**N & NE**




SIDE MOUNTED AUXILIARY

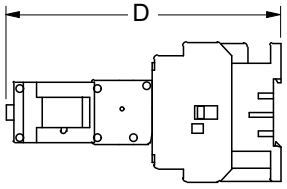



SINGLE POLE TOP MOUNTED AUXILIARY

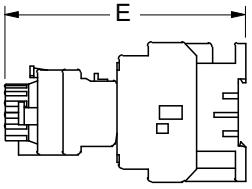



FOUR POLE TOP MOUNTED AUXILIARY

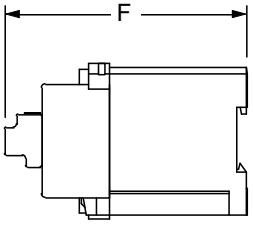





ON-POSITION LATCH




PNEUMATIC TIMER

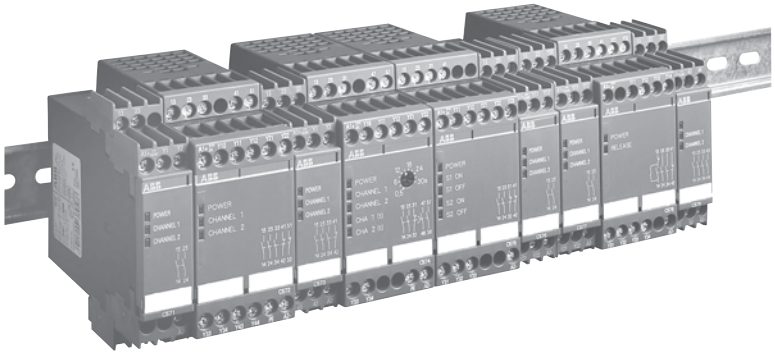



MECH INTERLOCK D.C. OPERATED

| Type | | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| N | IN | 2.20 | 3.96 | 4.21 | 5.71 | 5.00 | — |
| | *MM* | *56* | *100.5* | *107* | *145* | *127* | — |
| NE | IN | 2.20 | 3.96 | 4.21 | 5.71 | 5.00 | — |
| | *MM* | *56* | *100.5* | *107* | *145* | *127* | — |

Electronic
Safety relays





## Description

The C57x series covers 10 safety relays which perform safety functions on machines. Their fields of application extend from emergency-stop circuits through guard door monitoring functions and tread mats to presses and punches. All C57x products are UL Listed, CSA approved and bear the CE Mark.
All safety relays can be used on the basis of their classification into the risk categories to EN 954-1, they are approved by the employers' liability insurance associations and/or the German Technical Inspection Authority (TÜV) and comply with the requirements of EN 60204, Part 1.
Redundancy is achieved by series-connection of two N.O. contacts. These N.O. contacts are located in two mutually independent, positive-action, all-or-nothing relays which monitor each other by means of a special-purpose circuit.
Diversity is provided thanks to the combination of N.C. contact and N.O. contact. Cyclic monitoring of the safety circuit in each On/Off cycle ensures maximum reliability.
Thanks to the two-channel control and/or control which is immune to shorts across contacts, it is also possible to monitor signalling devices such as emergency-stop buttons or limit switches of the guard doors. This ensures the required level of safety even on systems subject to a high level of pollution.
In the event of a fault or error, the safe state of the system is achieved directly after opening the safety contacts. These enable circuits are N.O. contacts which open reliably in the event of fault or error and thus reliably switch off the potentially hazardous drives or machines.
Additional signalling contacts, N.C. contacts which close in the event of a fault or error or semiconductor outputs, are available, depending on the type of equipment.
Easy, reliable and fast wiring is achieved by a clear and manageable terminal designation system. This allows wiring errors to be minimized.
In addition to all these safe features, the C57x safety relays correspond to the product design of ABB's range of switchgear and control systems. They fit in perfectly with the overall design of the switch cabinet.

# Type C570

C570

| Voltage range | | Output contacts | | | Safety category | Weight (oz.) | Piece per unit | Catalog number | List price |
|---|---|---|---|---|---|---|---|---|---|
| 50/60Hz | VDC | Enable contacts: Instantaneous | Enable contacts: Time delay | Auxiliary | | | | | |
| — | 24VDC | | | | | | | 1SAR501042R0003 | **$ 870** |
| 24VAC | — | 4 N.O. | — | 1 N.C. | 3 | 33.86 | 1 | 1SAR501042R0002 | |
| 110VAC | — | | | 1 N.O. | | | | 1SAR501042R0004 | |
| 230VAC | — | | | | | | | 1SAR501042R0005 | |

## Description

- Single channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for power and operation
- Output: 4 N.O. and 1 N.O. & 1 N.C. positively driven
- Overall width: 75mm

## Application

The safety relay can be used to monitor Emergency Stop circuits and for monitoring of other protective devices (i.e., safety gates).

# Type C571

C571

| Voltage range | | Output contacts | | | Safety category | Weight (oz.) | Piece per unit | Catalog number | List price |
|---|---|---|---|---|---|---|---|---|---|
| 50/60Hz | VDC | Enable contacts: Instantaneous | Enable contacts: Time delay | Auxiliary | | | | | |
| 24VAC | 24VDC | 2 N.O. | — | — | 3, (4)① | 8.47 | 1 | 1SAR501020R0001 | $ 280 |
| | 24VDC | 2 N.O. | | | 3, (4)① | | | 1SAR501020R0003 | |
| 115 VAC | — | 2 N.O. | | | 3, (4)① | | | 1SAR501020R0004 | |
| 230 VAC | — | 2 N.O. | | | 3, (4)① | | | 1SAR501020R0005 | |

## Description

Emergency Stop monitor and safety gate monitor C571

- Auto-start / monitored start
- Operating voltage Vc at Emergency Stop button or limit switch
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1 and 2
- Safety outputs: 2 N.O. contacts, positively guided
- Width of enclosure: 22.5mm

## Application

Use the safety control gears C571/C573 in Emergency Stop devices as per EN418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), e.g., with moveable covers and guard doors. Depending on the external connections, categories 3 and 4 (with additional external measures) as per DIN EN 954-1 are achievable.

① Possible with additional external measures. The digit in parenthesis applies only if the cables and sensors are laid safely and protected mechanically.

# Type C572

C572

| Voltage range | | Output contacts | | | Safety | Weight | Piece | Catalog | List |
|---|---|---|---|---|---|---|---|---|---|
| | | Enable contacts | | Auxiliary | | | | | |
| 50/60Hz | VDC | Instan-taneous | Time delay | | category | (oz.) | per unit | number | price |
| — | 24VDC | — | — | — | 4 | 0.360 | 1 | 1SAR501032R0003 | **$ 520** |
| 24VAC | — | 3 N.O. | — | 2 N.C. | | 0.450 | | 1SAR501032R0002 | |
| 110VAC | — | 3 N.O. | — | 2 N.C. | | 0.450 | | 1SAR501032R0004 | |
| 230VAC | — | 3 N.O. | — | 2 N.C. | | 0.360 | | 1SAR501032R0005 | |

## Description

Emergency Stop monitor and safety gate monitor C572

- Auto-start / monitored start
- 24 VDC at Emergency Stop button or limit switch
- Cross-short circuit detection at Emergency Stop button or limit switch
- Feedback loop for monitoring of external contactors
- LED indicators for power, channel 1 and 2
- Safety outputs: 3 NO contacts positively guided
- Signalling contacts: 2 NC contacts positively guided
- Width of enclosure: 45mm

## Application

Use safety control gear C572 in Emergency Stop devices as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), e.g. with moveable covers and guard doors. Depending on the external connection, safety category 4 as per DIN EN 945-1 is achievable with this device.

# Type C573

C573

| Voltage range | | Output contacts | | | Safety category | Weight (oz.) | Piece per unit | Catalog number | List price |
|---|---|---|---|---|---|---|---|---|---|
| | | Enable contacts | | Auxiliary | | | | | |
| 50/60Hz | VDC | Instan-taneous | Time delay | | | | | | |
| 24VAC | 24VDC | 3 N.O. | — | 1 N.C. | 3, (4)① | 8.47 | 1 | 1SAR501031R0001 | **$ 340** |

## Description

- Operating voltage $U_e$ at Emergency-Stop button or limit switch
- Single or two-channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for Power, Channels 1 and 2
- Output: 3NO and 1 NC positively driven
- Overall width: 45mm

## Application

The safety relays C571/C573 can be used in Emergency Stop circuits as per EN 418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), i.e., with movable covers and guard doors. Depending on the external connections, categories 3 and 4 (with additional external measures) as per DIN EN 954-1 are achievable.

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① Possible with additional external measures. The digit in parenthesis applies only if the cables and sensors are laid safely and protected mechanically.

# Type C574

C574



| Voltage range | | Output contacts | | | Safety | Weight | Piece | Catalog | List |
|---|---|---|---|---|---|---|---|---|---|
| | | Enable contacts | | Auxiliary | | | | | |
| 50/60Hz | VDC | Instan-taneous | Time delay | | category | (oz.) | per unit | number | price |
| — | 24VDC | | | | | | | 1SAR503041R0003 | |
| 24VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4) ① | 15.87 | 1 | 1SAR503041R0002 | **$ 675** |
| 110VAC | — | | | | | | | 1SAR503041R0004 | |
| 230VAC | — | | | | | | | 1SAR503041R0005 | |

## Description

Emergency Stop switching device and safety door monitor with time delay C574

- Single or two-channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for Power, Channels 1 and 2, delayed channel 1/2
- Release time adjustable steplessly up to 30 s
- Output: 2 NO, 1 NC, 2 NO time-delayed
- Overall width: 45 mm

## Application

The safety relay C574 can be used in Emergency Stop devices as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), such as for monitoring safety gates, or in circuits with controlled stand-still requirement (Stop Category 1). Depending on the external circuitry, this device can be used to realize Safety Category 4 instantaneous release circuits and Safety Category 3 delayed release circuits according to DIN EN 954-1.

**• Delay time, 0.5 to 30 s stepless adjustment**
**• Auto-start**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| — | 24VDC | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 15.17 | 1 | 1SAR503141R0003 | |
| 24VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 21.16 | 1 | 1SAR503141R0002 | |
| 110VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 21.16 | 1 | 1SAR503141R0004 | **$ 675** |
| 230VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 15.17 | 1 | 1SAR503141R0005 | |

**• Delay time, 0.05 to 3 s stepless adjustment**
**• Monitoring-start**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| — | 24VDC | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 15.17 | 1 | 1SAR533241R0003 | |
| 24VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 21.16 | 1 | 1SAR533241R0002 | |
| 110VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 21.16 | 1 | 1SAR533241R0004 | **$ 675** |
| 230VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 15.17 | 1 | 1SAR533241R0005 | |

**• Auto-start**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| — | 24VDC | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 15.17 | 1 | 1SAR533141R0003 | |
| 24VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 21.16 | 1 | 1SAR533141R0002 | |
| 110VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 21.16 | 1 | 1SAR533141R0004 | **$ 675** |
| 230VAC | — | 2 N.O. | 2 N.O. | 1 N.C. | 3, (4)① | 15.17 | 1 | 1SAR533141R0005 | |

① Possible with additional external measures. The digit in parenthesis apply only if the cables and sensors are laid safely and protected mechanically.

# Type C575

C575

| Voltage range | | Output contacts | | | Safety | Weight | Piece | Catalog | List |
|---|---|---|---|---|---|---|---|---|---|
| | | Enable contacts | | Auxiliary | | | | | |
| 50/60Hz | VDC | Instan-taneous | Time delay | | category | (oz.) | per unit | number | price |
| —<br>24VAC<br>110VAC<br>230VAC | 24VDC<br>—<br>—<br>— | 2 N.O. | — | 2 N.C. | 4 | 12.35 | 1 | 1SAR504022R0003<br>1SAR504022R0002<br>1SAR504022R0004<br>1SAR504022R0005 | **$ 780** |

## Description

Two-hand control C 575

- For activating presses (e.g. in conjunction with overtravel monitor C 578)
- 24 V DC at the two-hand control switches
- Feedback circuit for monitoring external contactors
- 5 LED circuit state indicators for Power, S1 ON, S1 OFF, S2 ON, S2 OFF
- Simultaneity monitoring: 0.5 s
- Output: 2 NO, 2 NC positively driven
- Overall width: 45 mm

## Application

C575 is suitable for installation in controls for presses.

- Hydraulic presses DIN EN 693
- Eccentric and related presses EN 692
- Screw presses EN 692

# Type C576

C575

| Voltage range | | Output contacts | | | Safety | Weight | Piece | Catalog | List |
|---|---|---|---|---|---|---|---|---|---|
| | | Enable contacts | | Auxiliary | | | | | |
| 50/60Hz | VDC | Instan-taneous | Time delay | | category | (oz.) | per unit | number | price |
| 24VAC | 24VDC | 2 N.O. | — | — | 4 | 8.47 | 1 | 1SAR501120R0001 | **$ 350** |

## Description

Emergency Stop switching device and safety door monitor C 576

- Cross-short detection at the EMERGENCY-STOP button or limit switch
- 24 V DC at the EMERGENCY-STOP button
- Single or two-channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for Power, Channel 1, Channel 2 and Power
- Output: 2 NO
- Auto-start
- Overall width: 22.5 mm

## Application

The safety relay C576 can be used in safety circuits as per VDE 0113 Part 1 (11.98) or EN 60 204-1 (11.98), i.e., with movable covers and safety gates; the safety relay C577 in Emergency Stop circuits as per EN 418. Depending on external connections, category 4 as per DIN EN 954-1 is achievable.

# Type C577

C575

| Voltage range | | Output contacts | | | Safety category | Weight (oz.) | Piece per unit | Catalog number | List price |
|---|---|---|---|---|---|---|---|---|---|
| | | Enable contacts | | Auxiliary | | | | | |
| 50/60Hz | VDC | Instan-taneous | Time delay | | | | | | |
| 24VAC | 24VDC | 2 N.O. | — | — | 4 | 8.47 | 1 | 1SAR501220R0001 | **$ 350** |

## Description

Emergency stop switching device and safety door monitor C577
- Cross-short detection at the Emergency Stop button or limit switch
- 24 V DC at the Emergency Stop button
- Single or two-channel connection
- Feedback circuit for monitoring external contactors
- LED indicators for Power, Channel 1, Channel 2 and Power
- Output: 2 NO
- Controlled start
- Overall width: 22.5 mm

## Application

The safety relay C576 can be used in safety circuits as per VDE 0113 Part 1 (11.98), or EN 60 204-1 (11.98) i.e., with movable covers and safety gates; the safety relay C577 in Emergency Stop circuits as per EN 418. Depending on external connections, category 4 as per DIN EN 954-1 is achievable.

# Type C578

C575

| Voltage range | | Output contacts | | | Safety | Weight | Piece | Catalog | List |
|---|---|---|---|---|---|---|---|---|---|
| | | Enable contacts | | Auxiliary | | | | | |
| 50/60Hz | VDC | Instan-taneous | Time delay | | category | (oz.) | per unit | number | price |
| —<br>24VAC<br>110VAC<br>230VAC | 24VDC<br>—<br>—<br>— | 3 N.O. | — | 1 N.C. | 4 | 15.87 | 1 | 1SAR505031R0003<br>1SAR505031R0002<br>1SAR505031R0004<br>1SAR505031R0005 | **$ 910** |

## Description

Overtravel monitor C 578

- Cross-short detection at the EMERGENCY-STOP button or limit switch
- 24 V DC at the EMERGENCY-STOP button
- Feedback circuit for monitoring external contactors
- LED indicators for Power and Enable
- Output: 3 NO and 1 NC positively driven
- Controlled start
- Overall width: 45 mm

## Application

The overtravel distance tester C578 is intended for checking the overtravel of linearly operating hydraulic, pneumatic and spindle presses in accordance with VBG 7n5.2 §11.

# Type C579

C575

| Voltage range | | Output contacts | | | Safety category | Weight (oz.) | Piece per unit | Catalog number | List price |
|---|---|---|---|---|---|---|---|---|---|
| | | Enable contacts | | Auxiliary | | | | | |
| 50/60Hz | VDC | Instan-taneous | Time delay | | | | | | |
| 24VAC<br>110VAC<br>230VAC | — | 4 N.O. | — | — | — | 8.47 | 1 | 1SAR502040R0001<br>1SAR502040R0004<br>1SAR502040R0003 | **$ 390** |

## Description

Expansion unit for contact expansion of the safety switching devices C 579.
One enable contact of the basic device is required for connection to the expansion unit.

- 4 NO positively driven
- Overall width: 22.5 mm

## Application

You can use the C579 expansion unit in combination with all the C57x basic units. It extends the number of release circuits. Depending on the external connection, category 4 as per DIN EN 954-1 is achievable with this device.

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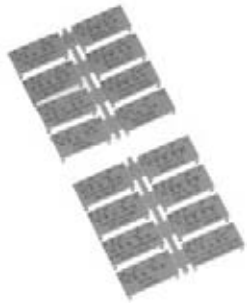
# Accessories
## for Type C560

| Type | Description | Weight (oz.) | Pcs per unit pk | Catalog number | List price |
|---|---|---|---|---|---|
| C560.10 | Cover cap sealable, for protection against unauthorized adjustment | 8.47 | 5 sets | 1SAR390000R1000 | **$ 30** |
| C560.20 | Panel mounting bracket | 8.47 | 5 sets of two pcs ea. | 1SAR390000R2000 | **22** |

# C565-S
## with positively guided contacts

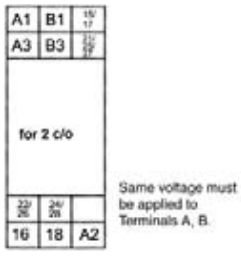
1SAR330030R0000

1SAR390000R2000

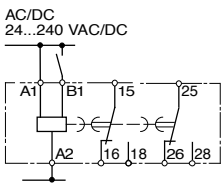


1SAR390000R4000

### Terminal positioning C 565-S




### Circuit diagram C 565-S




## Multifunction time relay – 8 functions④, 15 time ranges, 2 c/o positively guided & gold plated

| Time range with rotary switch can be set to | Supply voltage AC 50/60Hz | Supply voltage DC | Weight (oz.) | Piece per unit | | Catalog number | List price |
|---|---|---|---|---|---|---|---|
| 0.05s - 100h① | 24 - 240V② | 24 - 240V③ | 5.28 | 1 | | 1SAR330030R0000 | **$ 129.00** |

Functions can be set by a rotary switch.
Separate markers allow a clearly legible and distinctive setting of the timing functions.
The markers are available as an accessory.

## Accessories

| Item description | Ident letter | Piece per unit | | Catalog number | List price |
|---|---|---|---|---|---|
| **C560.10, cover sealable**<br>For protecting against unauthorized readjustment | — | 5 | | 1SAR390000R1000 | **$ 30.00** |
| **C560.20, plug-in tab for screw mounting**<br>Mounting on panel | — | 5 with 2 pieces each | | 1SAR390000R2000 | **22.00** |
| **C560.40, Set of labels for multifunction relay C565, full set with 16 functions**<br>ON-delay<br>OFF-delay, with auxiliary voltage<br>ON and OFF-delay, with auxiliary voltage<br>Flascher, starting with OFF<br>Impulse-ON<br>Impulse-OFF, with auxiliary voltage<br>Pulseformer with auxiliary voltage | <br>A<br>B<br>C<br>D<br>E<br>F<br>G | 5 sets | | 1SAR390000R4000 | **42.00** |

① Switch position y no timing. To be used for testing purposes (ON/OFF function) within the installation. When voltage is applied the relay remains energized or remains de-energizes permanently.
② Operating range 0,7 to 1,25 x $U_s$.
③ Operating range 0,85 to 1,1 x $U_s$.
④ The c/o contacts are operated simultaneously, so that 8 functions can be selected (no Ym, no instantaneous contact)
⑤ Positively guided: N/C and N/O contacts are never closed both, contact distance of 22.5mm is guaranteed, minimum switching load 12V, 3mA.

## Technical data

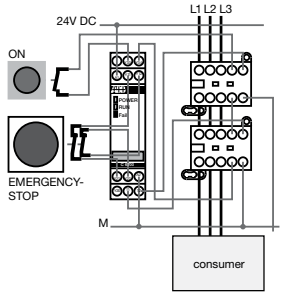
| Time relay | | | C 565-S |
|---|---|---|---|
| **Mechanical service life** | | operations | 30 x $10^6$ |
| **Rated insulated voltage (Pollution degree 3)**<br>**Overvoltage categorie III acc. to DIN VDE 0110** | | AC V | 300 |
| **Permissible ambient temperature** | during operation<br>storage | °C<br>°C | – 25 to + 60<br>– 40 to + 80 |
| **Operating range of excitation** ① | | | 0.85 to 1.1 x $U_s$ with AC; 0.8 to 1.25 x $U_s$ with DC<br>0.95 to 1.05 times rated frequency |
| **Rated power**<br>at AC 230V, 50 Hz | | W<br>VA | 2<br>6 |
| **Rated operating currents $I_e$**<br>Output relay | AC-15 at AC 230V, 50 Hz<br>AC-140; DC-13<br>DC-13 at DC 24V<br>DC-13 at DC 48V<br>DC-13 at DC 60V<br>DC-13 at DC 110V<br>DC-13 at DC 230V | A<br>—<br>A<br>A<br>A<br>A<br>A | 3 ③<br>—<br>1<br>0.45<br>0.35<br>0.2<br>0.1 |
| **Fusing DIAZED** ② [Utilization category gL/gG] | | A | 4 |
| **Switching frequency**<br>when loaded with $I_e$, AC 230V<br>when loaded with contactors B6, B7, AC 230 V | | <br>1/h<br>1/h | <br>2500<br>5000 |
| **Recovery time** | | ms | 150 ④ |
| **Minimum ON period** | | ms | 35 |
| **Setting tolerance** referred to full scale value | | typically ± 5% | |
| **Repeat accuracy** | | | ≤ ± 1% |
| **Enclosure**<br>acc. to DIN EN 60 529 | | | IP 20 terminals<br>IP 40 covers |
| **Wire size** | single-core<br>stranded with wire end ferrule<br>single-core or stranded | mm/in.<br>mm¨<br>AWG | 1 x (0.5 – 4)<br>2 x (0.5 – 2.5)<br>1 x (0.5 – 2.5)<br>2 x (0.5 – 1.5)<br>2 x (20 – 14) |
| **Terminal screws** | for normal screw-driver size 3 and Pozidrive 2 | | M 3.5 |
| **Permissible normal position** | | | any |
| **Resistance to shock** semi-sinusoidal acc. to IEC 60068-2-27 | | g/ms | 15/11 |
| **Vibrostability** acc. to IEC 60068-2-6 | | Hz/mm | 10-55 / 0,35 |
| **EMV-tests** by basic specification | | | EN 50081-1<br>EN 50082-2 |

① Unless otherwise specified
② Without any welding as per IEC 60947-5-1.
③ For C565-S; open $I_e$=1A
④ Wide range voltage power pack; voltage dependent 10 to 250 ms.

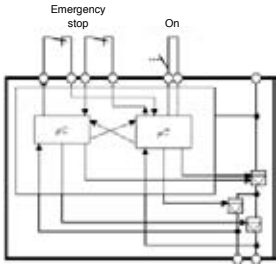
# C6700 - C6702
## with solid state output

- Solid-state control of actuators, therfore no wear
- No contact failure at currents of 17V, 1mA
- Short circuit proof
- High switching frequencies
- 24VDC sensor supply
- Economical

Internal standard circuit diagram of a safe circuit in accordance to C 6700




Internal standard circuit diagram of safety relay C 6701with solid-state output.




## Electronic safety relays with solid-state output C 67xx

- Solid-state outputs – no contacts – no wear
- Low weight & small size – Space and weight advantage
- Positively guided standard contactors operate as switching elements

C 67xx safety relays are solely used to monitor the sensors connected (e.g. limit switches resp. EMERGENCY-STOP-buttons) and actuators (positively guided standard contactors).

The basic unit C 6700 itself does not feature safe outputs. Only when the unit is used together with positively guided actuators (e.g. contactors B6, B7) the complete circuit fulfills up to category 3 to EN 954-1.
Us = 24VDC; Ue = 24VDC; Ie = 0.5ADC 13.

The safety relay C 6701 with solid-state outputs can be used directly to switch off connected devices up to category 3 or 4 to EN 954-1. Us = 24VDC; Ue = 24VDC; Ie = 1.5ADC 13.

The safety relay C 6702 with solid-state outputs can also be used to directly switch off connected devices up to category 3 to EN 954-1 and stop categories 0 and 1 at a width of 22.5 mm only.
Time delay settable from 0.05-3 or 0.5-30s. Us = 24VDC; Ue = 24VDC; Ie = 1.5ADC 13.

| Type | Supply voltage $V_c$ | Package unit piece | Weight 1 piece kg/lb | | Catalog number | List Price |
|---|---|---|---|---|---|---|
| C 6700<br>C 6701<br>C 6702<br>C 6702 | 24VDC | 1 | 0.150/0.33 | | 1SAR510120R0003<br>1SAR511320R0003<br>1SAR543320R0003<br>1SAR513320R0003 | **Consult factory** |

## Technical data

| | C 6700 | C 6701 | C 6702 |
|---|---|---|---|
| Permissible ambient temperature $T_U$ | -25...+60 °C / -40...+80 °C | | |
| Operation / storage | IP40, IP20 at terminals | | |
| Degree of protection acc. to EN 60 529 | 50V | | |
| Rated insulation voltage $V_i$ | | | |
| Rated impulse withstand voltage $V_{imp}$ | 500V | 2kV | 2kV |
| Rated control supply voltage $V_S$ | 24VDC | 24VDC | 24VDC |
| Rated power consumption | 1.5W | 1.3W | 1.3W |
| Operational voltage range | 0.9...1.15 x $V_S$ | 0.9...1.15 x $V_S$ | 0.9...1.15 x $V_S$ |
| Shock resistance (half-sine) acc. to IEC 60068 | 8g/10ms | 8g/10ms | 8g/10ms |
| Weight | 150g/0.33lb | 150g/0.33lb | 150g/0.33lb |
| Recovery time after EMERGENCY STOP | min. 20ms | min. 30ms | min. 30ms |
| Recovery time after power failure | — | 7 s | — |
| Release time after EMERGENCY STOP | < 30ms | min. 30ms | 30ms / 0.05...3s or 0.5...30s adjustable |
| Recovery time after power failure | max. 25ms | — | — |
| Response time | — | max. 40ms | max. 40ms |
| Response time monitored start | < 125ms | — | — |
| Response time Auto-start | < 250ms | — | — |
| Short circuit protection | no fusing necessary | no fusing necessary | no fusing necessary |

Utilization category acc. to IEC 60947-5-1:

| | | Rated operational voltage $V_e$ | Rated operational current $I_e$ |
|---|---|---|---|
| C 6700 | DC-13 | 24V | 0.5A (per output, 60 °C) |
| C 6701 | DC-13 | 24V | 2.0A |
| C 6702 | DC-13 | 24V | 2.0A |

# Technical data
## C570 - C579

| Type | C570 | C571 | C572 | C573 | C574 | C575 | C576 | C577 | C578 | C579 |
|---|---|---|---|---|---|---|---|---|---|---|
| Single-channel connection<br>2-channel connection<br>Cross-short protection | x<br>-<br>(x)① | x<br>x<br>(x)① | x<br>x<br>x | x<br>x<br>(x)① | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | -<br>-<br>- | x<br>x<br>- |
| Test certificate | BIA, SUVA | BG, SUVA, UL, CSA | | | | | | | | |
| Safety category to EN 954-1 | 2, (3) ① , (4) ① | 3, (4) ① | 4 | 3, (4)① | 4, (3)② | 4 | 4 | 4 | 4 | 4 |
| Mechanical service life | 3 million operations | 10 million operations | | | | | | | | |
| Rated insulation voltage $U_i$<br>Pollution severity 3<br>Overvoltage category III to DIN VDE 0110 | 250 V control circuit<br>400 V output contacts | 300 V | | | | | | | | |
| Rated impulse strength $U_{imp}$<br>Pollution severity 3 | 1.5 kV control circuit<br>4 kV output contacts | 4 kV | | | | | | | | |
| Permissible ambient temperature<br>for operation<br>for storage | <br>-25 to + 55 °C<br>-25 to + 80 °C | <br>-25 to +60 °C (suitable for butt-mounting design)<br>-40 to +80 °C | | | | | | | | |
| Enclosure to EN 60 529 | IP20 | IP20③ | IP20 | IP20③ | IP20 | IP20 | IP20③ | IP20③ | IP20 | IP20③ |
| Shock-hazard protection to VDE 0106 | Safe from finger-touch | Safe from finger-touch | | | | | | | | |
| Rated power<br>DC/AC operation at 1.0 x $U_s$ | 6 W | 1.5 W | 3 W | 1.5 W | 4 W | 3 W | 1.5 W | 1.5 W | 4 W | 1.5 W |
| Operating range<br>AC operation<br>DC operation | <br>0.8 to 1.1 x $U_S$<br>0.8 to 1.1 x $U_S$ | <br>0.85 to 1.1 x $U_S$<br>0.85 to 1.1 x $U_S$ | | | | | | | | |
| Switching frequency | 500/h<br>at AC-15 resp. DC-13 | 1000/h when loaded with $I_e$ | | | | | | | | |
| Resistance to shock | <br>Rectangular shock: 10/5 and 6/10 g/ms<br>Sinusoidal shock: 30/5 and 8/10 g/ms | <br>8 g/10 ms<br>semi-sinusoidal to IEC 60 068 | | | | | | | | |
| Short-circuit protection<br>(non-welding fusing at $I_k$ = 1kA) | Fuse-links for Enable/signalling contacts: l.v.h.b.c., neozed and diazed utilization cats. gL/gG quick-acting<br>Fuse supply C570:<br>Cartridge fuse quick-acting/slow-blow, power circuit bkr. A, B, C-characteristic | Fuse-links l.v.h.b.c. Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE6A<br>Utilisation category gL/gG quick-acting | | | | | | | | |
| Wire ranges<br>Flexible with wire end ferrule<br>Single-core | <br>2 x (0.5-1.5) mm² or 1 x (0.5-2.5) mm²<br>2 x (0.5-2.5) mm² or 1 x (0.5-4) mm² | | | | | | | | | |
| Tightening torque, terminal screw M3.5 | 0.8 to 1.2 Nm | | | | | | | | | |
| Electrical service life at $I_e$ | | 100.000 operations | | | | | | | | |
| Rated operating currents<br>to IEC 60 947-5-1<br>Thermal continuous current $I_{th}$<br>$I_e$/AC-15<br><br>$I_e$/DC-13 | <br>6A<br><br>up to 230 V, 4 A | <br>5A<br>115 V, 5 A<br>230 V, 5 A<br>24 V, 2 A<br>115 V, 0.2 A<br>230 V, 0.1 A | | | | | | | | |
| Continuous current | | Enable circuits: 2FK, 3 FK, 4FK<br>UT 70 °C: 4 A, 3.5 A, 3 A<br>UT 60 °C: 4.5 A, 4 A, 3.5 A<br>UT 50 °C: 5 A, 4.5 A, 4 A | | | | | | | | |
| Mounting positions | any | | | | | | | | | |
| Width / mm | 75 | 22.5 | 45 | 22.5 | 45 | 45 | 22.5 | 22.5 | 45 | 22.5 |

① Possible with additional external measures. The figures in bracket apply only if the cables and sensors are laid safely and protected mechanically.
② Applies only to undelayed FK; category 3 applies to time-delayed FK
③ IP 20 terminals, IP 40 housing

# Application examples
## C6700

## Applications
The C 6700 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to EN 60 204-1 (11.98), e.g. for moving covers and safety gates. Safety catetory 3 according to DIN EN 954-1 or SIL2 according to IEC 61508 can be achieved, depending on the external circuits.

## Functions and connections
The C 6700 safety relay has two solid-state outputs. Three LEDs indicate the operating state and the function. During operation, all internal circuit elements are cyclically monitored for faults.
The EMERGENCY STOP button or the position switch are connected to terminals Y11, 12 or Y21, 22. The ON button is connected in series to the NC contacts of the external actuators (feedback loop) to terminals Y33, 34 .
The C 6700 safety relay and the activated contactors K1 and K2 must have the same frame potential. Safety category 3 to EN 954-1 is achieved only in combination with 2 external actuators with positively driven feedback contacts.

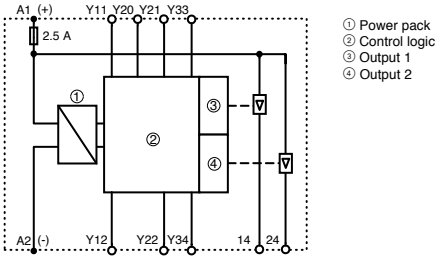


**Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!**

## Terminal marking

| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | M |
| Inputs | Y11, 12 | Channel 1 EMERGENCY STOP or position switch |
| | Y21, 22 | Channel 2 EMERGENCY STOP or position switch |
| | Y20 | Single channel switch |
| | Y33, 34 | ON button, feedback loop |
| Outputs | 14, 24 | Solid-state outputs |

## Internal circuit




## Operation

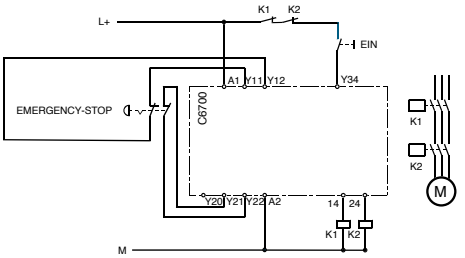
| LEDs | | | Operation | | | |
|---|---|---|---|---|---|---|
| POWER | RUN | FAIL | PS | E-STOP | ON | Outputs |
| ☼ | ☼ | ● | ON | non activated | activated | on |
| ☼ | ● | ☼ | | activated | non activated | off |
| ☼ | ● | ● | | non activated | non activated | off |
| | | | **Faults** | | | |
| ☼ | ● | ☼ | • Defect in electronic<br>• Crossover in EMERGENCY STOP circ. | | | off |
| ● | ● | ● | No supply voltage | | | |

**Fault clearance**
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

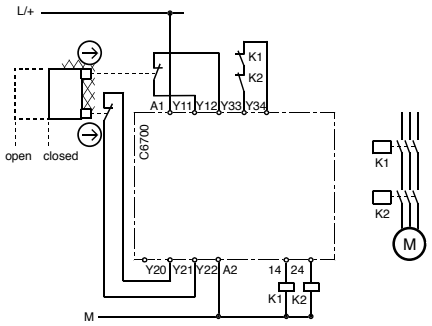
**Cable length**

| | | |
|---|---|---|
| for | 2 x 1.5mm² 150nF/km | max. 2000m total cable length for sensors |

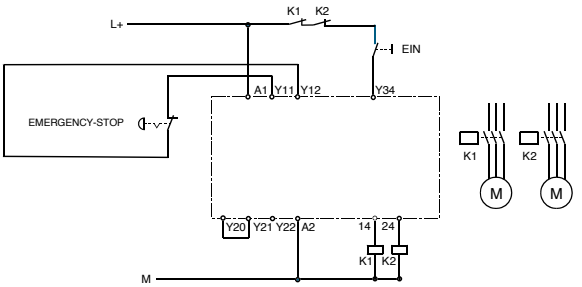
## EMERGENCY STOP, single channel, with monitored start
Category 3/SIL2



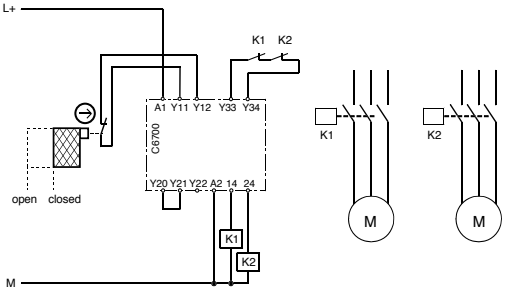

## Two channel autostart for safety gate monitoring
Category 3/SIL2




## EMERGENCY STOP, single channel, with monitored start
Category 2/SIL1




## Single channel autostart for safety gate monitoring
Category 2/SIL1



# Application examples
## C6701

## Application
The C 6701 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to EN 60 204-1 (11.98), e.g. in movable guards and safety gates.
Depending on the external circuit elements, safety category 4 according to DIN EN 954-1 or SIL 3 according to IEC 61508 can be achieved.

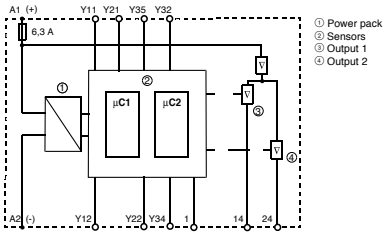
## Functions and connections
The C 6701 safety combination has two reliable solid-state outputs. Three LEDs indicate the operating state and the function.
When the device is put into operation it runs through a self-test to test the correct functioning of the internal electronics. All internal circuit components are monitored for faults cyclically during operation.
The EMERGENCY STOP button and/or the position switches or light arrays are connected to terminals Y11, Y12 and Y21, Y22. The ON button is connected in series with the NC contacts of the external actuators to the supply voltage L+ (24 V DC) and to terminal Y34. The cascading input 1 is connected either via a safe output or directly to the supply voltage L+ (24 V DC).
External actuators or loads can be switched via safe outputs 14, 24.
It must be ensured that the actuators or loads and the C 6701 electronic safety combination have the same frame potential. Paralleling outputs 14 and 24 to increase the load current is not permissible.
If electronic sensors (e.g. light-array monitoring) are used, in single-channel operation, Y35 must be connected to L+ (24VDC).
For autostart operation, Y32 must be connected directly to L+ (24VDC) and Y34 must be connected to it via NC contacts of the external actuators.

⚠ **Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!**

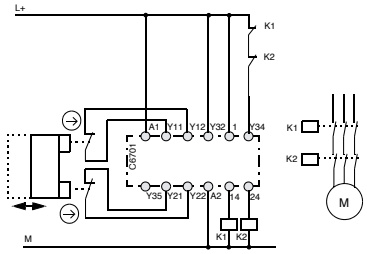
## Terminal marking

| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | M |
| Inputs | Y11, 12 | Channel 1 EMERGENCY STOP or position switch |
| | Y21, 22 | Channel 2 EMERGENCY STOP or position switch |
| | Y35 | With / without cross circuit detection |
| | Y32 | Autostart switch |
| | Y34 | ON button, feedback loop |
| Input | 1 | Cascading input |
| Outputs | 14, 24 | Safe solid state outputs |

## Internal circuit




## Safety gate monitoring, two channel, autostart
Category 4/SIL 3




① Sensor circuits open; Cross circuit between the sensors; Short circuit of sensors to frame
② Only when using circuit variant with "cross circuit detection".

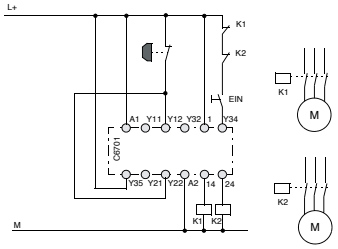
## Operation

| LEDs | | | Operation | | | |
|---|---|---|---|---|---|---|
| POWER | RUN | FAIL | PS | E-STOP | ON | Outputs |
| ☼ | ☼ | ● | ON | non activated | activated | on |
| ☼ | ● | ☼ | | activated ① | non activated | off |
| ☼ | ● | ● | | non activated | non activated | off |
| ☼ | ● | ◑ flashes | on start up self test approx. 7 sec. | | | |
| | | | Fault | | | |
| ☼ | ● | ◑ flashes | Defect in the electronic<br>Change in terminal assignment during operation<br>Short circuit to 24V ② | | | off |
| ● | ● | ● | No supply voltage | | | |

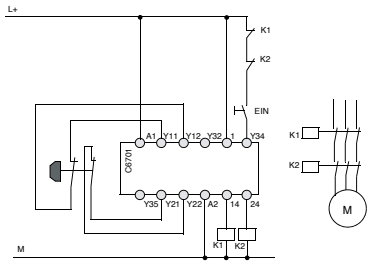
Fault clearance
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

Cable length
for 2 x 1.5mm² 150nF/km max. 2000m total cable length for sensors

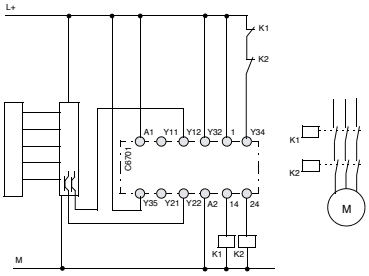
## EMERGENCY STOP, single channel, monitored start
Category 2/SIL 1




## EMERGENCY STOP, two channel, monitored start with additional ON button category — Category 4/SIL3



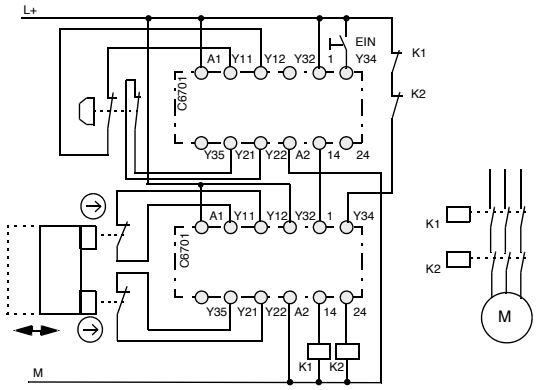

## Light array monitoring, two channel, autostart category,
Category 4/SIL3



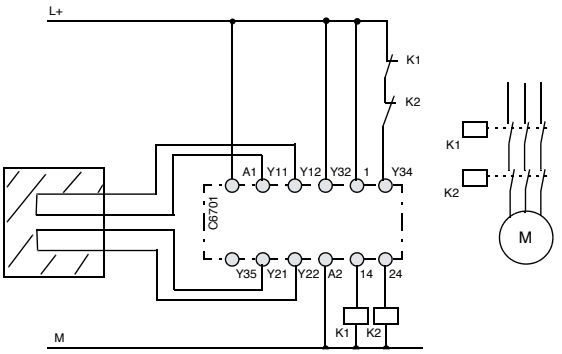
# Application examples
## C6702



### Emergency Stop, two channel, monitored start with additional ON button and safety gate monitoring category 4/SIL 3




### Safety mat, two channel, autostart category 3/SIL 2




### Application

The C 6702 safety combination can be used in EMERGENCY STOP circuits according to EN 418 and in safety circuits according to EN 60 204-1 (11.98), e.g. in movable guards and safety gates. Depending on the external circuit elements, safety category 4 according to DIN EN 954-1 or SIL 3 according to IEC 61508 can be achieved.

### Functions and connections

The C 6702 solid-state safety combination has one safe solid-state output and one time-delayed safe solid-state output. Three LEDs indicate the operating state and the function.
When the device is put into operation it runs through a self-test to test the correct functioning of the internal electronics. All internal circuit components are monitored for faults cyclically during operation.
The EMERGENCY STOP button and/or the position switches or light arrays are connected to terminals Y11, Y12 and Y21, Y22. The ON button is connected in series with the NC contacts of the external.
The cascading input 1 is connected either via a safe output or directly to the supply voltage L+ (24 V DC). External actuators or loads can be switched via safe outputs 14, 28. It must be ensured that the actuators or loads and the C 6702 electronic safety combination have the same frame potential. Paralleling outputs 14 and 28 to increase the load current is not permissible.
If electronic sensors (e.g. light-array monitoring) are used in single-channel operation, Y35 must be connected to L+ (24VDC).
For autostart operation, Y32 must be connected directly to L+ (24VDC) and Y34 must be connected to it via NC contacts of the external actuators.

**⚠ Use a power pack to IEC 60536 safety class III (SELV or PELV) for power supply!**

### Terminal marking

| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | M |
| Inputs | Y11, 12 | Channel 1 EMERGENCY STOP or position switch |
| | Y21, 22 | Channel 1 EMERGENCY STOP or position switch |
| | Y35 | With / without cross circuit detection |
| | Y32 | Autostart changeover switch |
| | Y34 | ON button, feedback circuit |
| Input | 1 | Cascading input |
| Outputs | 14 | Safe solid state output |
| | 28 | Safe solid state output, time delayed |

### Operation

| LEDs | | | Operation | | | |
|---|---|---|---|---|---|---|
| POWER | RUN | FAIL | PS | E-STOP | ON | Outputs |
| ☼ | ☼ | ● | ON | non activated | activated | on |
| ☼ | ● | ☼ | | activated ① | non activated | off |
| ☼ | ● | ● | | non activated | non activated | off |
| ☼ | ◑ flashes | ☼ | | activated | non activated | off/on |
| ☼ | ● | ◑ flashes | on start up self test approx. 7 sec. | | | |
| | | | **Fault** | | | |
| ☼ | ● | ◑ flashes | Defect in electronic<br>Change in terminal assignment during operation<br>Short circuit to 24V ② | | | off |
| ● | ● | ● | No supply voltage | | | |

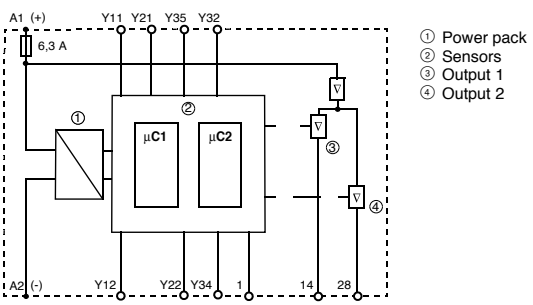
**Fault clearance**

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

**Cable length**

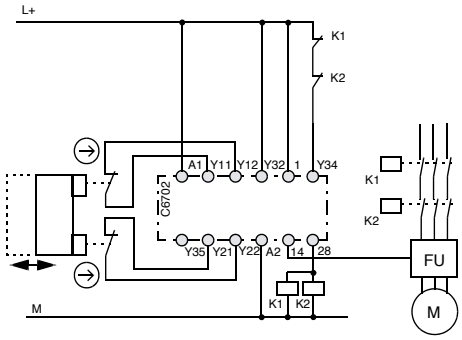
| | | |
|---|---|---|
| for | 2 x 1.5mm² 150nF/km | max. 2000m total cable length for sensors |

### Internal circuit

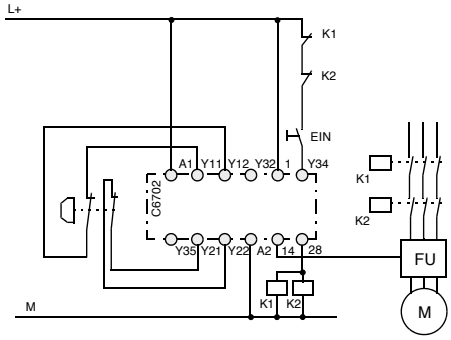



① Sensor circuits open; Cross circuit between the sensors; Short circuit of sensors to frame
② Only when using device with "cross circuit detection".

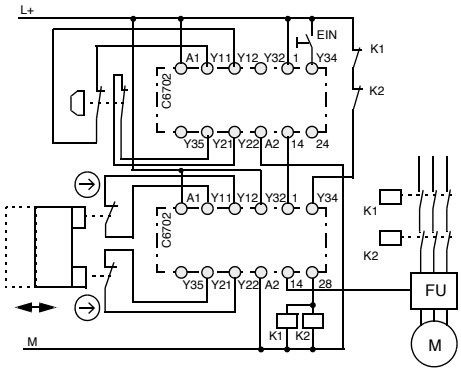
Safety gate monitoring, two-channel, autostart category 4 / SIL 3 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1



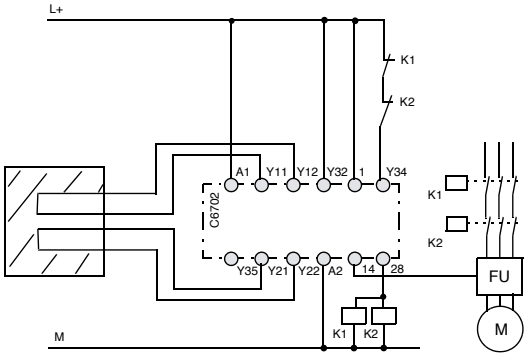

EMERGENCY STOP, two-channel, monitored start with additional ON button category 4 / SIL 3 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1



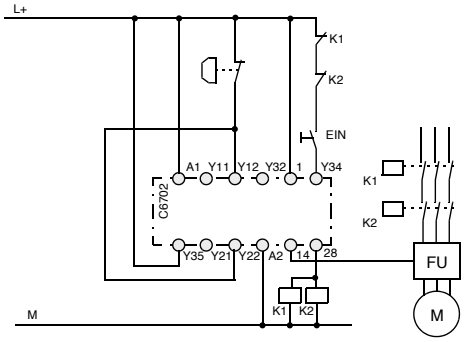

EMERGENCY STOP, two-channel, monitored start with additional ON button and safety gate monitoring, two-channel, autostart; category 4 / SIL 3



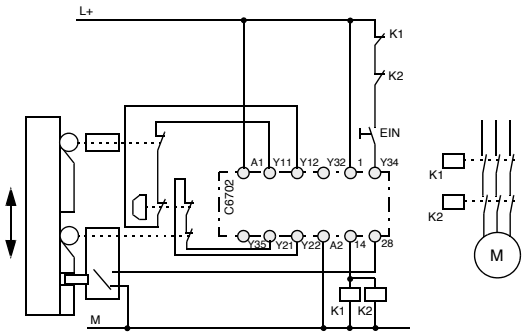

Safety mat, two-channel, autostart; category 3 SIL2



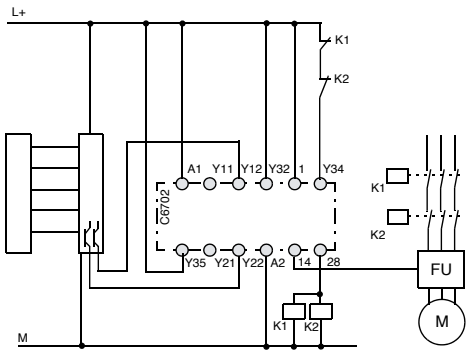

EMERGENCY STOP, single-channel, monitored start with additional ON button category 2 / SIL 1 with voltage-operated e.l.c.b. and delayed disconnection, stop category 1




EMERGENCY STOP and safety gate monitoring, two channel with tumbler, monitored start category 4 / SIL 3




Light-array monitoring, two-channel, autostart category 4 SIL 3



# Personnel safety and machine protection
## Risk category according to EN 954-1

### Classification of a machine into categories to EN 954-1

Pursuant to the Machinery Directive 89/393/EEC, every machine must comply with the relevant directives and standards. Measures must be taken to keep the risk to persons below a tolerable extent.

In the first step, the project planner performs a risk evaluation to EN 1050 "Risk Assessment". This must take into consideration the machine's ambient conditions for instance. Any overall risk must then be assessed. This risk assessment must be conducted in such a form as to allow documentation of the procedure and the results achieved. The risks, dangers and possible technical measures to reduce risks and dangers must be stipulated in this risk assessment. After stipulating the extent of the risk, the category on the basis of which the safety circuits are to be designed is determined with the aid of EN 954-1 “Safety-Related Components of Controls”.

This determined category defines the technical requirements applicable to the design of the safety equipment.

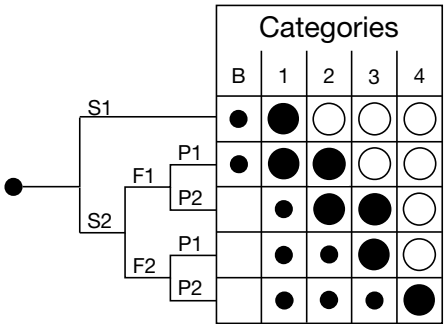
There are five categories (B, 1, 2, 3 and 4), whereby B (standing for basic category) defines the lowest risk and, thus, also the minimum requirements applicable to the controller.

**Possible selection of categories pursuant to EN 954-1**
Starting point for the risk assessment of the safety-related component of the controller.

**S- Serious injuries**
- **S1** Slight (normally reversible) injuries,
- **S2** Serious (normally irreversible) injuries, including death

**F- Frequency and/or duration of the risk exposure**
- **F1** Rare to frequent and/or short duration of exposure
- **F1** Frequent to sustained and/or longduration of exposure

**P- Options for risk avoidance**
(Generally referred to the speed and frequency at which the dangerous components moves and to the clearance from the dangerous component).
- **P1** Possible under certain conditions
- **P2** Hardly possible




**B1-4 Categories for safety-related components of controls**
- ☒ Preferred category
- ☒ Possible category requiring additional measures
- ◯ Disproportionately extensive measures by comparison with the risk

| Safety category ① | Summary of requirements | System behaviour ② | Principles for achieving safety |
|---|---|---|---|
| B | The safety-related components of controls and/or their protection devices and their components must be designed, constructed, selected, assembled and combined in compliance with the applicable standards, such that they can withstand the anticipated influences. | The occurrence of a fault may lead to loss of the safety function. | Predominantly characterised by selection of componentsl |
| 1 | The requirements of B must be complied with. Time-proven components and time-proven safety principles must be applied. | The occurrence of a fault may lead to loss of the safety function but the probability of occurrence is less than in category B. | |
| 2 | The requirements of B and the use of the time-proven safety principles must be complied with. The safety function must be checked at appropriate intervals by the machine control. | • The occurrence of a fault may lead to loss of the safety function between the inspection intervals. | Predominantly characterised by the structure |
| 3 | The requirements of B and the use of the time-proven safety principles must be complied with. Safety related components must be designed such that:<br>• a single fault in any of these components does not lead to loss of the safety function and<br>• the individual fault is detected, wherever feasible in an appropriate manner. | • The loss of the safety function is detected by the check/inspection.<br>• If the single fault occurs, the safety function is always retained.<br>• Certain faults but not all faults are detected.<br>• An accumulation of undetected faults may lead to loss of the safety function. | |
| 4 | The requirements of B and the use of the time-proven safety principles must be complied with. Safety related components must be designed such that:<br>• a single fault in any of these components does not lead to loss of the safety function and<br>• the individual fault is detected at or before the next requirement applicable to the safety function or, if this is not possible an accumulation offaults may then not lead to loss of the safety function. | • If the faults occur, the safety function is always retained.<br>• The faults are detected in good time to prevent loss of the safety function | |

This mandatory classification runs likes a red thread from selection of the smallest limit switch through to the overall concept of the entire machine, whereby it is necessary to grapple with the permanent conflict between what is technically feasible and what is permitted on the basis of “pure theory”.

Thus: Depending on application, not every technically feasible safety category is also permitted. For instance, in the case of contactless protection devices (light barriers etc.) only categories 2 or 4 are permitted. By contrast, in the case of tread mats, categories B to 4 can be used, depending on risk assessment, provided these categories can be reached at all owing to the design.
The 2-hand control C575 would technically also comply with the lower categories but it cannot be connected in categories 1-3.

① The categories are not intended to be applied in any specific order or hierarchical arrangements with respect to the technical-safety requirements.
② The risk assessment will indicate whether full or partial loss of the safety function(s) as the result of fault is acceptable.

## Classification of a machine into categories to EN 954-1

Pursuant to the Machinery Directive 89/393/EEC, every machine must comply with the relevant Directives and Standards. Measures must be taken to keep the risk to persons below a tolerable extent.
In the first step, the project planner performs a risk evaluation to EN 1050 “Risk Assessment”. This must take into consideration the machine’s ambient conditions for instance. Any overall risk must then be assessed. This risk assessment must be conducted in such a form as to allow documentation of the procedure and the results achieved. The risks, dangers and possible technical measures to reduce risks and dangers must be stipulated in this risk assessment.
After stipulating the extent of the risk, the category on the basis of which the safety circuits are to be designed is determined with the aid of EN 954-1 “Safety-Related Components of Controls”.
This determined category defines the technical requirements applicable to the design of the safety equipment. There are five categories (B, 1, 2, 3 and 4) whereby B (standing for basic category) defines the lowest risk and, thus, also the minimum requirements applicable to the controller.

**Possible selection of categories pursuant to EN 954-1**
Starting point for risk assessment of the safety-related components of the control.

## Description

**Scope of application**
Potential risks and hazards posed by a machine must be eliminated as quickly as possible in the event of danger.
For dangerous movements, the safe state is generally standstill. All safety switching devices of Series C 570 switch to de-energised state, i.e. standstill for drives, in the event of danger or fault. Standard EN 60204 demands that every machine must feature the Stop function of category 0.
Stop functions of categories 1 and/or 2 must be provided if necessary for technical-safety and/or technical-function requirements of the machine. Category-0 and category-1 stops must be operable independently of the operating mode, and a category-0 stop must have priority.
There are three categories of stop function:

**Category 0:**
Shut-down by immediate switch-off of the energy supply to the machine drives.

**Category 1:**
Controlled shut-down, whereby the energy supply to the machine drive is retained in order to achieve shut-down and the energy supply is only interrupted when shut-down has been reached.

**Category 2:**
A controlled shut-down in which the energy supply to the machine drive is retained.
**EMERGENCY-STOP**
EMERGENCY-STOP devices must have priority over all other functions. The energy supplied to the machine drives which may cause dangerous states must be switched off as quickly as possible without further risks or dangers. Resetting of the drives may not trigger a restart. The EMERGENCY-STOP must act either as a stop of category 0 or as a stop of category 1.
The basic device of the 570 Series of safety switching devices can be used for EMERGENCY-STOP applications up to maximum category 4 to EN 954-1. Depending on external wiring and cable routing of the sensors, category 3 resp. 4
to EN 954-1 must be reached.

**Safety door monitoring**
Pursuant to EN 1088, a distinction is made between interlocked, separating protective devices and interlocked, separating protective devices with follower. Here as well, the safety switching devices are used for EMERGENCY-STOP applications. Controls up to category 4 to EN 954-1 are possible.

**Presses and punches**
The two-hand control C 575 is a device on which the operator must use both hands simultaneously, thus protecting him against risks and dangers.
The overtravel monitor C 578 is used on linear-driven presses (e.g. hydraulic, pneumatic and
spindle presses) in accordance with VBG7n52.
It checks for the following only once during the test stroke:
- Correct connection of the operating controls
- External cable discontinuity
- Possible failure of the components to be monitored cyclically

The overtravel monitor can be used only in conjunction with a two-hand control. The press controllers and overtravel monitors are suitable for installation in controls for eccentric, hydraulic and spindle presses. They can be used up to category 4 to EN 954-1. Type III C to DIN 574 is possible specifically for presses.

**Device construction**
The safety switching device C 570 operates internally with several contactor relays. The contacts of the relays comply with the requirement in respect of positively driven operation to ZH 1/457, Edition 2, 1978. This means that NO contact and NC contact may not be closed simultaneously.
Safety relays with positively driven contacts are used in the newly developed safety switching devices C 571-C 574, C 576, C 577 , the contact expansion C 579 and on the press controllers
C 575 and C 578. This series of devices is characterised by an extremely narrow design
(22.5mm and 45 mm). Approvals and
test certificates, conventional on the market, have been issued by BG, SUVA, UL and CSA.
The function of the internal contactor relays/relays is monitored in a redundant circuit. In the event of failure of a relay, the safety switching device always switches to de-energised state. The fault is detected and the safety switching device can no longer be switched on. Using normally closed contacts and normally open contacts for the same function complies with the requirement in respect
of diversity.

**Enable contacts (FK)**
The safety-related function must be controlled via safe output contacts, the so-called Enable contacts. Enable contacts are always normally open contacts and switch off without delay.
**Signalling contacts (MK)**
Normally open contacts and normally closed contacts which may not perform safety-related functions are used as the signalling contact.
An Enable contact may also be used as a signalling contact.

**Delayed Enable contacts**
Drives which have a long overtravel must be decelerated in the event of danger. For this purpose, the energy supply must be maintained for electrical braking (stop category 1 to EN 60 204-1). The safety switching device C 574 also feature OFF-delayed Enable contacts, besides undelayed Enable contacts. Delay times of 0.5 to 30 s are available.
The sealable cover cap C 560.10 (see Selection data and Ordering details, Accessories) can be fitted onto C 574, C 6702 to protect against unauthorised adjustment of the set delay time.

**Contact expansion**
If the Enable contacts of the basic device do not suffice, positively driven contactors (e.g. B6, B7) may be used for contact expansion. One solution for increasing the number of Enable contacts, which is both simple to use and space-saving,
is the expansion unit C 579 (only 22.5mm wide).
The expansion unit C 579 provides 4 additional Enable contacts.

**Expansion unit C 579**
Expansion unit C 579 may not be operated separately in safety-related circuits but must be combined with a safety switching device C 57x. One Enable contact of the basic device is required for connection of an expansion unit. The category of a control with expansion units corresponds to the category of the basic device.

**Mounting**
Snap-on mounting on 35mm top-hat rail to
EN 50 022. Screw mounting of the safety switching devices C 57x can be implemented with two additional plug-in tabs C 560.20 (see Selection data and Ordering details, Accessories).

**User Manual**
A User Manual with a device description, connection diagrams and application information in several languages is enclosed with every safety switching devices of Series C 570 and C 67xx.

**“Safety Engineering” Application Manual**
You can find further information in the “Safety Engineering” Application Manual. It provides you with the required information on the relevant safety standards and project planning information.
The entire range of components used for safety applications is explained in this Manual, from the sensor (Emergency-Stop command devices and position switches), through evaluation units (safety switching devices C 57x and fail-safe control
AC 31 S) to the actuator (e.g. contactor for switching motors). All these components must be selected correctly in order to meet the requirements applicable to modern safety facilities.
Please order the “Safety Engineering” Application Manual
1SAC 103 201 H 0101 German
1SAC 103 201 H 0201 English

# Selection guide
## C570 – C6702

### Selection table for ABB safety relays in accordance to risk category (EN 954-1):

| Category | C 570 | C 571 | C 572 | C 573 | C 574 | C 575 | C 576 | C 577 | C 578 | C 6700 | C 6701 | C 6702 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **B** | | | | | | | | | | | | |
| **1** | x | x | x | x | x | | x | x | | x | x | x |
| **2** | x | x | x | x | x | | x | x | | x | x | x |
| **3** | x① | x | x | x | x | | x | x | | x | x | x |
| **4** | | x① | x | x① | x② | x | x | x | x | | x | x |

### Selection table for ABB safety relays in accordance to device characteristics

| Characteristics suitable for device | C 570 | C 571 | C 572 | C 573 | C 574 | C 575 | C 576 | C 577 | C 578 | C 579 | C 6700 | C 6701 | C 6702 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EMERGENCY STOP | yes | yes | yes | yes | yes | – | yes | yes | – | ③ | yes | yes | yes |
| Safety gate monitoring | yes | yes | yes | yes | yes | – | yes | yes | – | ③ | yes | yes | yes |
| Tread mats | – | – | – | – | – | – | – | – | – | – | – | – | - |
| Two-hand control e.g. presses | – | – | – | – | – | yes | – | – | – | – | – | – | - |
| Feedback loop for monitoring of external contactors | yes | yes | yes | yes | yes | yes | yes | yes | – | – | yes | yes | yes |
| Single channel | yes | yes | yes | yes | yes | – | – | – | – | – | yes | yes | yes |
| Two channel | – | yes | yes | yes | – | yes | yes | yes | – | – | yes | yes | yes |
| Cross-short circuit monitoring | – | – | yes | – | yes | – | yes | yes | – | – | – | yes | yes |
| 24VDC at the EMERGENCY STOP limit switch | – | – | yes | – | – | yes | yes | yes | yes | – | yes | yes | yes |
| Operating voltage at the EMERG. STOP limit switch | yes | yes | – | yes | yes | – | – | – | – | – | – | – | - |
| No. of safety outputs | 4 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | – | 4 | 2 ④ | 2 | 1 |
| No. of time delayed safety output contacts | – | – | – | – | 1 | – | – | – | – | – | – | – | 1 |
| No. of signalling contacts | 2 | – | 2 | 1 | 2 | 2 | – | – | – | – | – | – ⑤ | – ⑤ |
| Enclosure width in mm | 75 | 22.5 | 45 | 22.5 | 45 | 45 | 22.5 | 22.5 | 45 | 22.5 | 22.5 | 22.5 | 22.5 |
| Monitoring overtravel e.g. presses | – | – | – | – | – | – | – | – | yes | | – | – | – |
| Auto-start | yes | yes | yes | yes | yes | – | yes | – | – | – | yes | yes | yes |
| Controlled/monitored start | – | – | yes | – | – | – | – | yes | – | – | yes | yes | yes |

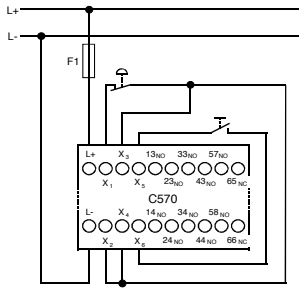
① Possible with additional external measures.
② Applies only to undelayed contact. Category 3 applies to delayed contact.
③ Contact extension
④ Solid-state outputs requirements of safety in acc. to 954-1 only in combination with positively guided contactors.
⑤ Solid-state outputs could also be used as safe messaging outputs.

# Application examples
## C570, C571, C573

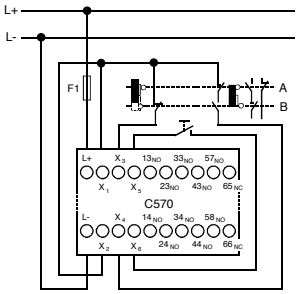
### Information
The safety relays are tested by BIA. The shown external wiring diagrams / application examples are examples of use only. A risk appraisal has to be done by the user. Further application examples on request.

## C570
### Application
The safety relay can be used to monitor EMERGENCY STOP circuits and for monitoring of other protective devices (e.g. safety gates)

EMERGENCY-STOP circuit




### Operation
Operating states indication:
"READY" indicates that the supply voltage is applied to the unit, provided that the contacts of the EMERGENCY STOP pushbutton or door safety switch are closed. "ON" lights up, when the ON button is pressed and the enabling circuits are switched through.




Safety gate monitoring
(A= door open,
B= door closed)

7

## C571, C573
### Application
The safety relays C 571/C 573 can be used in EMERGENCY STOP circuits as per EN 418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (11.98), e.g. with movable covers and guard doors. Depending on the external connections, categories 3 and 4 (with additional external measures) as per DIN EN 954-1 are achievable.

### Functions and connection
The safety relay C 573 has three release circuits (safety outputs) which are configured as NO contacts and a signal circuit configured as a NC contact. The safety relay C 571 has two release (safe) circuits which are configured as NO contacts. The number of release circuits can be increased by adding one or more C 579 extension units. Three LEDs indicate the operating state and function.
When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuits of the safety relays and the external contactors are checked for proper functioning.
Connect the EMERGENCY STOP pushbutton or the limit switch in the supply cable from A1 to +24 or L24 V. To evaluate over two channels, connect Channel 2 from A2 to 0 V or N. Connect the ON button in series with the NC contacts of the external contactor (feedback loop) between terminals Y1 and Y2.

### Terminal markings

| | | |
|---|---|---|
| Supply | A1 | L/+ |
| voltage | A2 | N/- |
| Sensors | Y1, Y2 | ON button, feedback loop |
| Outputs | 13, 14 | Safety output 1 (n/o) |
| | 23, 24 | Safety output 2 (n/o) |
| | 33, 34 | Safety output 3 (n/o)* |
| | 41, 42 | Signal circuit 1 (n/c)* |
| | | * with C 573 only |

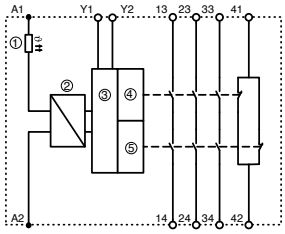
### Operating states

| LEDs | | | Operation | | | |
|---|---|---|---|---|---|---|
| POWER | Channel 1 | Channel 2 | PS | EMERG. STOP | ON | Safety output |
| ☼ | ☼ | ☼ | ON | non activated | activated | closed |
| ☼ | ● | ● | | activated | non activated | open |
| ☼ | ● | ● | | non activated | non activated | open |
| | | | **Faults** | | | |
| ☼ | ☼ | ● | Relay fusion-welded | | | open |
| ☼ | ● | ☼ | Motor contactor fusion-welded | | | |
| ☼ | ● | ● | Defects in electronic | | | |
| ● | ● | ● | Cross or ground faults in EMERG. STOP circuit (min. fault current $I_{Kmin}$= 0.5A; PTC-fuse trips or supply voltage missing | | | |

**Fault clearance**
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

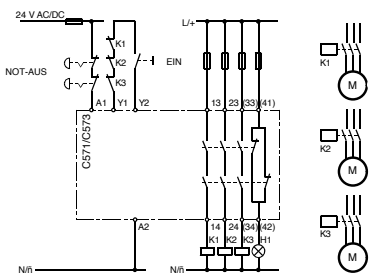
**Cable length**
for 2 x 1.5mm² max. 1000m (total cable length for 150 nF/km sensors and power supply lines)

**IInternal circuit**

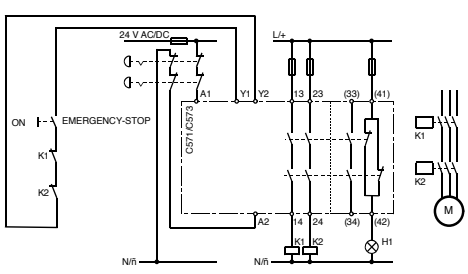



① PTC fuse
② Power pack
③ Control logic
④ Channel 1
⑤ Channel 2

**Emergency Stop, category 2 acc. to EN 954-1**

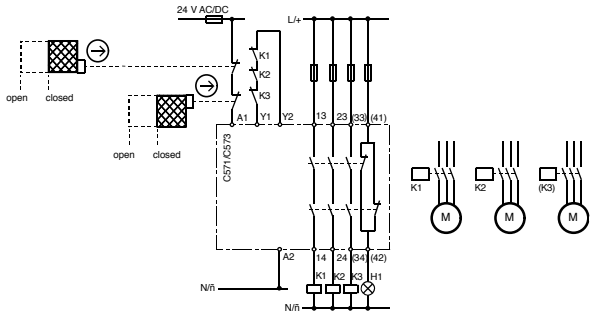



**EMERGENCY STOP, category 3 and 4 acc. to EN 954-1**

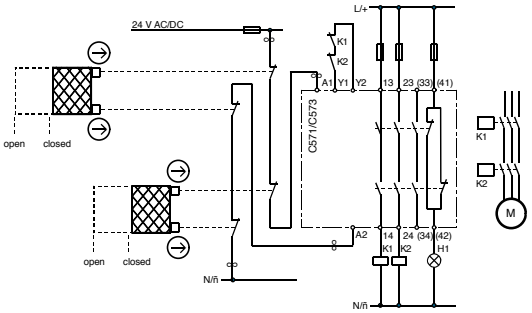


# Application examples
## C571-AC

### Safety gate monitoring, category 2 acc. to EN 954-1




### Safety gate monitoring, category 3 and 4 acc. to EN 954-1

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## Application

The safety relay C 571-AC can be used in EMERGENCY STOP circuits as per EN 418 and in safety circuits as per VDE 0113 Part 1 (11.98) and/or EN 60 204-1 (12.97), e.g. with movable covers and safety gates. Depending on the external connections, safety categories 3 and 4 as per DIN EN 954-1 are achievable.
When the safety combination is used in «automatic start» mode, automatic re-starting (as per EN 60 204-1, sections 9.2.5.4.2 and 10.8.3) must be prevented by the higher-level control system in the event of EMERGENCY STOP.

## Functions and connections

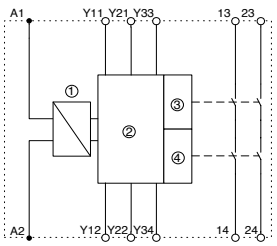
The safety relay C 571-AC has two release circuits (safety outputs) which are configured as NO contacts. The number of safety outputs can be increased by adding one or more C 579 extension modules. Three LEDs indicate the operating state and function.
When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuits of the safety relay and the external contactors are checked for proper functioning.

Connect the EMERGENCY STOP button or the limit switch to terminals Y11, 12 and Y21, 22. The ON button is connected in series with the NC contacts of the external contactor (feedback loop) between terminals Y33, 34.

## Terminal marking

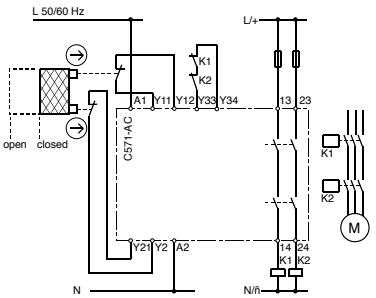
| | | |
|---|---|---|
| Supply voltage | A1 | L |
| | A2 | N |
| Sensors | Y11, 12 | Channel 1 EMERGENCY STOP or limit switch |
| | Y21, 22 | Channel 2 EMERGENCY STOP or limit switch |
| | Y33, 34 | ON button, feedback loop |
| Outputs | 13, 14 | Safety output 1 (n/o) |
| | 23, 24 | Safety output 2 (n/o) |

### Internal circuit




① Power pole
② Control logic
③ Channel 1
④ Channel 2

### Two channel autostart for contactor monitoring; Safety category 3 and 4 acc. to EN 954-1



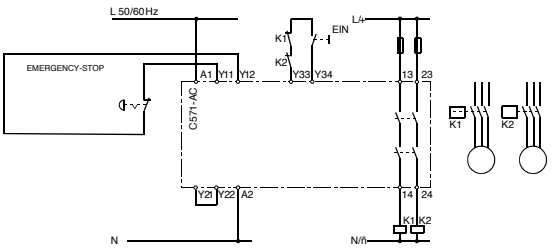

## Operating states

| LEDs | | | Operation | | | |
|---|---|---|---|---|---|---|
| POWER | Channel 1 | Channel 2 | PS | E-STOP | ON | Safety output |
| ☼ | ☼ | ☼ | ON | non activated | activated | closed |
| ☼ | ● | ● | | activated | non activated | open |
| ☼ | ● | ● | | non activated | non activated | open |
| | | | Faults | | | |
| ☼ | ☼ | ● | Relay fusion-welded<br>Motor cont.fusion-welded<br>Defects in electronic | | | open |
| ● | ● | ● | Cross or ground faults in EMERG. STOP circuit | | | |

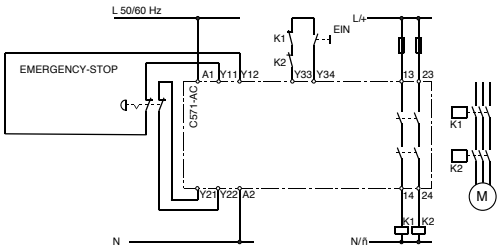
**Fault clearance**
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

**Cable length**
for 2 x 1.5mm² max. 1000m (total cable length for 150 nF/km sensors and power supply lines)

### Single-channel EMERGENCY STOP with additional ON button Safety category 2 acc. to EN 954-1




### Two-channel EMERGENCY STOP with additional ON button Safety category 3 and 4 acc. to EN 954-1



# Application examples
## C572

## Application

The safety relay C 572 can be used in EMERGENCY STOP circuits as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), e.g. with movable covers and safety gates.
Depending on the external connection, safety category 4 as per DIN EN 945-1 is achievable with this device.

## Functions and connections

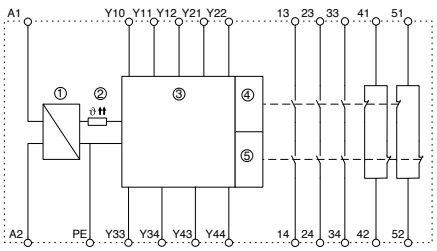
The safety relay C 572 has three release circuits (safety outputs) which are configured as NO contacts and two signal circuits configured as an NC contact.
Three LEDs indicate operating state and function.
When the EMERGENCY STOP pushbutton or limit pushbutton is unlocked and the ON pushbutton is pressed, the redundant safety relays, electronic circuitry and external contactors are tested for proper functioning.
On the C 572, the ON circuit Y33, 34 is checked for short circuit. This means that a fault ist detected when Y33,34 is closed before the EMERGENCY STOP button is closed.

## Terminal marking

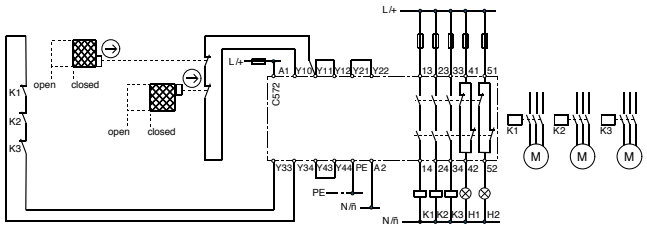
| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | N/- |
| Outputs | 13, 14 | Safety output 1 (n/o) |
| | 23, 24 | Safety output 2 (n/o) |
| | 33, 34 | Safety output 3 (n/o) |
| | 41, 42 | Signal output 1 (n/c) |
| | 51, 52 | Signal output 2 (n/c) |

| Function | Monitored start | Monitored start / Autostart | Autostart |
|---|---|---|---|
| 1-channel | ON push button at Y33, 34 | Jumper from Y11 to Y12<br>Jumper from Y21 to Y22<br>EMERGENCY-STOP circuits at Y10, 11 | Feedback loop or jumper to Y33, 34 and jumper from |
| 2-channel | | Jumper from Y10 to Y11<br>EMERGENCY-STOP circuits at Y11, 12 and Y21, 22 | Y43 auf Y44<br>Important: Y21, 22 must be closed before or at the same time as Y11, 12 |

## Internal circuit




### Autostart for guard door monitoring; Safety category 2 acc. to EN 954-1




## Operation states

| LEDs | | | Operation | | | |
|---|---|---|---|---|---|---|
| POWER | Channel 1 | Channel 2 | PS | E-STOP | ON | Safety outputs |
| ☼ | ☼ | ☼ | ON | non activated | activated | closed |
| ☼ | ● | ● | | activated | non activated | open |
| ☼ | ● | ● | | non activated | non activated | open |
| | | | **Faults** | | | |
| ☼ | ☼ | ● | Relay fusion-welded | | | open |
| ☼ | ● | ☼ | Motor cont.fusion-welded | | | |
| ☼ | ● | ● | Defects in electronic | | | |
| | | | Short circuit in ON circuit | | | |
| ● | ● | ● | Cross or ground faults in EMERG. STOP circuit (min. fault current $I_{Kmin}$= 0.5A; PTC-fuse trips or supply voltage missing | | | |

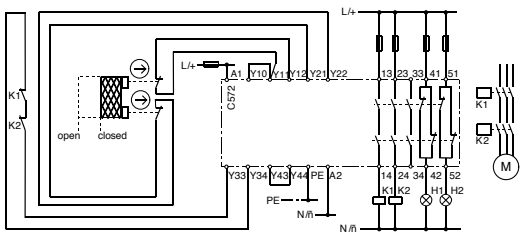
**Fault clearance**

1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

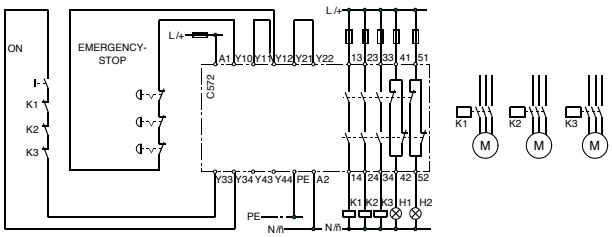
**Cable length**

for 2 x 1.5mm² max. 1000m (total cable length for 150 nF/km sensors and power supply lines)

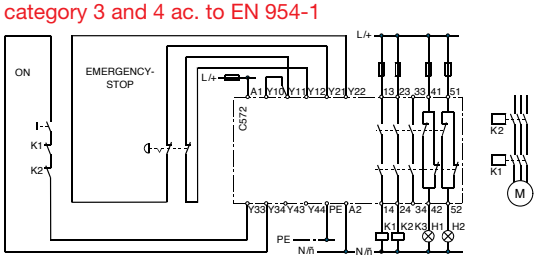
### Autostart and safety gate monitoring
Safety category 4 acc. to EN 954-1




### Monitored start for EMERGENCY STOP
Safety category 2 acc. to EN 954-1




### Monitored start for EMERGENCY STOP
Safety category 3 and 4 ac. to EN 954-1



# Application examples
## C574

## Application

The safety relay C 574 can be used in EMERGENCY STOP devices as per EN 418, in safety circuits as per VDE 0113 Part 1 (06.93) and/or EN 60 204-1 (12.97), such as for monitoring safety gates, or in circuits with controlled stand-still requirement (STOP Category 1).
Depending on the external circuitry, this device can be used to realize Safety Category 4 instantaneous release circuits and Safety Category 3 delayed release circuits according to DIN EN 954-1.

## Functions and connections

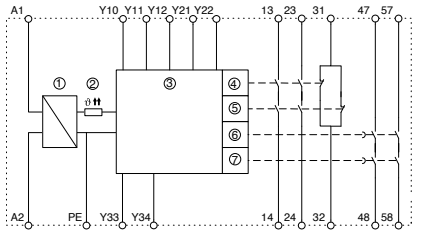
The C 574 safety relay possesses two delayed and two instantaneous release circuits (safety outputs) as NO contacts and one instantaneous signal output as NC contact. Five LEDs indicate the operating status and the functions.
The redundant safety relays, the electronics and the operated motor contactors are tested for proper functioning when the EMERGENCY STOP button or the limit switch button is unlatched, and when ON circuit Y33, Y34 is closed.
On the C 574 (monitored start), the ON circuit Y33, 34 is checked for short circuit. This means that a fault ist detected when Y33, 34 is closed before the EMERGENCY STOP button is closed.

## Terminal marking

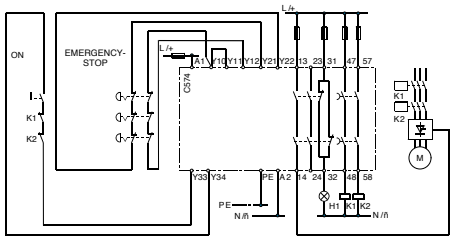
| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | N/- |
| Output | 13, 14 | Safety output 1, instantaneous |
| | 23, 24 | Safety output 2, instantaneous |
| | 31, 32 | Signal output, instantaneous |
| | 47, 48 | Safety output 1, delayed (t) |
| | 57, 58 | Safety output 2, delayed (t) |

| Function | Monitored Start | |
|---|---|---|
| 1-channel | ON pushbutton at Y33, 34 | Jumper from Y11 toY12<br>Jumper from Y21 to Y22<br>EMERGENCY STOP circuits at Y10, 11 |
| 2-channel | | Jumper from Y10 to Y11<br>EMERGENCY STOP circuits at Y11, 12 and Y21, 22 |

## Internal circuit




### Monitored start for EMERGENCY STOP
Safety category 3 and 4 acc. to EN 954-1




## Operation

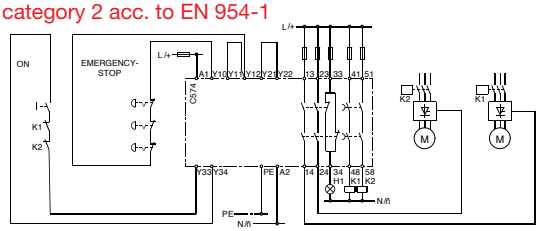
| LEDs | | | | | Operation | | | |
|---|---|---|---|---|---|---|---|---|
| POWER | Ch 1 | Ch 2 | Ch 1 | Ch 2 | PS | E-STOP | ON | Safety outputs |
| ☼ | ☼ | ☼ | ☼ | ☼ | ON | non activated | activated | closed |
| ☼ | ● | ● | ● | ● | | activated delay time elapsed | non activated | open |
| ☼ | ● | ● | ● | ● | | non activated | non activated | open |
| ☼ | ● | ● | ☼ | ☼ | | activated delay time elapsed | non activated | FK 1 & 2 open, FK1(t) & FK2(t) closed |
| | | | | | **Faults** | | | |
| ☼ | ☼ | ● | ☼ | ● | Relay fusion-welded | | | open |
| ☼ | ● | ☼ | ● | ☼ | Motor cont. fusion-welded | | | |
| ☼ | ● | ● | ● | ● | Defect in electronic<br>Short circuit in ON circuit | | | |
| ● | ● | ● | ● | ● | Cross or ground faults in emergency trip circuit (min. fault current $I_{Kmin}$= 0.5A; PTC fuse trips) | | | |

**Fault clearance**
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

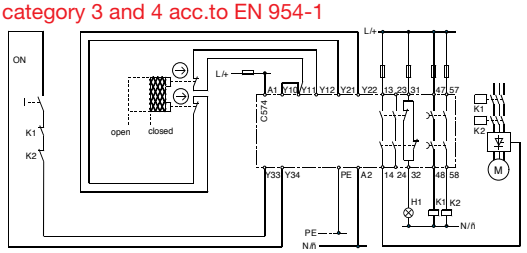
**Cable length**

| | | |
|---|---|---|
| for | 2 x 1.5 mm² | max. 1000m total cable length for |
| | 150nF/km | sensors and power supply lines) |

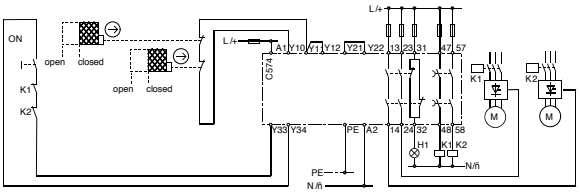
### Monitored start for EMERGENCY STOP
Safety category 2 acc. to EN 954-1




### Safety gate monitoring
Safety category 3 and 4 acc.to EN 954-1




### Safety gate monitoring
Safety category 2 acc.to EN 954-1



# Application examples
## C575

### Application

C 575 is suitable for installation in controls for presses.
- Hydraulic presses DIN EN 693,
- Eccentric and related presses EN 692,
- Screw presses EN 692.

### Functions and connections

The two-hand control unit C 575 possesses two release circuits (safety outputs) configure as NO contacts and two signal outputs configured as NC contacts. Five LEDs indicate the operating status and the functions.

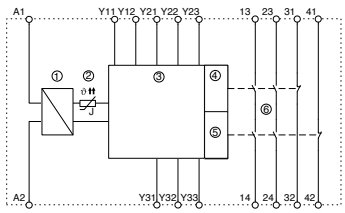
The safety outputs are closed by simultaneous operation (< 0.5s) of the push-buttons S1, S2. If one pushbutton is no longer pressed, the outputs open. They do not close again until both pushbuttons are no longer pressed and then simultaneously pressed again.

1. Operating voltage to be applied to the terminals A1 and A2. The operating voltage must be de-energized with the operating energy of the press.
2. Feedback loop to be closed: Y11, Y12 to be jumperd or connected to the NC contacts of external contactors.
3. Input circuits to be connected: Pushbutton S1 to terminals Y21, Y22, Y23 and pushbutton S2 to terminals Y31, Y32, Y33.

### Terminal marking

| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | N/- |
| Outputs | 13, 14 | Safety output 1 (n/o contact) |
| | 23, 24 | Safety output 2 (n/o contact) |
| | 31, 32 | n/c signal output |
| | 41, 42 | n/c signal output |
| Inputs | Y11,12 | Feedback loop |
| | Y21, 22, 23 | Pushbutton S1 |
| | Y31, 32, 33 | Pushbutton S2 |

### Internal circuit




### Operation

| LEDs | | | | | Operation |
|---|---|---|---|---|---|
| POWER | S1 ON | S2 ON | Channel 1 | Channel 2 | Pushbutton |
| ☼ | ● | ● | ● | ● | non activated |
| ☼ | ☼ | ● | ● | ● | only S1 activated |
| ☼ | ● | ☼ | ● | ● | only S2 activated |
| ☼ | ☼ | ☼ | ☼ | ☼ | S1 and S2 activated |

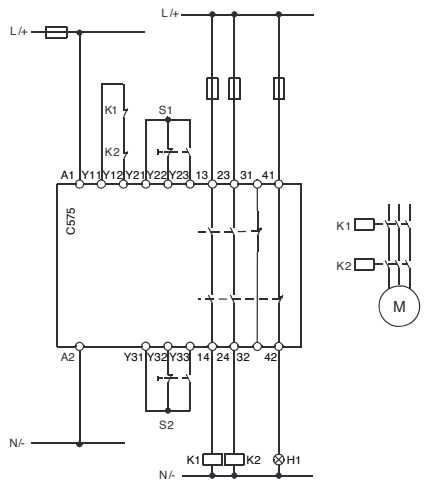
**The unit cannot be started with the following faults:**
- Short circuit, e.g. between the pushbuttons
- Defective relay coils
- Conductor failure
- Welded contacts

**The output relays does not enegize if:**
- The pushbuttons are not pressed simultaneously (< 0.5s)
- Only one pushbutton is pressed
- The feedback loop Y11, Y12 is open.

**Cable length**

max. 1000m for 2 x 1.5mm² (Total cable length for sensors and power supply lines)

**External circuit S1, S2 pushbuttons on two-hand control console, H1 indicator light, K1and K2 must be positively guided contactors,**
Safety category 4 acc.to EN 954-1



# Application examples
## C576, C577

## Application

The safety relay C 576 can be used in safety circuits as per VDE 0113 Part 1 (11.98) or EN 60 204-1 (11.98), e.g. with movable covers and safety gates; the safety relay C 577 in EMERGENCY STOP circuits as per EN 418. Depending on external connections, category 4 as per DIN EN 954-1 is achievable.

## Functions and connections

The safety relays C 576/C 577 have two release circuits (safety outputs) configured as NO contacts. The number of release circuits can be increased by adding one or more C 579 extension units.
Three LEDs indicate operating state and function.
When the EMERGENCY STOP button or the limit switch is unlocked and when the ON button is pressed, the internal circuit of the safety relay and the external contactors are checked for proper functioning.
On the C 577, the ON circuit Y33, 34 is checked for short circuit.
This means that a fault is detected when Y33, 34 is closed before the EMERGENCY STOP button is closed.
The EMERGENCY STOP button or the limit switch are connected to terminals Y11, 12, 21, 22. The ON button is connected in series to the NC contacts of the external contactors (feedback loop) to terminals Y33, 34.

## Terminal marking

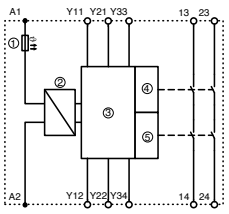
| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | N/- |
| Sensors | Y11, 12 | Channel 1 EMERGENCY STOP or limit switch |
| | Y21, 22 | Channel 2 EMERGENCY STOP or limit switch |
| | Y33, 34 | ON button, feedback loop |
| Outputs | 13, 14 | Safety output 1 (n/o contact) |
| | 23, 24 | Safety output 2 (n/o contact) |

**Fault clearance**
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

**Cable length**

| | | |
|---|---|---|
| for | 2 x 1.5mm$^2$ 150nF/km | max. 1000m total cable length for sensors and power supply lines) |

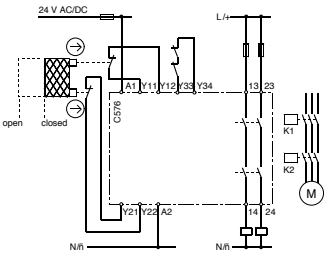
## Internal circuit



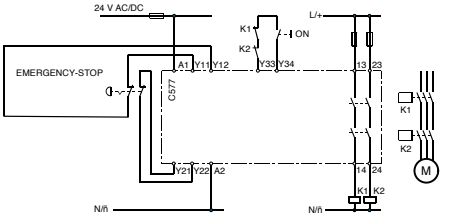

## Operation

| LEDs | | | Operation | | | |
|---|---|---|---|---|---|---|
| POWER | Channel 1 | Channel 2 | PS | E-Stop | ON | Safety outputs |
| ☼ | ☼ | ☼ | ON | non activated | activated | closed |
| ☼ | ● | ● | | activated | non activated | open |
| ☼ | ● | ● | | non activated | non activated | open |
| | | | Faults | | | |
| ☼ | ☼ | ● | Relay fusion-welded<br>Motor cont. fusion-welded | | | open |
| ☼ | ● | ☼ | | | | |
| ☼ | ● | ● | Defect in electronic<br>Short circuit in ON circuit | | | |
| ● | ● | ● | Cross or ground faults in EMERGENCY STOP circuit (min. fault current $I_{Kmin}$= 0.5A; PTC fuse trips) | | | |

**C 577 with monitored start for EMERGENCY STOP**
Category 4 acc. to EN 954-1




**C 577 with monitored start for EMERGENCY STOP**
Category 4 acc. to EN 954-1



# Application examples
## C578

## Application

The overtravel distance tester C 578 is intended for checking the overtravel of linearly operating hydraulic, pneumatic and spindle presses in accordance with VBG 7n5.2 §11.

## Functions and connections

The overtravel distance tester C 578 has four safety outputs, three NO contacts and one NC contact. Two LEDs indicate the functions.
The C 578 tests the overtravel distance in connection with a position switch every time the control voltage is switched on. The permissible overtravel distance corresponds to dimension 's' of the cam that is used
to operate the position switch. Obtain dimension 's' from the press manufacturer in accordance with ZH 1/456 (published by the German central office for accident prevention and labour safety, Cologne).

## Terminal marking

| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | N/- |
| Outputs | 13, 14 | Safety output 1 (tool down) |
| | 23, 24 | n/o contact (tool up) |
| | 33, 34 | n/o contact (overtravel distance OK) |
| | 41, 42 | n/c contact (hydraulic pump ON) |
| Inputs | Y11,12, 13, 14 | Feedback loop (K4) |
| | Y21, 22 | Position switch (S4) |
| | Y31, 32, 33, 34 | Top dead centre switch (S3) |

## Operation

Sequence of operations after the press has been switched on:

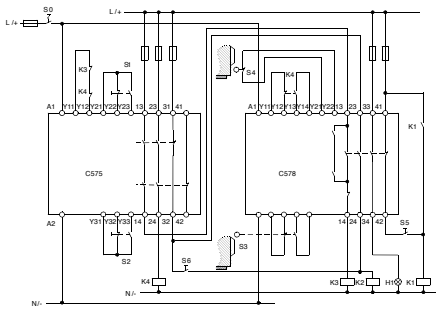
1. Switch on the hydraulic pump with S5, move plunger to top dead centre, if necessary by means of S6.
2. Operate S1, S2 on the two-hand control console until the position switch for test-cam (S4) opens.
3. Stop operating S1, S2.
4. Operate S1, S2 again: Indicator light H1 lights up if the overtravel distance is OK.
5. Stop operating S1, S2: The plunger returns to top dead centre.
6. If overtravel distance is OK, all outputs remain active until the control voltage is switched OFF.

| LEDs | | Operation |
|---|---|---|
| POWER | Release | |
| ☼ | ● | Overtravel distance OK. |
| ☼ | ☼ | Overtravel distance incorrect or test not yet performed |

### Fault

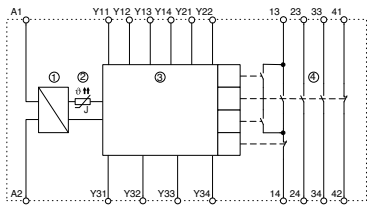
If the cam overtravels position switch S4, indicator light H1 does not light up. The hazardous part of the machine can be moved up to top dead centre only by means of S6.
The press can no longer be used for production. When this happens, notify the maintenance staff that the press needs attention.

## External circuit




C 575 two hand control unit,
S0 Main switch,
S1, S2 keys at two hand control console,
S3 Position switch for top dead centre,
S4 Position switch for test cam
S5 Hydraulic pump "ON",
S6 Tool "up" (manual mode),
K1 Contactor for hydr. pump,
K2 Tool "up",
K3, K4 Tool "down",
H1 Indicator light

## Internal circuit



# Application examples
## C579

## Applications

You can use the C 579 expansion unit in combination with all the C 57x basic units. It extends the number of release circuits. Depending on the external connection, category 4 as per DIN EN 954-1 is achievable with this device.

## Functions and connections

The C 579 expansion unit has four release circuits (safety circuits) configured as NO circuits.
Two LEDs indicate operating state and function. The device is controlled via any release circuit of the safety relays C 57x.
When the EMERGENCY STOP pushbutton or the limit switch is unlocked and the ON button is pressed, the internal circuit of the safety relay and the external contactors are checked for correct functioning.

## 7 Terminal marking

| | | |
|---|---|---|
| Supply voltage | A1 | L/+ |
| | A2 | N/- |
| Outputs | 13, 14 | Safety output 1 (n/o contact) |
| | 23, 24 | Safety output 2 (n/o contact) |
| | 33, 34 | Safety output 3 (n/o contact) |
| | 43, 44 | Safety output 4 (n/o contact) |
| Feedback loop | 51, 52 | Monitoring of the extension unit |

## Operation

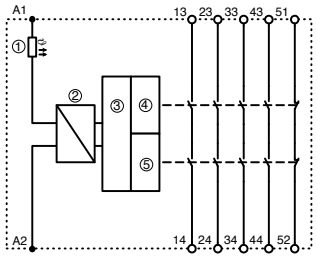
| LEDs | | Operation | |
|---|---|---|---|
| Channel 1 | Channel 2 | PS | Safety output of C 57x safety relays |
| ☼ | ☼ | ON | closed |
| ● | ● | | open |
| | | **Faults** | |
| ● | ☼ | | Relay fusion-welded |
| ☼ | ● | | Defect in electronics |
| ● | ● | | Motor contactor fusion welded |

**Fault clearance**
1. Switch supply voltage off.
2. Clear fault or replace device.
3. Switch supply voltage back on.

**Cable length**

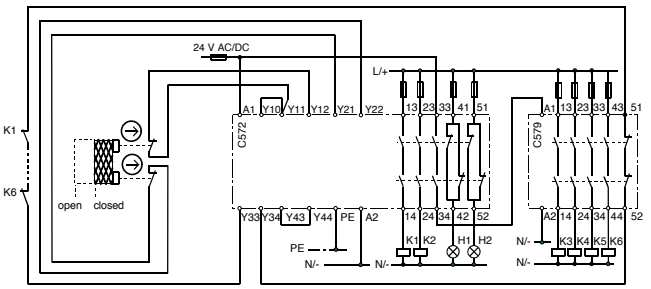
For 2 x 1.5mm$^2$ max. 1000m total cable length for 150nF/km sensors and power supply lines.

## Internal circuit



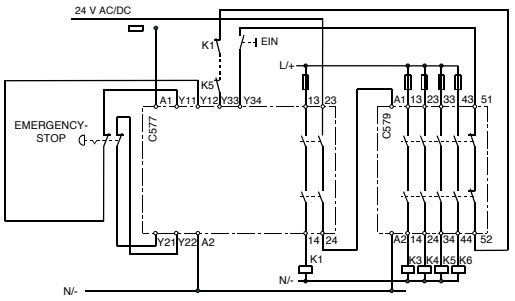

## Safety gate monitoring

Safety category 4 acc. to EN 954-1

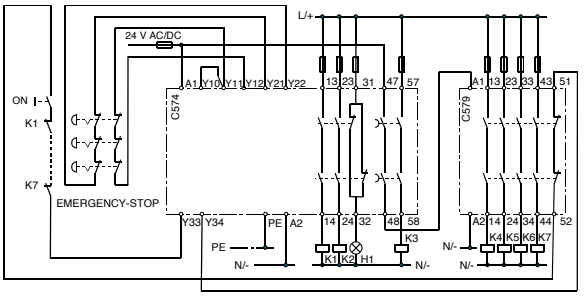



## EMERGENCY STOP

Safety category 4 acc. to EN 954-1

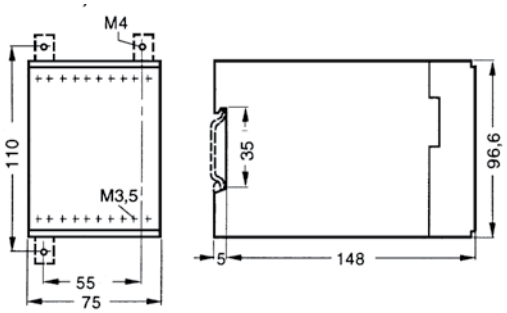



## EMERGENCY STOP with time delay

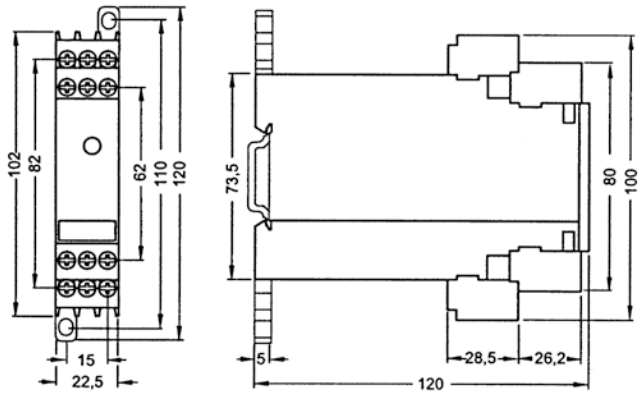


# Approximate dimensions

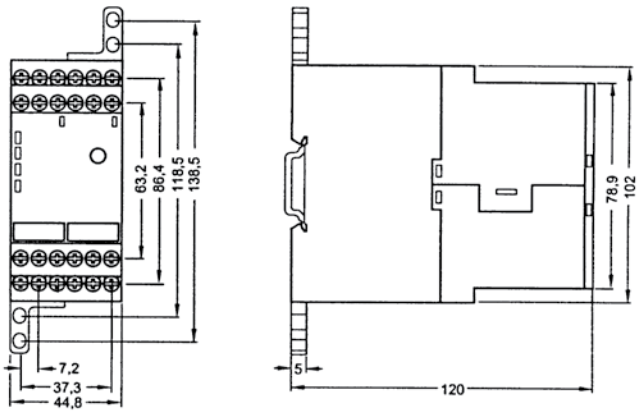
## C570



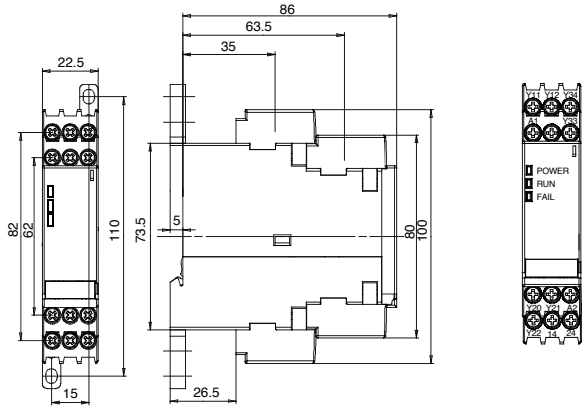

## C571, C573, C576, C577, C579



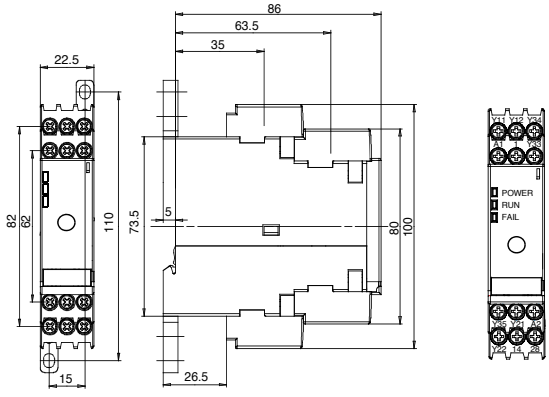

## C572, C574, C575, C578




## C6700 / C6701 / C6702




## C565-S



# Notes