



Safety relay emergency stop/protective door, 24VDC/AC, 3 enabling paths

Part no. **ESR5-NO-31-24VAC-DC**  
**118702**  
 EL Number **4133318**  
**(Norway)**

General specifications		
Product name		Eaton ESR5 Safety relay
Part no.		ESR5-NO-31-24VAC-DC
EAN		4015081168422
Product Length/Depth		114.5 millimetre
Product height		99 millimetre
Product width		22.5 millimetre
Product weight		0.164 kilogram
Certifications		EN 50178 IEC 61508, Parts 1-7 Machines 2006/42/EG IEC/EN 60204 UL File No.: E29184 CSA Class No.: 3211-83; 3211-03 UL 508 2014/30/EU CSA-C22.2 No. 14-95 CE Certified by UL for use in Canada IEC 62061 UL Category Control No.: NKCR; NKCR7 UL report applies to both US and Canada UL EN ISO 13849-1
Product Tradename		ESR5
Product Type		Safety relay
Product Sub Type		None
Features & Functions		
Electric connection type		Screw connection
Features		Basic insulation Automatic reset 3 Non-delayed enable current paths Reinforced insulation Safe insulation 6 kV between input circuit and enable current paths
Fitted with:		Detachable clamps Start input Approval according to UL Feedback circuit Approval for TÜV
Functions		1-channel 2-channel
Material		Enclosure: Polyamide (PA), not reinforced Contacts: silver tin oxide, gold plated (AgSnO <sub>2</sub> , 0.2 µm Au)
General information		
Connection type		M3 screw terminals
Current consumption		65 mA, DC 140 mA, AC
Degree of protection		Enclosure: IP20 Installation location: ≥ IP54 Terminals: IP20 IP20
Duty factor		100 %
Emitted interference		According to EN 61000-6-4
Interference immunity		According to EN-61000-6-2 According to EN 662061_x
LED indicator		Status indication of SmartWire-DT network: Green LED
Lifespan, mechanical		10,000,000 Operations
Lifetime		240 mo
Model		Basic device
Mounting method		Top-hat rail fixing (according to IEC/EN 60715, 35 mm)

		Rail mounting possible
Mounting width		22.5 mm
Overtoltage category		III
Pollution degree		2
Power loss		Normally 5.16 W
Product category		Electronic safety relays
Protection		Finger and back-of-hand proof, Protection against direct contact when actuated from front (EN 50274)
Rated impulse withstand voltage (Uimp)		4000 V AC
Recovery time		1000 ms
Safety parameter (EN ISO 13849-1)		PL e, Performance level Cat. 4, Category 300,000 switching cycles, B10d
Safety parameter (IEC 62061)		5.05 x 10 <sup>-10</sup> , PFHd, Probability of failure per hour SILCL 3, Safety integrity level claim limit Cat. 4, Category SIL 3, Safety integrity level, In accordance with IEC 61508 SIL 3, Safety integrity level
Stop category (IEC 60204)		0
Suitable for		Safety relay for monitoring emergency stop and protective door switch Monitoring of emergency-stop circuits Monitoring of position switches Module used to safely interrupt electrical circuits
Switching frequency		Max. 0.5 Hz, Input data
Type		Protective door Feedback circuit Emergency stop category 0; emergency switching off
Voltage type		AC/DC
<b>Ambient conditions, mechanical</b>		
Mounting position		As required
Proof test		240 Months (High Demand) 66 Months (Low Demand)
Switching capacity		4 A at 360 O/h, AC-15 at 230 V, Outputs 0.4 W 2.5 A at 3600 O/h, DC-13 at 24 V, Outputs 3 A at 3600 O/h, AC-15 at 230 V, Outputs In accordance with IEC 60947-5-1, Outputs 4 A at 360 O/h, DC-13 at 24 V, Outputs
Vibration resistance		10 - 150 Hz, Amplitude: 0.15 mm, Acceleration: 2 g, (IEC/EN 60068-2-6)
<b>Climatic environmental conditions</b>		
Air pressure		795 - 1080 hPa (operation)
Altitude		Max. 2000 m
Ambient operating temperature - min		-20 °C
Ambient operating temperature - max		55 °C
Ambient storage temperature - min		-40 °C
Ambient storage temperature - max		70 °C
Climatic proofing		Damp heat, constant, to IEC 60068-2-3 Cold to EN 60068-2-1 Dry heat to IEC 60068-2-2
Environmental conditions		Condensation: Non-condensing Clearance in air and creepage distances according to EN 50178, UL 508, CSA C22.2, No. 14-95
Operating temperature - min		-20 °C
Operating temperature - max		55 °C
Relative humidity		< 75 %
<b>Terminal capacities</b>		
Terminal capacity		1 x (0.25 – 2.5) mm <sup>2</sup> , flexible with ferrule 2 x (0.2 – 1) mm <sup>2</sup> , solid 1 x (0.2 – 2.5) mm <sup>2</sup> , solid 24 - 12 AWG, solid or stranded 2 x (0.25 – 1) mm <sup>2</sup> , flexible with ferrule
Stripping length (main cable)		7 mm
Screwdriver size		2, Terminal screw, Pozidriv screwdriver 0.6 x 3.5 mm, Terminal screws
Tightening torque		0.6 Nm, Screw terminals
<b>Electrical rating</b>		

Inrush current		0.025 - 6 A
Power supply circuit		3.4 W (AC operated 50/60 Hz) 1.6 W (DC operated)
Rated control supply voltage (Us) at AC, 50 Hz - min		0 V
Rated control supply voltage (Us) at AC, 50 Hz - max		26.4 V
Rated control supply voltage (Us) at AC, 60 Hz - min		20.4 V
Rated control supply voltage (Us) at AC, 60 Hz - max		24 V
Rated control supply voltage (Us) at DC - min		0 V
Rated control supply voltage (Us) at DC - max		24 V
Rated insulation voltage (Ui)		250 V
Rated operational voltage		Approx. 24 V DC at input, starting and feedback circuit 24 V AC/DC (power supply) 230 V AC
Short-circuit current		2.3 A, Input data
Short-circuit protection		Fuse 6 A gL/gG, For output circuits, External Short-circuit proof, 24 V, Fuse for control circuit supply, Control circuit
Short-circuit protection rating		6A gL/gG, NEOZED (N/C), Output fuse, External, Output data 10A gL/gG, NEOZED (N/O), Output fuse, External, Output data
<b>Input/Output</b>		
Breaking power		33 W max., inductive load ( $\tau = 40$ ms), at 220 V DC 88 W max., resistive load ( $\tau = 0$ ms), at 220 V DC 144 W max., resistive load ( $\tau = 0$ ms), at 24 V DC 77 W max., resistive load ( $\tau = 0$ ms), at 110 V DC 288 W max., resistive load ( $\tau = 0$ ms), at 48 V DC 1500 VA, max., resistive load ( $\tau = 0$ ms), at 250 V AC 48 W max., inductive load ( $\tau = 40$ ms), at 24 V DC 40 W max., inductive load ( $\tau = 40$ ms), at 48 V DC 35 W max., inductive load ( $\tau = 40$ ms), at 110 V DC
Input		$\infty$ ms, Simultaneity for inputs 1/2
Nominal current		30 A
Number of inputs		One- and two-channel
Number of outputs (safety related, delayed) with contact		0
Number of outputs (safety related, undelayed) with contact		3
Number of outputs (signaling function, delayed) with contact		0
Number of outputs (signaling function, undelayed) with contact		1
Permissible total cable resistance		Approx. 50 $\Omega$ (input and starting circuits for UN)
Pick-up time		100 ms typ. (at U# in automatic mode) 100 ms typ. (K1, K2 - for UN automatic mode)
Quadratic summation current		72 A <sup>2</sup> ( $I_{TH}^2 = I_1^2 + I_2^2 + I_3^2$ )
Reset time		45 ms (single-channel) Normally 10 ms (dual-channel)
Resistance		50 $\Omega$ (impedance)
Switching voltage		250 V
Uninterrupted current		6 A N/O, Limiting continuous current 6 A N/C, Limiting continuous current
<b>Design verification</b>		
Equipment heat dissipation, current-dependent Pvid		0 W
Heat dissipation capacity Pdis		0 W
Heat dissipation per pole, current-dependent Pvid		0 W
Rated operational current for specified heat dissipation (In)		0 A
Static heat dissipation, non-current-dependent Pvs		5.16 W
10.2.2 Corrosion resistance		Meets the product standard's requirements.
10.2.3.1 Verification of thermal stability of enclosures		Meets the product standard's requirements.
10.2.3.2 Verification of resistance of insulating materials to normal heat		Meets the product standard's requirements.
10.2.3.3 Resist. of insul. mat. to abnormal heat/fire by internal elect. effects		Meets the product standard's requirements.
10.2.4 Resistance to ultra-violet (UV) radiation		Meets the product standard's requirements.
10.2.5 Lifting		Does not apply, since the entire switchgear needs to be evaluated.
10.2.6 Mechanical impact		Does not apply, since the entire switchgear needs to be evaluated.
10.2.7 Inscriptions		Meets the product standard's requirements.
10.3 Degree of protection of assemblies		Does not apply, since the entire switchgear needs to be evaluated.
10.4 Clearances and creepage distances		Meets the product standard's requirements.
10.5 Protection against electric shock		Does not apply, since the entire switchgear needs to be evaluated.

10.6 Incorporation of switching devices and components		Does not apply, since the entire switchgear needs to be evaluated.
10.7 Internal electrical circuits and connections		Is the panel builder's responsibility.
10.8 Connections for external conductors		Is the panel builder's responsibility.
10.9.2 Power-frequency electric strength		Is the panel builder's responsibility.
10.9.3 Impulse withstand voltage		Is the panel builder's responsibility.
10.9.4 Testing of enclosures made of insulating material		Is the panel builder's responsibility.
10.10 Temperature rise		The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices.
10.11 Short-circuit rating		Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.12 Electromagnetic compatibility		Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.13 Mechanical function		The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.

## Technical data ETIM 9.0

Relays (EG000019) / Device for monitoring of safety-related circuits (EC001449)			
Electric engineering, automation, process control engineering / Low-voltage switch technology / Monitoring equipment (low-voltage switch technology) / Device for monitoring of safety-related circuits (ecl@ss13-27-37-18-19 [AC0304016])			
Model			Basic device
Rail mounting possible			Yes
With detachable clamps			Yes
Type of electric connection			Screw connection
Voltage type (supply voltage)			AC/DC
Supply voltage AC 50 Hz		V	24 - 24
Supply voltage AC 60 Hz		V	24 - 24
Supply voltage DC		V	24 - 24
Suitable for monitoring of position switches			Yes
Suitable for monitoring of emergency-stop circuits			Yes
Suitable for monitoring of valves			No
Suitable for monitoring of optoelectronic protection equipment			No
Suitable for monitoring of tactile sensors			No
Suitable for monitoring of magnetic switches			No
Suitable for monitoring of proximity switches			No
Evaluation inputs			One- and two-channel
Power consumption		W	5.16
With start input			Yes
With muting function			No
With feedback circuit			Yes
Release-delay		s	0 - 0
Type of control voltage 1			AC/DC
Control voltage 1		V	24 - 24
Type of control voltage 2			AC/DC
Control voltage 2		V	24 - 24
Number of outputs, safety related, undelayed, with contact			3
Number of outputs, safety related, delayed, with contact			0
Number of outputs, safety related, undelayed, semiconductors			0
Number of outputs, safety related, delayed, semiconductors			0
Number of outputs, signalling function, undelayed, with contact			1
Number of outputs, signalling function, delayed, with contact			0
Number of outputs, signalling function, undelayed, semiconductors			0
Number of outputs, signalling function, delayed, semiconductors			0
Voltage type (operating voltage)			AC/DC
Operating voltage AC 50 Hz		V	24 - 24
Operating voltage AC 60 Hz		V	24 - 24
Operating voltage DC		V	24 - 24
Rated switch current		A	6

Type of safety according to IEC 61496-1			None
Stop category according to IEC 60204			0
Performance level according to EN ISO 13849-1			Level e
SIL according to IEC 61508			3
With approval for BG BIA			No
With approval according to UL			Yes
Width		mm	22.5
Height		mm	99
Depth		mm	114.5
With approval for TÜV			Yes