## Technical Data and Specifications

### Safety Relay

| Description | Unit | ESR5-NO-21_ | ESR5-NO-41_ | ESR5-NO-31-24VAC-DC | ESR5-NZ-21_ |
|---|---|---|---|---|---|
| **General** | | | | | |
| Standards | | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed |
| Type-dependent standards | | — | — | — | EN 574 Part no. IIIC |
| Lifespan, mechanical—c (contacts) | x $10^6$ | 10 | 10 | 10 | 10 |
| Maximum operating frequency | Ops/h | 3600 | 3600 | 3600 | 3600 |
| Climatic proofing | | Cold according to EN 60068-2-1, dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Cold according to EN 60068-2-1, dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 |
| Ambient temperature | °F (°C) | –4° to 131° (–20° to 55°) | –4° to 131° (–20° to 55°) | –4° to 131° (–20° to 55°) | –4° to 131° (–20° to 55°) |
| Ambient temperature storage | °F (°C) | –13° to 167° (–25° to 75°) | –13° to 167° (–25° to 75°) | –13° to 167° (–25° to 75°) | –13° to 167° (–25° to 75°) |
| Mounting position | | Any | Any | Any | Any |
| Vibration resistance (IEC/EN 60068-2-6) | | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2 g, frequency: 10–150 Hz, amplitude: 0.15 mm |
| Shock resistance (IEC 60068-2-27) | | — | — | — | — |
| Protection type | | | | | |
| Housing | | IP20 | IP20 | IP20 | IP20 |
| Terminals | | IP20 | IP20 | IP20 | IP20 |
| Protection against direct contact when actuated from front (IEC 0106 Part 100) | | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof |
| Weight | kg | 0.17 | 0.22 | 0.17 | 0.22 |
| Terminal capacity | | | | | |
| Solid or flexible | $mm^2$ | 1 x (0.2–2.5)<br>2 x (0.2–1) | 1 x (0.2–2.5)<br>2 x (0.2–1) | 1 x (0.2–2.5)<br>2 x (0.2–1) | 1 x (0.2–2.5)<br>2 x (0.2–1) |
| Flexible with ferrule | $mm^2$ | 1 x (0.25–2.5)<br>2 x (0.25–1) | 1 x (0.25–2.5)<br>2 x (0.25–1) | 1 x (0.25–2.5)<br>2 x (0.25–1) | 1 x (0.25–2.5)<br>2 x (0.25–1) |
| Solid or stranded | AWG | 24–12 | 24–12 | 24–12 | 24–12 |
| Terminal screw | | | | | |
| Pozidriv screwdriver | Size | 2 | 2 | 2 | 2 |
| Flat-blade screwdriver | mm | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 |
| Max. tightening torque | Nm | 0.6 | 0.6 | 0.6 | 0.6 |
| **Main Contacts** | | | | | |
| Rated impulse withstand voltage—$U_{imp}$ | Vac | 6000 | 4000 | 4000 | 6000 |
| Overvoltage category/pollution degree | | | | | |
| Outside | | III/2 | III/2 | III/2 | III/2 |
| Inside | | — | — | — | — |
| Rated insulation voltage—$U_i$ | Vac | 250 | 250 | 250 | 250 |
| Rated operating voltage—$U_e$ | Vac | 230 | 230 | 230 | 230 |
| Rated operation current | | | | | |
| AC-15 | | | | | |
| 230V (360 ops./h)—$I_e$ | A | 5 | 4 | 5 | 4 |
| 230V (3600 ops./h)—$I_e$ | A | 3 | 3 | 3 | 3 |
| DC-13 | | | | | |
| 24V (360 ops./h)—$I_e$ | A | 6 | 4 | 6 | 4 |
| 24V (3600 ops./h)—$I_e$ | A | 3 | 2.5 | 3 | 2.5 |
| Max. summation current of all poles | | | | | |
| 24 Vac/Vdc devices | A | 72 | 72 | 72 | 72 |
| 230 Vac devices | A | — | — | — | — |
| Square of the total current (and total current) of all current paths | | 72 $A^2$ (6 + 6) | 72 $A^2$ (4.2 + 4.2 + 4.2 + 4.2) | 72 $A^2$ (4.9 + 4.9 + 4.9) | 72 $A^2$ (6 + 6) |
| Short-circuit protection | | | | | |
| Max. fuse | A gG/gL | 10 | 6 | 10 | 6 |

## Safety Relay, continued

| Description | Unit | ESR5-NO-21_ | ESR5-NO-41_ | ESR5-NO-31-24VAC-DC | ESR5-NZ-21_ |
|---|---|---|---|---|---|
| **Power Supply Circuit** | | | | | |
| Actuating voltage 50/60 Hz | Vac | 24 | 24 | 24 | 24 |
| Actuating voltage—$U_s$ | Vdc | 24 | 24 | 24 | 24 |
| Voltage tolerance pick-up voltage | $x_e$ | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 |
| Power consumption | | | | | |
| AC operated 50/60 Hz | VA | — | — | — | — |
| AC operated 50/60 Hz | W | 3.4 | 3.4 | 3.4 | 3 |
| DC operated | W | 1.6 | 1.6 | 1.6 | 1.5 |
| Fuse for control circuit supply | | | | | |
| 24V | | Short-circuit proof | Short-circuit proof | Short-circuit proof | Short-circuit proof |
| 115/230V | | — | — | — | — |
| **Control Circuit** | | | | | |
| Rated output voltage | Vdc | 24 | 24 | 24 | 24 |
| Rated operational current | mA | S12, S22: 30, S34: 45 | S12: 65, S34: 40 | S12, S22: 30, S34: 45 | S11, S21: 60, Y2: 45 |
| Resistance—R | | 50 | 22 | 50 | 22 |
| Short-circuit current | A | 2.3 | 2.3 | 2.3 | 2.3 |
| Response time | ms | 100 | 65 | 100 | 50 |
| Recovery time | ms | — | — | — | — |
| Response time with reset monitoring—$t_{A1}$ | ms | — | — | — | — |
| Response time without reset monitoring—$t_{A2}$ | ms | 100 | 65 | 100 | 50 |
| Reset time—$t_R/t_{R1}$ | ms | Single-channel 45; dual-channel 10 | 45 | Single-channel 45; dual-channel 10 | 20 |
| Minimum on duration—$t_M$ | ms | — | — | — | — |
| Recovery time—$t_W$ | ms | Approx. 1000 | Approx. 1000 | Approx. 1000 | Approx. 1000 |
| Synchronous monitoring time—$t_S$ | ms | — | — | — | 500 |
| **Electromagnetic Compatibility (EMC)** | | | | | |
| Emitted interference | | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 |
| Interference immunity | | According to EN 61000-6-2, EN 62061 | According to EN 61000-6-2 | According to EN 61000-6-2, EN 62061 | According to EN 61000-6-2 |

3

## Safety Relay, continued

| Description | Unit | ESR5-NO-31-230VAC | ESR5-NO-31-24V-230VAC-DC | ESR5-NV3_ | ESR5-VE3_ | ESR5-NE-51_ |
|---|---|---|---|---|---|---|
| **General** | | | | | | |
| Standards | | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed | EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed |
| Type-dependent standards | | EN 60204 (if applicable) | EN 60204 (if applicable) | EN 60204 (if applicable) | — | — |
| Lifespan, mechanical—c (contacts) | x $10^6$ | 10 | 10 | 10 | 10 | 10 |
| Maximum operating frequency | Ops/h | 3600 | 3600 | 3600 | 900 | 3600 |
| Climatic proofing | | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Cold in accordance with: EN 60068-2-1, dry heat in accordance with EN 60068-2-2, humidity storage test in accordance with 60068-2-78 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 | Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3 |
| Ambient temperature | °F (°C) | –4° to 131° (–20° to 55°) | –4° to 131° (–20° to 55°) | –4° to 113° (–20° to 45°) | –4° to 131° (–20° to 55°) | –4° to 131° (–20° to 55°) |
| Ambient temperature storage | °F (°C) | –13° to 167° (–25° to 75°) | –13° to 167° (–25° to 75°) | –13° to 167° (–25° to 75°) | –13° to 167° (–25° to 75°) | –13° to 167° (–25° to 75°) |
| Mounting position | | Any | Any | Any | Any | Any |
| Vibration resistance (IEC/EN 60068-2-6) | | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm | 2g, frequency: 10–150 Hz, amplitude: 0.15 mm |
| Shock resistance (IEC 60068-2-27) | | — | — | — | — | — |
| Protection type | | | | | | |
| Housing | | IP40 | IP40 | IP20 | IP20 | IP20 |
| Terminals | | IP20 | IP20 | IP20 | IP20 | IP20 |
| Protection against direct contact when actuated from front (IEC 0106 Part 100) | | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof | Finger- and back-of-hand proof |
| Weight | kg | 0.3 | 0.3 | 0.17 | 0.17 | 0.22 |
| Terminal capacity | | | | | | |
| Solid or flexible | $mm^2$ | 1 x (0.2–2.5)<br>2 x (0.2–1) | 1 x (0.2–2.5)<br>2 x (0.2–1) | 1 x (0.2–2.5)<br>2 x (0.2–1) | 1 x (0.2–2.5)<br>2 x (0.2–1) | 1 x (0.2–2.5)<br>2 x (0.2–1) |
| Flexible with ferrule | $mm^2$ | 1 x (0.25–2.5)<br>2 x (0.25–1) | 1 x (0.25–2.5)<br>2 x (0.25–1) | 1 x (0.25–2.5)<br>2 x (0.25–1) | 1 x (0.25–2.5)<br>2 x (0.25–1) | 1 x (0.25–2.5)<br>2 x (0.25–1) |
| Solid or stranded | AWG | 24–12 | 24–12 | 24–12 | 24–12 | 24–12 |
| Terminal screw | | | | | | |
| Pozidriv screwdriver | Size | 2 | 2 | 2 | 2 | 2 |
| Flat-blade screwdriver | mm | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 | 0.6 x 3.5 |
| Max. tightening torque | Nm | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| **Main Contacts** | | | | | | |
| Rated impulse withstand voltage—$U_{imp}$ | Vac | 6000 | 6000 | 4000 | 4000 | 4000 |
| Overvoltage category/pollution degree | | | | | | |
| Outside | | III/2 | III/2 | III/2 | III/2 | III/2 |
| Inside | | — | — | — | — | — |
| Rated insulation voltage—$U_i$ | Vac | 250 | 250 | 250 | 250 | 250 |
| Rated operating voltage—$U_e$ | Vac | 230 | 230 | 230 | 230 | 230 |
| Rated operation current | | | | | | |
| AC-15 | | | | | | |
| 230V (360 ops./h)—$I_e$ | A | 4 | 4 | — | 5 | 4 |
| 230V (3600 ops./h)—$I_e$ | A | 3 | 3 | 3 | 3 | 3 |
| DC-13 | | | | | | |
| 24V (360 ops./h)—$I_e$ | A | 4 | 4 | — | 6 | 4 |
| 24V (3600 ops./h)—$I_e$ | A | 2.5 | 2.5 | 3 | 3 | 2.5 |
| Max. summation current of all poles | | | | | | |
| 24 Vac/Vdc devices | A | 50 | 50 | 49 | 50 | 50 |
| 230 Vac devices | A | 50 | 50 | — | — | — |
| Square of the total current (and total current) of all current paths | | 50 $A^2$ (4 + 4 + 4) | 50 $A^2$ (4 + 4 + 4) | 50 $A^2$ (4 + 4 + 4) | 49 $A^2$ (3.5 + 3.5 + 3.5 + 3.5) | 50 $A^2$ (3.7 + 3.7 + 3.7 + 3.7 + 3.7) |
| Short-circuit protection | | | | | | |
| Max. fuse | A gG/gL | 6 | 6 | 10 | 10 | 6 |

## Safety Relay, continued

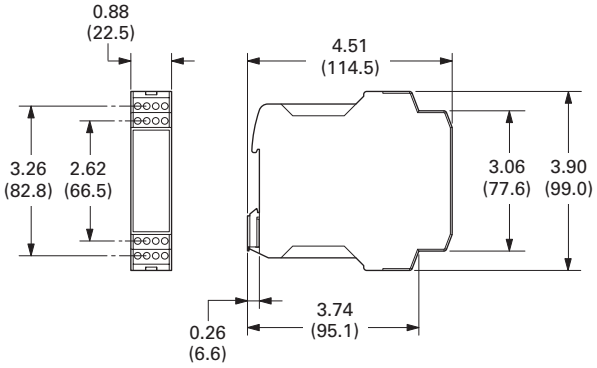
| Description | Unit | ESR5-NO-31-230VAC | ESR5-NO-31-24V-230VAC-DC | ESR5-NV3_ | ESR5-VE3_ | ESR5-NE-51_ |
|---|---|---|---|---|---|---|
| **Power Supply Circuit** | | | | | | |
| Actuating voltage 50/60 Hz | Vac | 230 | 24–230 | — | — | 24 |
| Actuating voltage—$U_s$ | Vdc | — | 230 | 24 | 24 | 24 |
| Voltage tolerance pick-up voltage | $x_e$ | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 | 0.85–1.1 | 0.8–1.1 |
| Power consumption | | | | | | |
| AC operated 50/60 Hz | VA | — | — | — | — | — |
| AC operated 50/60 Hz | W | 5.8 | 5.8 | — | — | 2.2 |
| DC operated | W | 2.9 | 2.9 | 1.8 | 2 | 2.2 |
| Fuse for control circuit supply | | | | | | |
| 24V | | — | Short-circuit proof | — | — | — |
| 115/230V | | Short-circuit proof | Short-circuit proof | — | — | — |
| **Control Circuit** | | | | | | |
| Rated output voltage | Vdc | 24 | 24 | 24 | 24 | 24 |
| Rated operational current | mA | S10, S12, S22: 35, S34, S35: 45 | S10, S12, S22: 35, S34, S35: 45 | S12, S22: 3.5, S34, S35: 7 | A1, A2: 84, K1/K2: 5 | A1, A2: 92 |
| Resistance—R | | 11 | 11 | 500 | — | — |
| Short-circuit current | A | 0.7 | 0.7 | 0.1 | — | — |
| Response time | ms | 250 | 250 | 150 | 20 | 20 |
| Recovery time | ms | — | — | — | — | — |
| Response time with reset monitoring—$t_{A1}$ | ms | 60 | 60 | 150 | 20 | 20 |
| Response time without reset monitoring—$t_{A2}$ | ms | 250 | 250 | 150 | 20 | 20 |
| Reset time—$t_R/t_{R1}$ | ms | 20 | 20 | 20 (non-delayed enable paths); 100 (min. delayed enable paths) | 0.3–3 s (+50%) adjustable | 20 |
| Minimum on duration—$t_M$ | ms | — | — | — | — | — |
| Recovery time—$t_W$ | ms | Approx. 1000 | Approx. 1000 | Approx. 330 | Approx. 1000 | — |
| Synchronous monitoring time—$t_S$ | ms | — | — | — | — | — |
| **Electromagnetic Compatibility (EMC)** | | | | | | |
| Emitted interference | | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 | EN 61000-6-4 |
| Interference immunity | | According to EN 61000-6-2 | According to EN 61000-6-2 | According to EN 61000-6-2, EN 62061 | According to EN 61000-6-2 | According to EN 61000-6-2 |

## Dimensions

Approximate Dimensions in Inches (mm)

### *Safety Relays, Contact Expansion Modules*

#### ESR5_ 24 Vac/Vdc




#### ESR5_ 230 Vac