

## Features

### 1 - Phase 230 V

#### Over & Under voltage monitoring relays

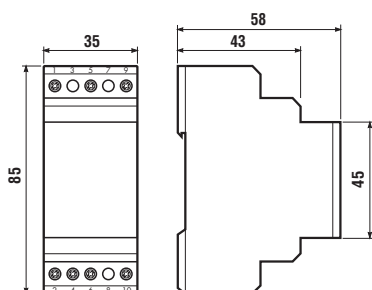
#### 71.11.8.230.0010

- Fixed Over & Under voltage detection
- Link selectable 5 or 10 minute lock-out delay

#### 71.11.8.230.1010

- Adjustable Over & Under voltage detection
- Switch selectable 5 or 10 minute lock-out delay

- 35 mm rail (EN 50022) mounting
- LED indication
- Positive safety logic (healthy conditions - output relay energised)



### 71.11.8.230.0010



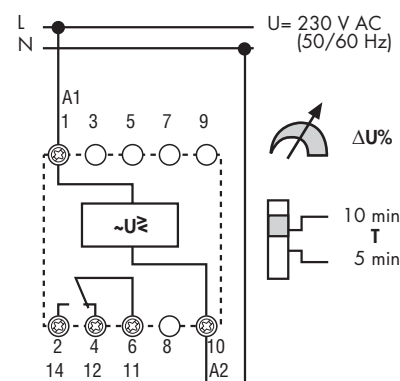
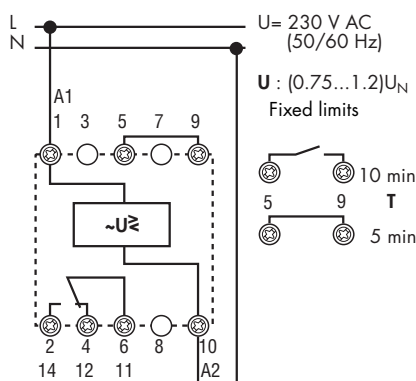
- Fixed - Over/Under voltage limits,  $(0.75...1.2) U_N$  respectively
- Link selectable - 5 min or 10 min delay

### 71.11.8.230.1010



- Adjustable - symmetrical Over/Under voltage limits adjustable between  $\pm 5\%$  to  $\pm 20\% U_N$
- Switch selectable - 5 min or 10 min delay

- Detects and trips on out-of-limits L-N voltage, and protects against excessive "starts/hour" through "power-on" and "lock-out" time delays.
- Typical applications - protection of compressor motors and high pressure discharge lamp circuitry.



### Contact specification

Contact configuration

1 CO (SPDT)

1 CO (SPDT)

Rated current/Maximum peak current A

10/15

10/15

Rated voltage/Maximum switching voltage V AC

250/400

250/400

Rated load AC1 VA

2,500

2,500

Rated load AC15 (230 V AC) VA

500

500

Single phase motor rating (230 V AC) kW

0.5

0.5

Breaking capacity DC1: 30/110/220 V A

10/0.3/0.12

10/0.3/0.12

Minimum switching load mW (V/mA)

300 (5/5)

300 (5/5)

Standard contact material

AgCdO

AgCdO

### Supply specification

Nominal voltage ( $U_N$ ) V AC (50/60 Hz)

230

230

—

—

Rated power AC/DC VA (50 Hz)/W

4/—

4/—

Operating range AC

$(0.75...1.2) U_N$

$(0.8...1.2) U_N$

DC

—

—

### Technical data

Electrical life at rated load AC1 cycles

$100 \cdot 10^3$

$100 \cdot 10^3$

Detection levels

Fixed  $(0.75...1.2) U_N$

Adjustable  $(\pm 5... \pm 20)\% U_N$

Switch-on lock-out time/reaction time

$(5 \text{ or } 10) \text{ min} / < 0.5 \text{ s}$

$(5 \text{ or } 10) \text{ min} / < 0.5 \text{ s}$

Fault memory

—

—

Electrical isolation: Supply to Measuring circuits

None – circuits are electrically common

None – circuits are electrically common

Ambient temperature range °C

$-20...+55$

$-20...+55$

Protection category

IP 20

IP 20

Approvals (according to type)



## Features

71.31.8.400.1010

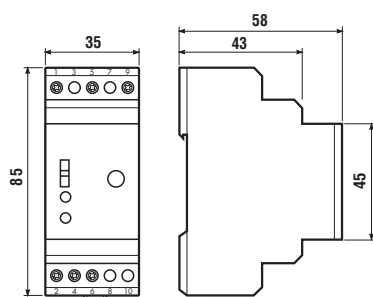
3 - Phase 400 V

Over & Under voltage monitoring relay

71.31.8.400.1010

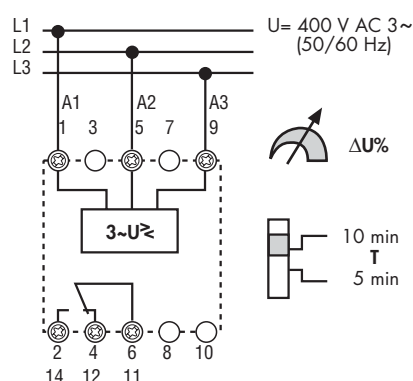
- Adjustable Over & Under voltage detection
- Switch selectable 5 or 10 minute lock-out delay

- 35 mm rail (EN 50022) mounting
- LED indication
- Positive safety logic (healthy conditions - output relay energised)



- Adjustable - symmetrical Over/Under voltage limits adjustable between  $\pm 5\%$  to  $\pm 20\%$   $U_N$
- Switch selectable - 5 min or 10 min delay

- Detects and trips on out-of-limits L-L voltage, and protects against excessive "starts/hour" through "power-on" and "lock-out" time delays.
- Typical applications - protection of compressor motors and high pressure discharge lamp circuitry.



### Contact specification

|                                              |                     |
|----------------------------------------------|---------------------|
| Contact configuration                        | 1 CO (SPDT)         |
| Rated current/Maximum peak current           | A 10/15             |
| Rated voltage/Maximum switching voltage V AC | 250/400             |
| Rated load AC1                               | VA 2,500            |
| Rated load AC15 (230 V AC)                   | VA 500              |
| Single phase motor rating (230 V AC)         | kW 0.5              |
| Breaking capacity DC1: 30/110/220 V          | A 10/0.3/0.12       |
| Minimum switching load                       | mW (V/mA) 300 (5/5) |
| Standard contact material                    | AgCdO               |

### Supply specification

|                           |                      |
|---------------------------|----------------------|
| Nominal voltage ( $U_N$ ) | V AC (50/60 Hz) 400  |
|                           | V DC —               |
| Rated power AC/DC         | VA (50 Hz)/W 4/—     |
| Operating range           | AC (0.8...1.2) $U_N$ |
|                           | DC —                 |

### Technical data

|                                                    |                                                         |
|----------------------------------------------------|---------------------------------------------------------|
| Electrical life at rated load AC1                  | cycles $100 \cdot 10^3$                                 |
| Detection levels                                   | V (50/60 Hz) Adjustable ( $\pm 5 \dots \pm 20$ )% $U_N$ |
| Switch-on lock-out time/reaction time              | (5 or 10)min / < 0.5 s                                  |
| Fault memory                                       | —                                                       |
| Electrical isolation: Supply to Measuring circuits | None – circuits are electrically common                 |
| Ambient temperature range                          | °C $-20 \dots +55$                                      |
| Protection category                                | IP 20                                                   |

Approvals (according to type)



## Features

### 3 - Phase 400 V - Line monitoring relays

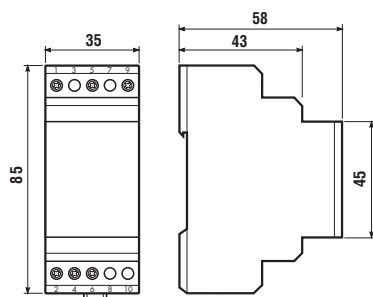
#### 71.31.8.400.1021

- Over & Under voltage trip on-delay
- Fault memory

#### 71.31.8.400.2000

- Phase asymmetry
- Phase rotation
- Phase loss

- 35 mm rail (EN 50022) mounting
- LED indication
- Positive safety logic (healthy conditions - output relay energised)

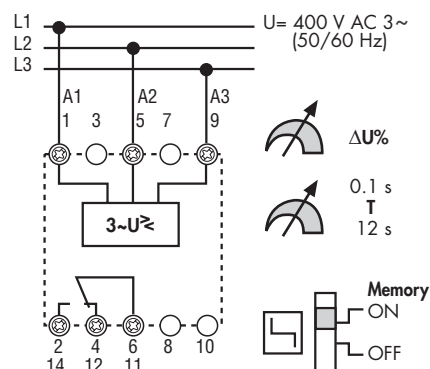


### 71.31.8.400.1021



- 3 phase 400 V - line voltage monitoring
- Detects over and under voltage
- Adjustable trip on-delay
- Switch selectable fault memory

- Under voltage trip level  $(0.8...0.95)U_N$  - Adjustable
- Over voltage trip level  $1.15 U_N$  - Fixed
- Trip delay time  $(0.1...12)s$  adjustable
- Fault memory, switch selectable
- Fault acknowledgement by switch manipulation from ON to OFF and back to ON or power down

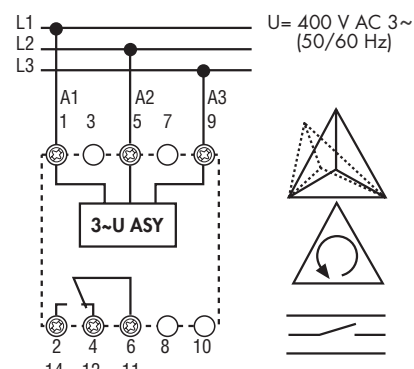


### 71.31.8.400.2000



- 3 phase asymmetry monitoring
- Phase rotation monitoring
- Phase loss monitoring

- Asymmetry between phases  $(-5...-20)\% U_N$  adjustable
- Detection of the supply voltage  $U$  to A1 (1) and/or A2 (5)  $> 1.11 U_N$



### Contact specification

Contact configuration

1 CO (SPDT)

1 CO (SPDT)

Rated current/Maximum peak current A

10/15

10/15

Rated voltage/Maximum switching voltage V AC

250/400

250/400

Rated load AC1 VA

2,500

2,500

Rated load AC15 (230 V AC) VA

500

500

Single phase motor rating (230 V AC) kW

0.5

0.5

Breaking capacity DC1: 30/110/220 V A

10/0.3/0.12

10/0.3/0.12

Minimum switching load mW (V/mA)

300 (5/5)

300 (5/5)

Standard contact material

AgCdO

AgCdO

### Supply specification

Nominal voltage ( $U_N$ ) V AC (50/60 Hz)

400

400

V DC

—

—

Rated power AC/DC VA (50 Hz)/W

4/—

4/—

Operating range AC

$(0.8...1.15)U_N$

$(0.8...1.15)U_N$

DC

—

—

### Technical data

Electrical life at rated load AC1 cycles

$100 \cdot 10^3$

$100 \cdot 10^3$

Detection level  $U_{min}/U_{max}/Asymmetry$

$(0.8...0.95)U_N / 1.15 U_N / —$

$0.7 U_N / 1.11 U_N / [-5...-20]\% U_N$

Trip on-delay/reaction time

$(0.1...12)s / < 0.5 s$

— /  $< 0.5 s$

Fault memory - selectable

Yes

—

Electrical isolation: Supply to Measuring circuits

None – circuits are electrically common

None – circuits are electrically common

Ambient temperature range °C

$-20...+55$

$-20...+55$

Protection category

IP 20

IP 20

Approvals (according to type)



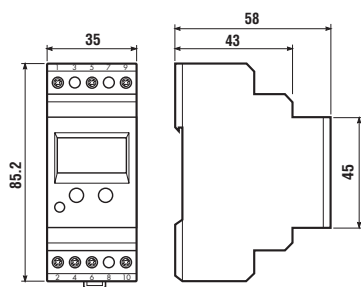
## Features

Universal voltage or current detecting and monitoring relay

**71.41.8.230.1021 - Voltage monitoring**

**71.51.8.230.1021 - Current monitoring**

- Zero voltage memory according to EN 60204-7-5
- Programmable for DC or AC detection level:
  - range detecting: upper and lower value
  - upper set point minus hysteresis range (5...50)% for switch on
  - lower set point plus hysteresis range (5...50)% for switch on
- Fault memory
- Electrical isolation between measuring and supply circuits
- Immune to supply interruptions of < 200 ms
- Wide detecting range:
  - voltage: DC (15...700)V, AC (15...480)V
- 35 mm rail (EN 50022) mounting

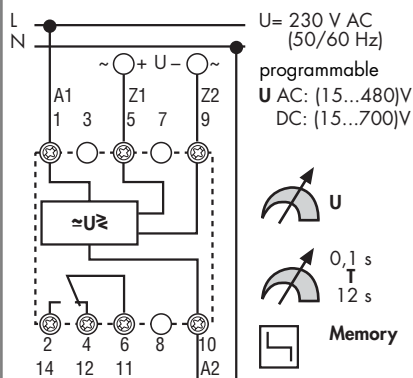


**71.41.8.230.1021**



- Programmable universal voltage monitoring relay

- AC/DC voltage detection - adjustable
- AC (50/60 Hz) (15...480)V
- DC (15...700)V
- Switch-on hysteresis (5...50)%
- Switch-off delay (0.1...12)s

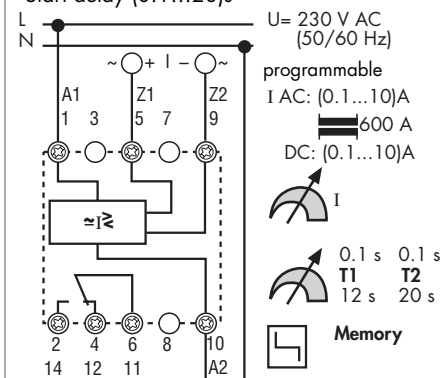


**71.51.8.230.1021**



- Programmable universal current monitoring relay
- Usable with current transformer 50/5, 100/5, 150/5, 250/5, 300/5, 400/5 or 600/5

- AC/DC current detection - adjustable
- AC(50/60Hz) (0.1...10)A with current transformer to 600A
- DC (0.1...10)A
- Switch-on hysteresis (5...50)%
- Switch-off delay (0.1...12)s
- Start delay (0.1...20)s



### Contact specification

|                                              |                     |             |
|----------------------------------------------|---------------------|-------------|
| Contact configuration                        | 1 CO (SPDT)         | 1 CO (SPDT) |
| Rated current/Maximum peak current           | A 10/15             | 10/15       |
| Rated voltage/Maximum switching voltage V AC | 250/400             | 250/400     |
| Rated load AC1                               | VA 2,500            | 2,500       |
| Rated load AC15 (230 V AC)                   | VA 500              | 500         |
| Single phase motor rating (230 V AC)         | kW 0.5              | 0.5         |
| Breaking capacity DC1: 30/110/220 V          | A 10/0.3/0.12       | 10/0.3/0.12 |
| Minimum switching load                       | mW (V/mA) 300 (5/5) | 300 (5/5)   |
| Standard contact material                    | AgCdO               | AgCdO       |

### Supply specification

|                           |                        |                     |
|---------------------------|------------------------|---------------------|
| Nominal voltage ( $U_N$ ) | V AC (50/60 Hz) 230    | 230                 |
|                           | V DC —                 | —                   |
| Rated power AC/DC         | VA (50 Hz)/W 4 / —     | 4 / —               |
| Operating range           | AC (0.85...1.15) $U_N$ | (0.85...1.15) $U_N$ |
|                           | DC —                   | —                   |

### Technical data

|                                                    |                                         |                                                 |
|----------------------------------------------------|-----------------------------------------|-------------------------------------------------|
| Electrical life at rated load AC1                  | cycles $100 \cdot 10^3$                 | $100 \cdot 10^3$                                |
| Detection levels                                   | AC(50/60 Hz)/DC (15...480)V/(15...700)V | (0.1...10)A at transducer to 600A / (0.1...10)A |
| Switch-off/reaction/Start delay                    | (0.1...12)s / < 0.35 s / < 0.5 s        | (0.1...12)s / < 0.35 s / (0.1...20)s            |
| Switch-on level of the detecting level             | % 5...50                                | 5...50                                          |
| Fault memory - programmable                        | Yes                                     | Yes                                             |
| Electrical isolation: Supply to Measuring circuits | Yes                                     | Yes                                             |
| Ambient temperature range                          | °C -20...+55                            | -20...+55                                       |
| Protection category                                | IP 20                                   | IP 20                                           |

Approvals (according to type)



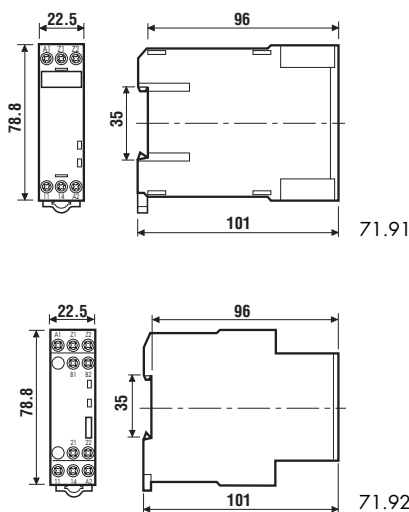
## Features

Thermistor temperature sensing relays for industrial applications

71.91 - 1 Pole, without fault memory

71.92 - 2 Pole, with fault memory

- Overload protection according EN 60204-7-3
- Positive safety logic - make contact opens if the measured value is outside of the acceptable range
- Industry standard module
- LED status indication
- 35 mm rail (EN 50022) mounting

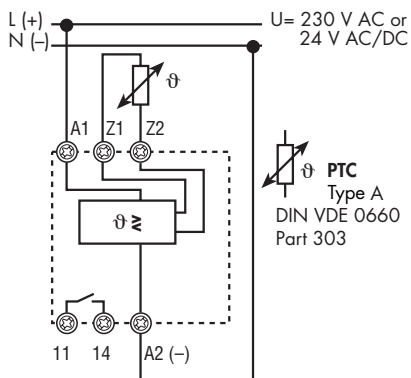


71.91.x.xxx.0300



- Thermistor relay
- 1 Pole normally open contact
- 24 V AC/DC, or 230 V AC supply

- Temperature detection with PTC
- PTC short circuit detection
- PTC wire breakage detection

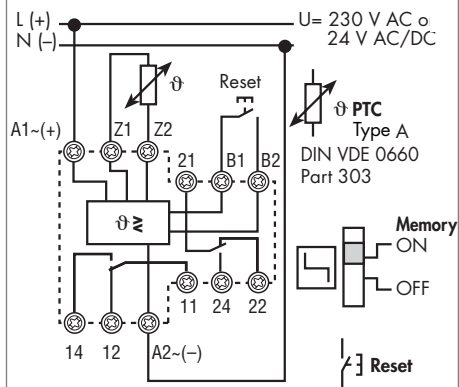


71.92.x.xxx.0001



- Thermistor relay with fault memory
- 2 Pole changeover contacts
- 24 V AC/DC, or 230 V AC supply

- Temperature detection with PTC
- Fault memory – switch selectable
- Reset by Reset button or supply interruption
- PTC short circuit detection
- PTC wire breakage detection



### Contact specification

|                                              |                |             |
|----------------------------------------------|----------------|-------------|
| Contact configuration                        | 1 NO (SPST-NO) | 2 CO (DPDT) |
| Rated current/Maximum peak current A         | 10/15          | 10/15       |
| Rated voltage/Maximum switching voltage V AC | 250/400        | 250/400     |
| Rated load AC1 VA                            | 2,500          | 2,500       |
| Rated load AC15 (230 V AC) VA                | 500            | 500         |
| Single phase motor rating (230 V AC) kW      | 0.5            | 0.5         |
| Breaking capacity DC1: 30/110/220 V A        | 10/0.3/0.12    | 10/0.3/0.12 |
| Minimum switching load mW (V/mA)             | 300 (5/5)      | 300 (5/5)   |
| Standard contact material                    | AgCdO          | AgCdO       |

### Supply specification

|                                           |                    |                    |
|-------------------------------------------|--------------------|--------------------|
| Nominal voltage ( $U_N$ ) V AC (50/60 Hz) | 230                | 230                |
| V AC/DC                                   | 24                 | 24                 |
| Rated power AC/DC VA (50 Hz)/W            | 1/0.5              | 1/0.5              |
| Operating range AC                        | $(0.85...1.15)U_N$ | $(0.85...1.15)U_N$ |
| DC                                        | —                  | —                  |

### Technical data

|                                                    |                                                    |                                                    |
|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|
| Electrical life at rated load AC1 cycles           | $100 \cdot 10^3$                                   | $100 \cdot 10^3$                                   |
| PTC detecting: Short circuit/Temperature OK        | $<20 \Omega / >20 \Omega \dots <3 \text{ k}\Omega$ | $<20 \Omega / >20 \Omega \dots <3 \text{ k}\Omega$ |
| Reset/PTC break                                    | $<1.3 \text{ k}\Omega / >3 \text{ k}\Omega$        | $<1.3 \text{ k}\Omega / >3 \text{ k}\Omega$        |
| Delay time/activation time                         | — / $<0.5 \text{ s}$                               | — / $<0.5 \text{ s}$                               |
| Fault memory - switch selectable                   | —                                                  | Yes                                                |
| Electrical isolation: Supply to Measuring circuits | Yes                                                | Yes                                                |
| Ambient temperature range $^{\circ}\text{C}$       | $-20...+55$                                        | $-20...+55$                                        |
| Protection category                                | IP 20                                              | IP 20                                              |

Approvals (according to type)



## Ordering information

Example: Universal voltage monitoring relay with LCD display for AC/DC voltage detection, 1 CO (SPDT) contact rated 10 A 250, supply voltage 230 V, programmable delay time and fault memory.

7 1 . 4 1 . 8 . 2 3 0 . 1 0 2 1

### Series

### Type

- 1 = 1 phase AC line monitoring
- 3 = 3 phase AC line monitoring
- 4 = AC/DC universal- Voltage detection
- 5 = AC/DC universal- Current detection
- 9 = Thermistor relay (temperature monitoring with PTC thermistor)

### No. of poles

- 1 = 1 CO (SPDT) types 71.11, 31, 41, 51
- 1 = 1 NO (SPST-NO) type 71.91
- 2 = 2 CO (DPDT) type 71.92

### Supply version

- 0 = AC(50/60Hz)/DC
- 8 = AC (50/60 Hz)

### Supply voltage

- 024 = 24 V AC/DC
- 230 = 230 V
- 400 = 400 V

### Additional functions

- 0 = Basic function
- 1 = Adjustable detection value
- 2 = Adjustable: Asymmetry, phase loss, phase rotation

### Special versions

- 0 = No fault memory
- 1 = Fault memory

### Options

- 0 = No delay time
- 1 = Two selectable delay times
- 2 = Adjustable delay times

### Contact circuit

- 0 = CO (nPDT)
- 3 = NO (nPST-NO)

## Technical data

| Insulation                                                                                       |  |                                               |                                                                                                                                                        |                 |               |
|--------------------------------------------------------------------------------------------------|--|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|
| Insulation according to EN 61810-1                                                               |  |                                               | insulation rated voltage                                                                                                                               | V               | 250           |
|                                                                                                  |  |                                               | rated impulse withstand voltage                                                                                                                        | kV              | 4             |
|                                                                                                  |  |                                               | pollution degree                                                                                                                                       |                 | 3             |
|                                                                                                  |  |                                               | over-voltage category                                                                                                                                  |                 | III           |
| Dielectric strength (A1, A2, A3, B1, B2), and                                                    |  |                                               | V AC                                                                                                                                                   | 2,500           |               |
| contact terminals (11, 12, 14) and terminals (Z1, Z2)                                            |  |                                               | kV (1.2/50 µs)                                                                                                                                         | 6               |               |
| Dielectric strength at open contact                                                              |  |                                               | V AC                                                                                                                                                   | 1,000           |               |
| EMC specifications                                                                               |  |                                               |                                                                                                                                                        |                 |               |
| Type of test                                                                                     |  |                                               | Reference Standard                                                                                                                                     |                 |               |
| Electrostatic discharge                                                                          |  | contact discharge                             | EN 610004-2                                                                                                                                            | 8 kV            |               |
|                                                                                                  |  | air discharge                                 | EN 610004-2                                                                                                                                            | 8 kV            |               |
| Radio-frequency electromagnetic field (80...1,000)MHz                                            |  |                                               | EN 610004-3                                                                                                                                            | 3 V/m           |               |
| Fast transients (burst) (5-50 ns, 5 kHz) on (A1, A2, A3, R1, R2) and ( Z1, Z2)                   |  |                                               | EN 610004-4                                                                                                                                            | 2 kV            |               |
| Surges (1.2/50 µs) on (A1, A2, A3, B1, B2) and (Z1, Z2)                                          |  | common mode                                   | EN 610004-5                                                                                                                                            | 4 kV            |               |
|                                                                                                  |  | differential mode                             | EN 610004-5                                                                                                                                            | 4 kV            |               |
| Radio-frequency common mode (0.15 ÷ 80 MHz) to A1 - A2                                           |  |                                               | EN 610004-6                                                                                                                                            | 10 V            |               |
| Radiated and conducted emission                                                                  |  |                                               | EN 55022                                                                                                                                               | class B         |               |
| Other data                                                                                       |  |                                               |                                                                                                                                                        |                 |               |
| Voltage and current values at terminals Z1 Z2                                                    |  | Type 71.11                                    | Link for time range                                                                                                                                    | V / mA          | 230 V / —     |
|                                                                                                  |  | Type 71.91, 71.92                             | PTC temperature measurement                                                                                                                            | V / mA          | 24 V / 2.4    |
| Maximum length of wiring to the Supply terminals/                                                |  | Type 71.11, 71.31                             | Contact bridge for time range                                                                                                                          | m               | 150 / —       |
| Measuring terminals                                                                              |  | Type 71.41                                    | Voltage measurement                                                                                                                                    | m               | 150 / 50      |
|                                                                                                  |  | Type 71.51                                    | Current measurement                                                                                                                                    | m               | 150 / 50      |
| (Wiring capacitance no greater than 10 nF/100 m)                                                 |  | Type 71.91, 71.92                             | PTC temperature measurement                                                                                                                            | m               | 50 / 50       |
| Measuring principle                                                                              |  | Type 71.11, 71.31, 71.41, 71.51, 71.91, 71.92 | The measured value is the arithmetical average of 500 individual measurements taken over a 100 ms period. Interruptions less than <200 ms are ignored. |                 |               |
| Safety logic                                                                                     |  | Type 71.11, 71.31, 71.41, 71.51, 71.91, 71.92 | Positive safety logic - When the value being monitored lies within the acceptable area, the make contact is closed.                                    |                 |               |
| Reaction time (following the application of the supply voltage)                                  |  | Type 71.11, 71.31, 71.41, 71.51, 71.91, 71.92 | ≤ 0.5 s                                                                                                                                                |                 |               |
| Power lost to the environment                                                                    |  | without contact load                          | VA                                                                                                                                                     | 4               |               |
|                                                                                                  |  | with rated current                            | VA                                                                                                                                                     | 5               |               |
| Permitted storage temperature range                                                              |  |                                               | °C                                                                                                                                                     | -40...+85       |               |
| Protection category                                                                              |  |                                               | IP 20                                                                                                                                                  |                 |               |
|  Screw torque |  |                                               | Nm                                                                                                                                                     | 0.8             |               |
| Max. wire size                                                                                   |  |                                               | solid cable                                                                                                                                            |                 | standed cable |
|                                                                                                  |  |                                               | mm²                                                                                                                                                    | 0.5...(2 x 2.5) | (2 x 1.5)     |
|                                                                                                  |  |                                               | AWG                                                                                                                                                    | 20...(2 x 14)   | (2 x 16)      |

## Functions

| Monitoring relay    | Types                            |                                  |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   |                        |            |                                  | Times               |                                   |                                                                                   | Supply voltage |          |          | Module width |              | Contact conf.               |
|---------------------|----------------------------------|----------------------------------|-------------------------------|---------------------------|----------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------|------------|----------------------------------|---------------------|-----------------------------------|-----------------------------------------------------------------------------------|----------------|----------|----------|--------------|--------------|-----------------------------|
|                     | 1-phase 230 V, Under/Overvoltage | 3-phase 400 V, Under/Overvoltage | 3-phase 400 V, Phase/Symmetry | 3-phase 400 V, Phase loss | 3-phase 400 V, Phase | DC voltage (15...700)V Under and Over voltage monitoring | AC voltage (15...484)V Under and Over voltage monitoring | DC current (0.1...10)A Under and Over current monitoring | AC current (0.1...10)A (for to 600 A with current transformers) Under and Over current monitoring | Thermistor relay (PTC) | Adjustable | Fault memory for 71.41 and 71.51 | Delay time 5/10 min | Delay time (0.1...12)s adjustable | Power-up activation time delay (0.1 ...20)s — starting inrush current suppression | 24 V AC/DC     | 230 V AC | 400 V AC | 35 mm wide   | 22.5 mm wide | Relay contact, 250 V AC/10A |
| 71.11.8.230.0010    | •                                |                                  |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   |                        |            |                                  | •                   |                                   |                                                                                   |                | •        |          | •            |              | 1 CO SPDT                   |
| 71.11.8.230.1010    | •                                |                                  |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   |                        | •          |                                  | •                   |                                   |                                                                                   |                | •        |          | •            |              | 1 CO SPDT                   |
| 71.31.8.400.1010    |                                  | •                                |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   |                        | •          |                                  | •                   |                                   |                                                                                   |                |          | •        | •            |              | 1 CO SPDT                   |
| 71.31.8.400.1021    |                                  | •                                |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   |                        | •          | •                                |                     | •                                 |                                                                                   |                |          | •        | •            |              | 1 CO SPDT                   |
| 71.31.8.400.2000    |                                  |                                  | •                             | •                         | •                    |                                                          |                                                          |                                                          |                                                                                                   |                        | •          |                                  |                     |                                   |                                                                                   |                |          | •        | •            |              | 1 CO SPDT                   |
| 71.41.8.230.1021    | •                                |                                  |                               |                           |                      | •                                                        | •                                                        |                                                          |                                                                                                   |                        | •          | •                                |                     | •                                 |                                                                                   |                | •        |          | •            |              | 1 CO SPDT                   |
| 71.51.8.230.1021    |                                  |                                  |                               |                           |                      |                                                          |                                                          | •                                                        | •                                                                                                 |                        | •          | •                                |                     | •                                 | •                                                                                 |                | •        |          | •            |              | 1 CO SPDT                   |
| 71.91.0.024.0300    |                                  |                                  |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   | •                      | •          |                                  |                     |                                   |                                                                                   | •              |          |          |              | •            | 1 NO SPST-NO                |
| 71.91.8.230.0300    |                                  |                                  |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   | •                      | •          |                                  |                     |                                   |                                                                                   |                | •        |          |              | •            | 1 NO SPST-NO                |
| 71.92.0.024.0001    |                                  |                                  |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   | •                      | •          | •                                |                     |                                   |                                                                                   | •              |          |          |              | •            | 2 CO DPDT                   |
| 71.92.8.230.0001    |                                  |                                  |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   | •                      | •          | •                                |                     |                                   |                                                                                   |                | •        |          |              | •            | 2 CO DPDT                   |
| Current transformer | Source as required               |                                  |                               |                           |                      |                                                          |                                                          |                                                          |                                                                                                   |                        |            |                                  |                     |                                   |                                                                                   |                |          |          |              |              |                             |



## Explanation of relay marking and LED/LCD display

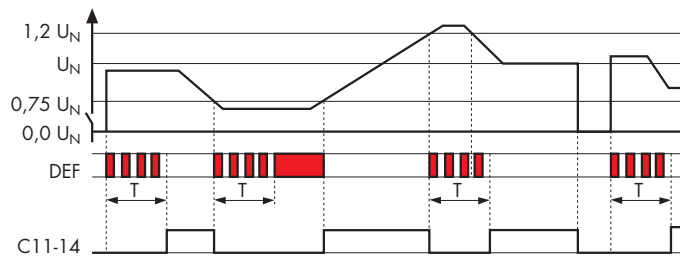
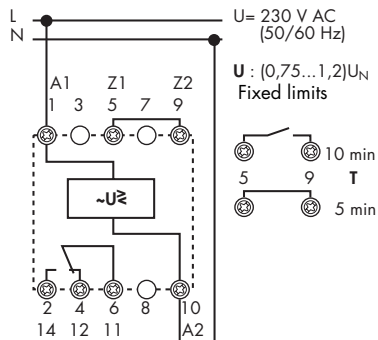
| Monitoring relay without LCD-display |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                               |                                                                                                                                                                                                                                       |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ON                                   | LED green steady light: supply voltage is on and measuring system is active.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                               |                                                                                                                                                                                                                                       |
| DEF                                  | Default: the detected value is outside of the acceptable range (asymmetric is shown by the LED ASY).<br>LED red flashing: delay time is running, see the function diagram.<br>LED red steady light: output relay is off, contact 11-14 (6-2) is open.                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                               |                                                                                                                                                                                                                                       |
| ASY                                  | Phase asymmetry is outside of the predefined range.<br>LED steady light: output relay is turned off, contact 11-14 (6-2) is open.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                               |                                                                                                                                                                                                                                       |
| LEVEL                                | Selected range as % value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                               |                                                                                                                                                                                                                                       |
| TIME                                 | Delay time min (minutes) or s (seconds).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                               |                                                                                                                                                                                                                                       |
| MEMORY ON                            | Fault memory switched on: the state of the output relay after the occurrence of a fault –contact 11-14 (6-2) open– will be maintained, monitored value returns to within acceptable limits. Fault reset is made by switch manipulation from ON to OFF to ON, or by power down (71.31.8.400.1021 & 71.92.x.xxx.0001), or by operating of the “RESET” (71.92.x.xxx.0001).                                                                                                                                                                                                                                                    |                                                                                                               |                                                                                                                                                                                                                                       |
| MEMORY OFF                           | Fault memory turned off: the state of the output contacts will only remain in the “fault” condition –contact 11-14 (6-2) open– while the monitored value is outside of the acceptable limits. When the monitored value returns within the acceptable limits the contact will revert to the energised state. Monitored equipment will start again automatically.                                                                                                                                                                                                                                                            |                                                                                                               |                                                                                                                                                                                                                                       |
| Monitoring relay with LCD-display    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                               |                                                                                                                                                                                                                                       |
| SET/RESET                            | Relay 71.41 and 71.51. Sets and resets the programmable values - see operating in the packing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                               |                                                                                                                                                                                                                                       |
| SELECT                               | Relay 71.41 and 71.51. Selects the desired parameter for programming - see operating instructions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                               |                                                                                                                                                                                                                                       |
| DEF                                  | Default, LED red steady or flashing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                               |                                                                                                                                                                                                                                       |
| PROG Modus                           | Enter the programming mode by simultaneously pressing the buttons “SET/RESET” and “SELECT” for 3 seconds.<br>The word “prog” is shown for 1 second. “SELECT” allows the choice of “AC” or “DC”, and is confirmed with “SET/RESET”.<br>Successively pressing the button “SELECT” brings up the choices of Up, or Up <sub>Lo</sub> .<br>The appropriate choice is made by pressing the “SET/RESET” button.<br>The next step will program the appropriate values and the selection of the fault memory function (which is selected with a “YES” or “NO”). If all programming steps are completed the display will read “end”. |                                                                                                               |                                                                                                                                                                                                                                       |
| Short programming instruction        | After repeatedly pressing the “SET/RESET” button the measured value will be displayed, or “0” appears if nothing is connected to Z1 and Z2 (5 and 9). If the programming is broken off before “end” is shown in the display the previous program will remain unchanged after an interruption of the supply voltage.                                                                                                                                                                                                                                                                                                        |                                                                                                               |                                                                                                                                                                                                                                       |
| Program query                        | Pushing the “SELECT” button for at least 1 second, enters the “program inquiry mode”. The programmed mode and the values are shown on the repeated pressing of the “SELECT” button.                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                               |                                                                                                                                                                                                                                       |
| Flashing M (memory)                  | Fault memory has had effect (fault acknowledgement and reset is made by a 3 second press of the “SET/RESET” button).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                               |                                                                                                                                                                                                                                       |
| LCD-display                          | V = volt<br>A = amp<br>Up = upper limit (with hysteresis in down direction)<br>Lo = lower limit (with hysteresis in up direction)<br>Up <sub>Lo</sub> = upper and lower limit - range detecting                                                                                                                                                                                                                                                                                                                                                                                                                            | Level= value<br>Hys = hysteresis<br>M = memory (fault)<br>Yes = yes - with memory<br>no = no - without memory | t <sub>1</sub> = T <sub>1</sub> - time during which short-time fluctuations are not taken into account<br>t <sub>2</sub> = T <sub>2</sub> - (monitoring relay 71.51) the time during which inrush currents are not taken into account |

## LED/LCD status announcement/advice

| Type                                                     | Starting mode                                                                               | Normal operation                                                                          | Abnormal mode                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                   | Reset                                                                                                                                                      |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 71.11.8.230.0010<br>71.11.8.230.1010<br>71.31.8.400.1010 | After connecting<br>T = 5 or 10 min<br>11-14 open                                           | Normal operation<br>Set point is OK<br>11-14 is closed                                    | Time T runs<br>Set point is immaterial<br>11-14 is open<br><b>Will close after T, if set point is OK</b>                                                                                                                                                                                                                     | After expiry of T<br>Set point is not OK<br>11-14 is open<br><b>Will close, if set point is OK</b>                                                                |                                                                                                                                                            |
| 71.31.8.400.1021<br>Memory OFF<br>                       |                                                                                             | Normal operation<br>Set point is OK<br>11-14 is closed                                    | Time T runs,<br>Set point is not OK<br>11-14 is closed                                                                                                                                                                                                                                                                       | After expiry of T<br>Set point is not OK<br>11-14 is open<br><b>Will close, if set point is OK</b>                                                                |                                                                                                                                                            |
| 71.31.8.400.1021<br>Memory ON<br>                        |                                                                                             | Normal operation<br>Set point is OK<br>11-14 is closed                                    | Time T runs,<br>Set point is not OK<br>11-14 is closed                                                                                                                                                                                                                                                                       | After expiry of T<br>Set point is not OK<br>11-14 is open<br><b>Will not close at RESET</b>                                                                       | After expiry of T<br>Set point is OK<br>11-14 is open<br><b>Will close at RESET</b>                                                                        |
| 71.31.8.400.2000                                         |                                                                                             | Normal operation<br>Set point is OK<br>11-14 is closed                                    | Supply voltage to<br>A1(1) and / or<br>A2(5) is missing<br>11-14 is open,<br><b>Will close if supply voltage<br/>restored and set point OK</b><br><br>Incorrect phase<br>rotation or phase<br>failure or voltage<br>A1(1) and/or A2(5)<br>is > 1.11 U <sub>N</sub><br>11-14 is open<br><b>Will close, if set point is OK</b> | Phase asymmetry<br>11-14 is open<br><br><b>Will close, if set point is OK</b>                                                                                     |                                                                                                                                                            |
| 71.41.8.230.1021<br>Memory OFF                           |                                                                                             | <b>Measured value displayed</b><br>Normal operation<br>Set point is OK<br>11-14 is closed | <b>Measured value displayed</b><br>Time T runs,<br>Set point is not OK<br>11-14 is closed                                                                                                                                                                                                                                    | <b>Measured value displayed</b><br>After expiry of T<br>Set point is not OK<br>11-14 is open<br><b>Will close, if set point is OK</b>                             |                                                                                                                                                            |
| 71.41.8.230.1021<br>Memory ON                            |                                                                                             | <b>Measured value displayed</b><br>Normal operation<br>Set point is OK<br>11-14 is closed | <b>Measured value displayed</b><br>Time T runs,<br>Set point is not OK<br>11-14 is closed                                                                                                                                                                                                                                    | <b>M in the display flashes</b><br><b>Measured value displayed</b><br>After expiry of T<br>Set point is not OK<br>11-14 is open<br><b>Will not close at RESET</b> | <b>M in the display - static</b><br><b>Measured value displayed</b><br>After expiry of T<br>Set point is OK<br>11-14 is open<br><b>Will close at RESET</b> |
| 71.51.8.230.1021<br>Memory OFF                           | <b>Measured value displayed</b><br>Time T2 runs,<br>Set point immaterial<br>11-14 is closed | <b>Measured value displayed</b><br>Normal operation<br>Set point is OK<br>11-14 is closed | <b>Measured value displayed</b><br>Time T runs,<br>Set point is not OK<br>11-14 is closed                                                                                                                                                                                                                                    | <b>Measured value displayed</b><br>After expiry of T<br>Set point is not OK<br>11-14 is open<br><b>Will close, if set point is OK</b>                             |                                                                                                                                                            |
| 71.51.8.230.1021<br>Memory ON                            | <b>Measured value displayed</b><br>Time T2 runs,<br>Set point immaterial<br>11-14 is closed | <b>Measured value displayed</b><br>Normal operation<br>Set point is OK<br>11-14 is closed | <b>Measured value displayed</b><br>Time T runs,<br>Set point is not OK<br>11-14 is closed                                                                                                                                                                                                                                    | <b>M in the display flashes</b><br><b>Measured value displayed</b><br>After expiry of T<br>Set point is not OK<br>11-14 is open<br><b>Will not close at RESET</b> | <b>M in the display - static</b><br><b>Measured value displayed</b><br>After expiry of T<br>Set point is OK<br>11-14 is open<br><b>Will close at RESET</b> |
| 71.91.x.xxx.0300                                         |                                                                                             | Normal operation<br>Set point is OK<br>11-14 is closed                                    | Temperature to high<br>or PTC line break<br>or PTC short circuit<br>11-14 is open<br><b>Will close, if set point is OK</b>                                                                                                                                                                                                   |                                                                                                                                                                   |                                                                                                                                                            |
| 71.92.x.xxx.0001<br>Memory OFF<br>                       |                                                                                             | Normal operation<br>Set point is OK<br>11-14 is closed                                    | Temperature to high<br>or PTC line break<br>or PTC short circuit<br>11-14 is open<br><b>Will close, if set point is OK</b>                                                                                                                                                                                                   |                                                                                                                                                                   |                                                                                                                                                            |
| 71.92.x.xxx.0001<br>Memory ON<br>                        |                                                                                             | Normal operation<br>Set point is OK<br>11-14 is closed                                    | Temperature to high<br>or PTC line break<br>or PTC short circuit<br>11-14 is open                                                                                                                                                                                                                                            |                                                                                                                                                                   | Temperature is OK<br>11-14 is open<br><br><b>Will close at RESET</b>                                                                                       |

## Functions

### Type 71.11.8.230.0010



#### Switch off

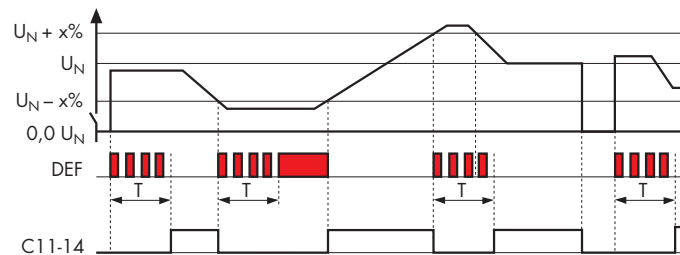
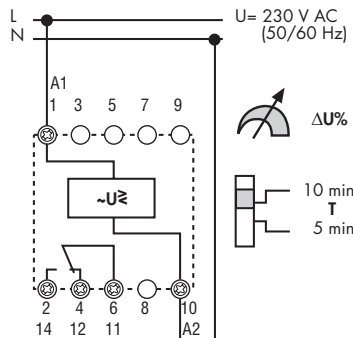
Immediately if monitored value is outside of the set points.

#### Switch on

After expiry of the time T and if monitored value is within the set points.

**C = output contact**  
 Normally open 11-14 (6-2) closed.

### Type 71.11.8.230.1010



#### Switch OFF

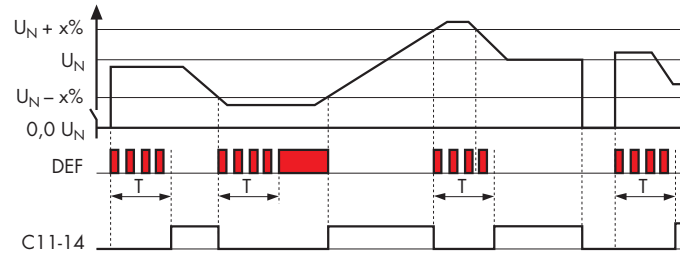
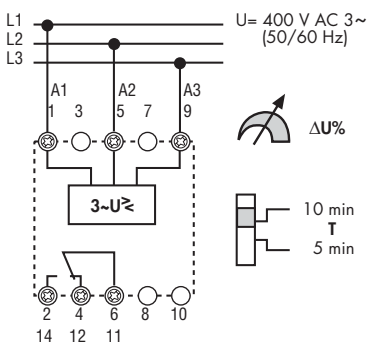
Immediately if monitored value is outside of the set points.

#### Switch on

After expiry of the time T and if monitored value is within the set points.

**C = output contact**  
 Normally open 11-14 (6-2) closed, all values within the set points.

### Type 71.31.8.400.1010



#### Switch off

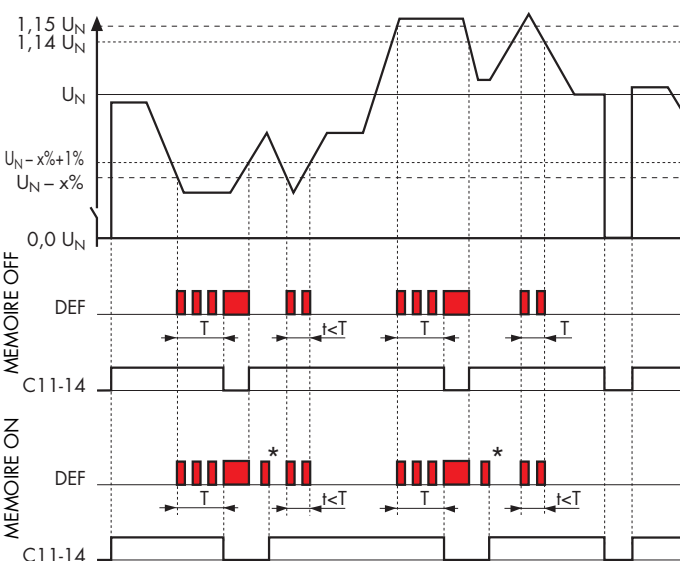
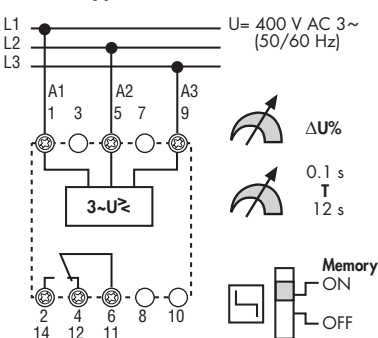
Immediately if monitored value is outside of the set points.

#### Switch on

After expiry of the time T and if monitored value is within the set points.

**C = output contact**  
 Normally open 11-14 (6-2) closed.

### Type 71.31.8.400.1021



#### Switch off

If monitored value is outside of the set points and time T has elapsed.

#### Switch on - MEMORY OFF

Immediately monitored value returns within limits (off-set by 1% hysteresis).

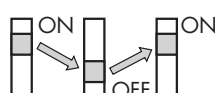
#### Switch on - MEMORY ON

As above, but subject to the RESET operation having been actioned.

#### RESET

By Memory switch manipulation from ON to OFF and back to ON, or power down.

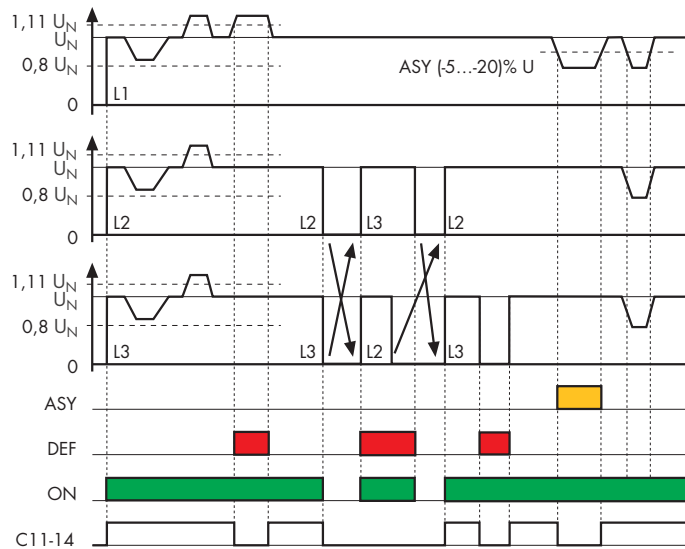
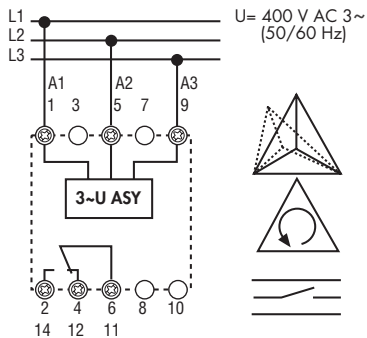
\*RESET MEMORY = By power-down or switch manipulation from ON to OFF to ON



**C = output contact**  
 Normally open 11-14 (6-2) closed.

**Functions**

**Type 71.31.8.400.2000**



**Switch off**

Phase asymmetry  
Incorrect phase rotation  
Phase loss

**LED • ASY yellow**

Phase asymmetry

**LED • DEF red**

Voltage to A1 (1) and/or A2 (5) > 1.11  $U_N$

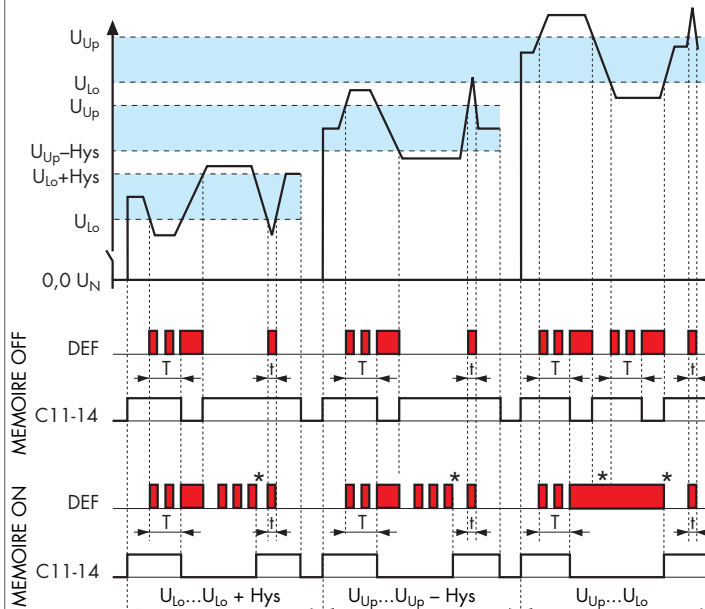
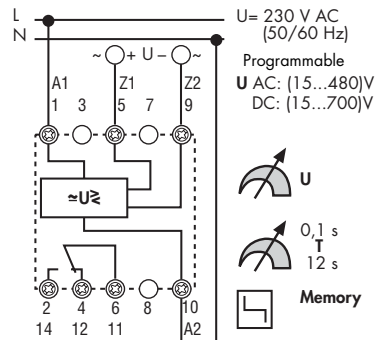
**LED • ON green**

Monitoring system is active and 400 V supply voltage is connected to 1-5 or A1-A2.

**C = output contact**

Normally open 11-14 (6-2) closed.

**Type 71.41.8.230.1021**



**Switch off**

$U_{Lo}$  - mode

If the monitored value is less than the lower-limit and, time T has expired.

$U_{Up}$  - mode

If the monitored value is higher than the upper limit, and time T has expired.

$U_{Lo}$   $U_{Up}$  - mode

If the monitored value of voltage is outside of the upper or lower voltage limits, and time T has expired.

Voltage dips < T do not result in output relay switching off.

**Switch on**

$U_{Lo}$  or  $U_{Up}$  - modes

When passing the hysteresis value.

$U_{Lo}$   $U_{Up}$  - mode

When passing the  $U_{Lo}$  or  $U_{Up}$  value.

**RESET MEMORY**

Pressing "SET/RESET" > 1 sec.

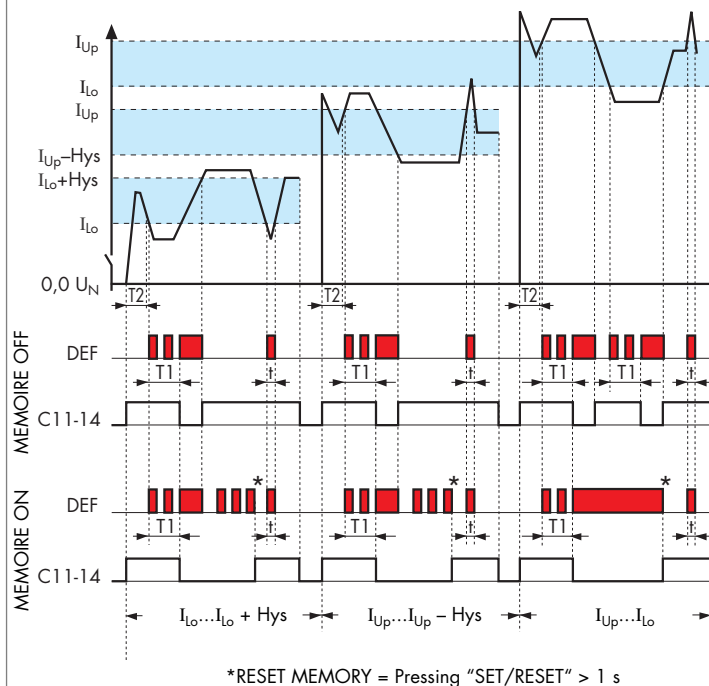
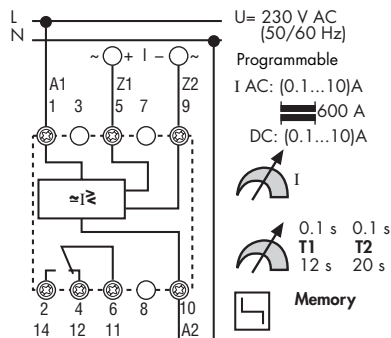
**C = output contact**

Normally open 11-14 (6-2) closed.

\*RESET MEMORY = Pressing "SET/RESET" > 1 s

**Functions**

**Type 71.51.8.230.1021**



**Switch off**

**$I_{Lo}$  – mode**  
 If the monitored value is less than the lower-limit and, time T1 has expired.

**$I_{Up}$  – mode**  
 If the monitored value is higher than the upper limit, and time T1 has expired.

**$I_{Lo}$   $I_{Up}$  – mode**  
 If the monitored value of voltage is outside of the upper or lower limits, and time T1 has expired.

Inrush current < T2 is ignored

Current dips < T1 do not result in output relay switching off.

**Switch on**

**$I_{Lo}$  or  $I_{Up}$  – modes**  
 When passing the hysteresis value.

**$I_{Lo}$   $I_{Up}$  – mode**  
 When passing the  $I_{Lo}$  or  $I_{Up}$  value.

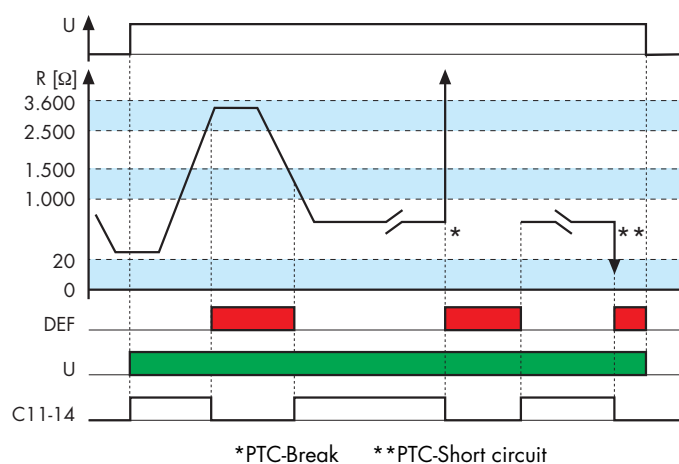
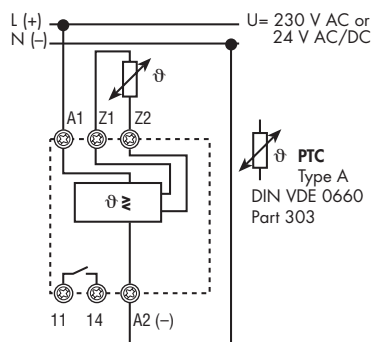
**RESET MEMORY**

Pushing "SET/RESET" > 1 sec.

**C = output contact**

Normally open 11-14 (6-2) closed.

**Type 71.91.x.xxx.0300**



**Switch off**

- Thermistor line break
- Over temperature  $R_{PTC} > (2.5...3.6)k\Omega$ ,
- Thermistor line short circuit ( $R_{PTC} < 20\Omega$ )
- Loss of supply

**Switch on**

Temperature within limits  
 $R_{PTC} > (1.0...1.5)k\Omega$  on power-up.  
 (1...1.5)kΩ on cooling.

**C = output contact**

Normally open 11-14  
 Closed when temperature within limits.

**Type 71.92.x.xxx.0001**

14