

# Solid State Relays Analog Full Cycle Switching Type RN.F

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- AC solid state relay, 1- and 2-poles
- Analog switching for resistive loads (heating)
- 4-20 mA or 0-10 V controls
- Rated operational current: 1-pole : 30A and 50A  
2-pole : 2 x15A and 2 x 25A
- Rated operational voltage up to 480 VAC
- LED-indication for normal operation and alarm status
- IP 20 protection
- DIN-rail mountable

## Product Description

The analog switching relay provides a number of full cycles, evenly distributed over a fixed period, depending of the control input. The input of 4-20 mA or 0-10 VDC respectively, corresponds to zero and full output within a period of 1.28 s @ 50 Hz (1.07 s @ 60 Hz). This principle makes the transfer characteristics fully linear. The

principle operates with zero switching, thus ensuring a reduced level of radiated and wire conducted noise. The 2-pole type has alarm LED indication by loss of master phase. The analogue Full Cycle Switching is not recommended for light control due to light-flickering.

## Ordering Key

**RN 1 F 40 V 30**

Solid State Relay \_\_\_\_\_  
Number of poles \_\_\_\_\_  
Switching type \_\_\_\_\_  
Rated operational voltage \_\_\_\_\_  
Control signal \_\_\_\_\_  
Rated operational current \_\_\_\_\_

## Type Selection, 1-Pole

| Rated operational voltage | Control input | Control supply    | Rated operational current |                   |
|---------------------------|---------------|-------------------|---------------------------|-------------------|
|                           |               |                   | 30 A                      | 50 A              |
| 120 VAC                   | 4-20 mA       | 7-10 VDC          | <b>RN 1F12I30</b>         | <b>RN 1F12I50</b> |
|                           | 0-10 VDC      | 12-32 VDC, 24 VAC | <b>RN 1F12V30</b>         | <b>RN 1F12V50</b> |
| 230 VAC                   | 4-20 mA       | 7-10 VDC          | <b>RN 1F23I30</b>         | <b>RN 1F23I50</b> |
|                           | 0-10 VDC      | 12-32 VDC, 24 VAC | <b>RN 1F23V30</b>         | <b>RN 1F23V50</b> |
| 480 VAC                   | 4-20 mA       | 7-10 VDC          | <b>RN 1F48I30</b>         | <b>RN 1F48I50</b> |
|                           | 0-10 VDC      | 12-32 VDC, 24 VAC | <b>RN 1F48V30</b>         | <b>RN 1F48V50</b> |

## Type Selection, 2-Pole

| Rated operational voltage | Control input | Control supply    | Rated operational current |                      |
|---------------------------|---------------|-------------------|---------------------------|----------------------|
|                           |               |                   | 30 A Total (2 x 15A)      | 50 A Total (2 x 25A) |
| 120 VAC                   | 4-20 mA       | 7-10 VDC          | <b>RN 2F12I30</b>         | <b>RN 2F12I50</b>    |
|                           | 0-10 VDC      | 12-32 VDC, 24 VAC | <b>RN 2F12V30</b>         | <b>RN 2F12V50</b>    |
| 230 VAC                   | 4-20 mA       | 7-10 VDC          | <b>RN 2F23I30</b>         | <b>RN 2F23I50</b>    |
|                           | 0-10 VDC      | 12-32 VDC, 24 VAC | <b>RN 2F23V30</b>         | <b>RN 2F23V50</b>    |
| 480 VAC                   | 4-20 mA       | 7-10 VDC          | <b>RN 2F48I30</b>         | <b>RN 2F48I50</b>    |
|                           | 0-10 VDC      | 12-32 VDC, 24 VAC | <b>RN 2F48V30</b>         | <b>RN 2F48V50</b>    |

## General Specifications

|                                      | RN.F12...          | RN.F23...          | RN.F48...           |
|--------------------------------------|--------------------|--------------------|---------------------|
| <b>Operational voltage range</b>     | 85 to 140 VAC      | 85 to 265 VAC      | 190 to 530 VAC      |
| <b>Non-rep. peak voltage</b>         | 800 V <sub>p</sub> | 800 V <sub>p</sub> | 1000 V <sub>p</sub> |
| <b>Varistor voltage</b>              | 275 VAC            | 275 VAC            | 510 VAC             |
| <b>Zero voltage turn-on</b>          | < 10 V             | < 10 V             | < 20 V              |
| <b>Operational frequency range</b>   | 45 to 65 Hz        | 45 to 65 Hz        | 45 to 65 Hz         |
| <b>Power factor at rated voltage</b> | ≥ 0.9              | ≥ 0.9              | ≥ 0.9               |
| <b>Average output power</b>          | 0 to 100%          | 0 to 100%          | 0 to 100%           |
| <b>Output power resolution</b>       | 1/64 of 100%       | 1/64 of 100%       | 1/64 of 100%        |
| <b>Approvals</b>                     | UL, cUL, CSA       | UL, cUL, CSA       | UL, cUL, CSA        |
| <b>CE-marking</b>                    | Yes                | Yes                | Yes                 |

Norms fulfilled    EN 60947-1 Low-voltage switchgear and control gear. Part 1- General Rules.  
 EN 61000-6-1 Generic Immunity Standard. Residential, Commercial & Light Industry Environment  
 EN 61000-6-2 Generic Immunity Standard. Industrial Environment

## Input Specifications

|                                 | RN.F.I..       |                                 | RN.F.V..                 |
|---------------------------------|----------------|---------------------------------|--------------------------|
| <b>Current controlled input</b> |                | <b>Voltage controlled input</b> |                          |
| Control current range           | 4 - 20 mA      | Supply voltage range            | 21 - 27 VAC, 12 - 32 VDC |
| Allowable input current         | 50 mA          | Supply current                  | 30 mA @ 24 VAC/32 VDC    |
| Reverse polarity protected      | Yes            | Control voltage range           | 0 - 10 V                 |
| Voltage drop                    | 10 VDC @ 20 mA | Control input current           | 0.1 mA @ 10 VDC          |

## Output Specifications

|                                                                                                       | RN.F..30                   | RN.F..50                 |
|-------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|
| <b>Rated operational current</b>                                                                      |                            |                          |
| RN1F..    AC51    @Ta=30°C                                                                            | 30 A                       | 50 A                     |
| "        @Ta=40°C                                                                                     | 30 A                       | 50 A                     |
| "        @Ta=50°C                                                                                     | 23 A                       | 38 A                     |
| "        @Ta=60°C                                                                                     | 20 A                       | 30 A                     |
| RN2F..    AC51    @Ta=30°C                                                                            | 30 A total sum (2 x 15A)   | 50 A total sum (2 x 25A) |
| "        @Ta=40°C                                                                                     | 30 A total sum (2 x 15A)   | 50 A total sum (2 x 25A) |
| "        @Ta=50°C                                                                                     | 23 A total sum (2 x 11.5A) | 38 A total sum (2 x 19A) |
| "        @Ta=60°C                                                                                     | 20 A total sum (2 x 10A)   | 30 A total sum (2 x 15A) |
| <b>Zero crossing detection</b>                                                                        | Yes                        | Yes                      |
| <b>Min. operational current</b> (per pole)                                                            | 500 mA                     | 500 mA                   |
| <b>Rep. overload current t=1 s</b><br>(T <sub>j</sub> init.=25°C)                                     | 55 A (rms)                 | 125 A (rms)              |
| <b>Non-rep. surge current t=10 ms</b><br>(T <sub>j</sub> init.=25°C)                                  | < 300 A <sub>p</sub>       | < 580 A <sub>p</sub>     |
| <b>Off-state leakage current,<br/>@ rated voltage and frequency</b><br>(T <sub>j</sub> .=125°C, max.) | < 6 mA                     | < 6 mA                   |
| <b>I<sup>2</sup>t for fusing t=1 to 10 ms</b>                                                         | 450 A <sup>2</sup> s       | 1680 A <sup>2</sup> s    |
| <b>Critical dV/dt off-state</b>                                                                       | 500 V/μs                   | 500 V/μs                 |

## Thermal Specifications

|                                                     | RN.F..30                       | RN.F..50                       |
|-----------------------------------------------------|--------------------------------|--------------------------------|
| <b>Operational temperature</b>                      | -20° to +70°C (-4° to +158°F)  | -20° to +70°C (-4° to +158°F)  |
| <b>Storage temperature</b>                          | -20° to +100°C (-4° to +212°F) | -20° to +100°C (-4° to +212°F) |
| <b>Junction temperature</b>                         | < 125°C (257°F)                | < 125°C (257°F)                |
| <b>R<sub>th</sub> junction to ambient</b> (AC load) | 2.8 K/W                        | 1.7 K/W                        |

## Housing Specifications

|                                  |                                                                                                      |
|----------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Mounting</b>                  | DIN-rail 35 mm                                                                                       |
| <b>Weight with RHN1</b>          | 470 g                                                                                                |
| <b>Weight with RHN2</b>          | 780 g                                                                                                |
| <b>Housing material</b>          | Noryl SEI, GFN1, Black                                                                               |
| <b>LED window material</b>       | PC Lexan 141R                                                                                        |
| <b>Base plate</b>                | Aluminium, nickel plated                                                                             |
| <b>Potting compound</b>          | Polyurethane, Casco Nobel                                                                            |
| <b>Terminals</b>                 | Screw with captive wire clamp                                                                        |
| <b>Control terminals nominal</b> | 4 mm <sup>2</sup> or 2 x 2.5 mm <sup>2</sup><br>AWG 12 or 2 x AWG 14<br>0.5 mm <sup>2</sup> , AWG 20 |
| Min.                             |                                                                                                      |
| <b>Mounting torque max.</b>      | 0.6 Nm                                                                                               |
| <b>Power terminals nominal</b>   | 10 mm <sup>2</sup> or 2 x 6 mm <sup>2</sup><br>AWG 6 or 2 x AWG 10                                   |
| Min.                             |                                                                                                      |
| <b>Mounting torque max.</b>      | 2.0 Nm                                                                                               |
| <b>Heatsink compound used</b>    | Electrolube HTS                                                                                      |

## Insulation

|                                        |                       |
|----------------------------------------|-----------------------|
| <b>Rated impulse withstand voltage</b> |                       |
| Input to output                        | 4000 V <sub>imp</sub> |
| <b>Rated impulse withstand voltage</b> |                       |
| Output to heatsink                     | 4000 V <sub>imp</sub> |

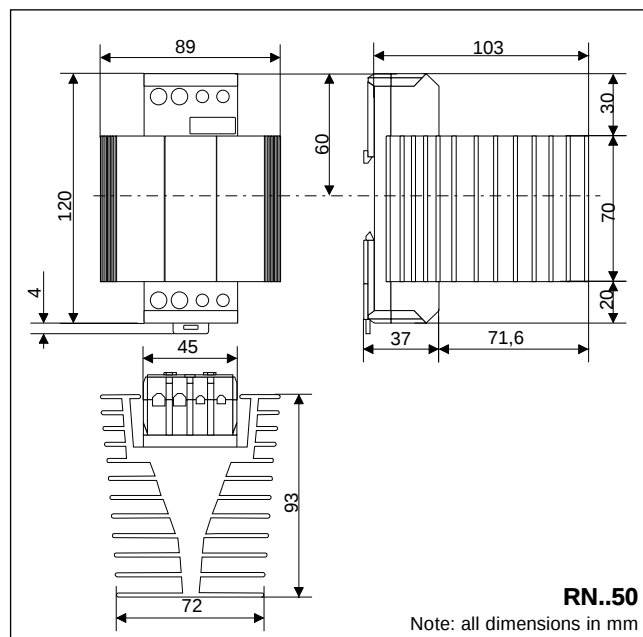
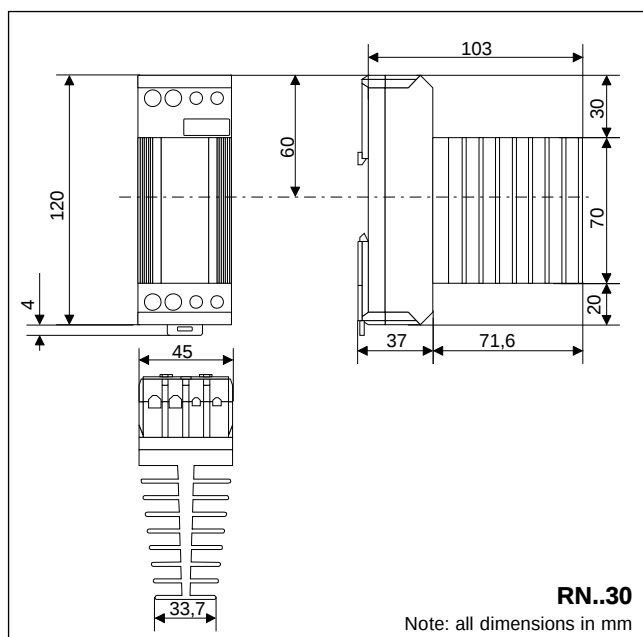
## Environment Specifications

|                      |                      |
|----------------------|----------------------|
| <b>Humidity max.</b> | 95%, no condensation |
|----------------------|----------------------|

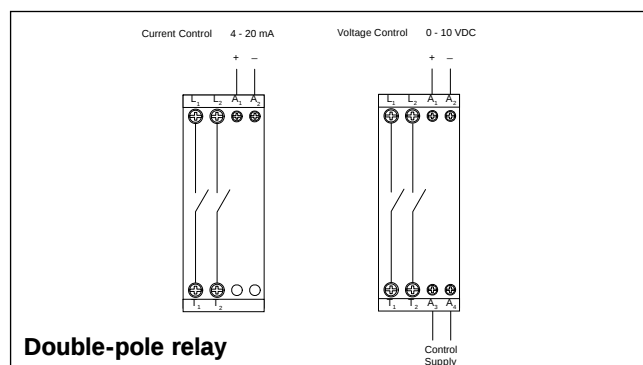
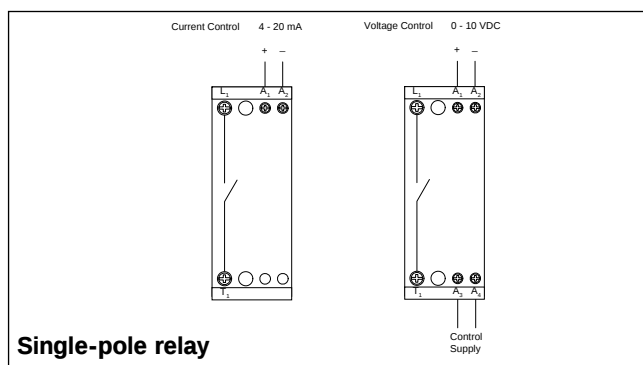
## Dimensions

|                   |                   |
|-------------------|-------------------|
| <b>Dimensions</b> | (H x W x D)       |
| RN..30            | 120 x 45 x 110 mm |
| RN..50            | 120 x 90 x 110 mm |

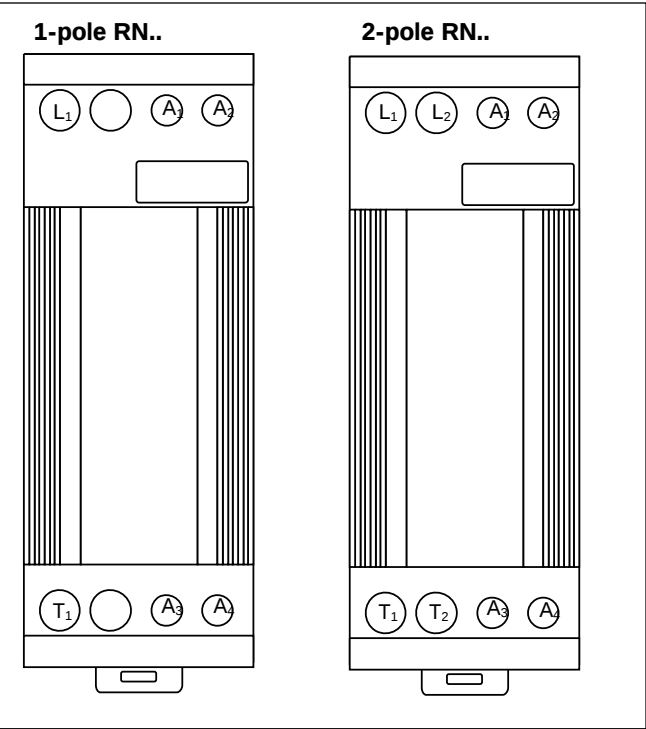
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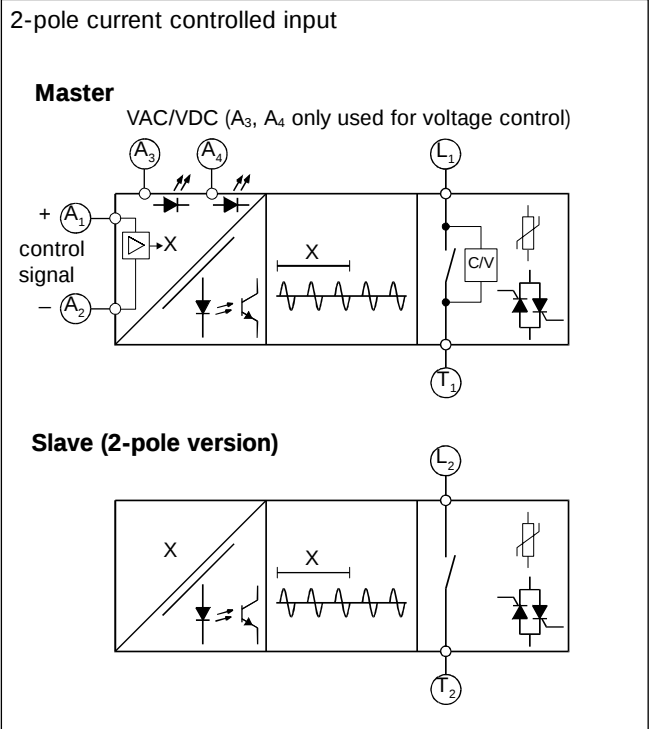
## Wiring Diagrams



Terminal Layout



Functional Diagrams



Applications

