

# RACPRO1-4SP/10A Series $\diamond$ e-fuse

## 4-Channel 10A $\diamond$ Input: 24VDC

### FEATURES

- Push-in connectors for tool-less wiring
- Start-Up delay adjustable by switch
- Individual switching for every channel
- Adjustable power limit & load indication by LED
- Individual ON/OFF and OCP limit for each channel
- Short circuit protection & power boost 150%/5s
- DC input UVLO protection
- DC-OK contacts with remote fault reset
- Overload priority channel protection
- Output hiccup or tripping mode adjustable by switch
- Easy daisy chaining of multiple modules
- Paired Input & output (+, -) connectors included
- 3 year warranty



Dimensions (HxWxD): 111.0 x 72.0 x 61.9mm (4.37 x 2.83 x 2.44 inch)  
250g (0.55 lbs)

### APPLICATIONS



### SAFETY & EMC



### DESCRIPTION

The RACPRO1-4SP series are 4-channel electronic fuse (e-Fuse) load switches with independent overcurrent limit control and real-time output current indication. Each channel is separately protected so that overload or fault conditions on an individual load do not affect overall system reliability or function. The useful LED indicators show the output current and change from green to yellow (current within limit) to orange (current at limit) to red (overcurrent or short-circuit). A volt-free DC-OK output can be used to monitor system function. Each channel can also be switched ON or OFF to ease fault diagnostics or for maintenance.

The RECOM e-Fuses RACPRO1-4SP/24V/10A are available with 10A maximum channel current and 150% power boost for 5s but can handle 150% overload for up to 120ms to avoid nuisance tripping. The channels power up in sequence to reduce the input inrush current with a pre-settable delay time. Under system overload conditions, the channels will disconnect the loads in reverse sequence, keeping essential functions running to the last. Output overload hiccup or tripping mode is adjustable by a switch.

The e-Fuses have a high lifetime expectancy >80.000h/40°C and easy wiring with tool-less push-in and lever-release terminals. The input and output terminals are also paired to allow easy daisy chaining.

### SELECTION GUIDE

| Part Number         | Input Voltage Range [VDC] | Output Voltage nom. [VDC] | Output Channels [ ] | Output Current per Channel [A] | Efficiency typ. <sup>(1)</sup> [%] | rated Output Power per Channel [W] |
|---------------------|---------------------------|---------------------------|---------------------|--------------------------------|------------------------------------|------------------------------------|
| RACPRO1-4SP/24V/10A | 22-28                     | 24                        | 4                   | 10                             | 98.6                               | 240                                |

Note1: Efficiency is tested at nominal input 24VDC, 100% load each output and +25°C ambient.

**BASIC CHARACTERISTICS** (measured @  $T_{AMB}= 25^{\circ}C$ , nom  $V_{IN}= 24VDC$ , rated load, unless otherwise stated)

| Parameter                            | Condition   | Min.  | Typ.                      | Max.     |
|--------------------------------------|---|-------|---------------------------|----------|
| Nominal Input Voltage                |   |       | 24VDC                     |          |
| Operating Input Range                |   | 22VDC |                           | 28VDC    |
| Absolute Maximum Input Voltage       | no damage to the device                                   |       |                           | 28VDC    |
| Turn-on Voltage                      |   |       | 21.5VDC                   |          |
| Turn-off Voltage                     | Channel 1   |       | 17.5VDC                   |          |
|                                      | Channel 2   |       | 18.5VDC                   |          |
|                                      | Channel 3   |       | 19.5VDC                   |          |
|                                      | Channel 4   |       | 20.5VDC                   |          |
| Input Current                        | nom. $V_{IN}= 24VDC$                                      |       |                           | 40.1A    |
| No Load Power Consumption            | nom. $V_{IN}= 24VDC$                                      |       | 1.5W                      |          |
| Internal Consumption                 |   |       | 60mA                      |          |
| Nominal Output Voltage               |   |       | 24VDC                     |          |
| Nominal Output Current (per channel) | nom. $V_{IN}= 24VDC$                                      |       | 10A                       |          |
| Output Current Range (adjustable)    | via potentiometer at each channel, % of nominal lout      | 3.5A  |                           | 11.5A    |
| Voltage Drop                         | Input to Output   |       |                           | 250mV    |
| Minimum Load                         |   | 0%    |                           |          |
| Sequential Switch-ON Delay           | selectable via Dip-switch, refer to „DIP-SWITCH SETTINGS“ |       | 5ms, 25ms, 200ms or 500ms |          |
| Remote Reset Input <sup>(3)</sup>    | referred to input ground                                  |       | yes, by applying 22-28VDC |          |
| Ripple and Noise                     | 20MHz bandwidth   |       |                           | 105mVp-p |
| Maximum Capacitive Load              |   |       |                           | 30mF     |

Note3: Do not connect remote reset input to hazardous voltages!

### DIP-SWITCH SETTINGS

**DIP1:** setting the overcurrent shutdown mode (ON= Latch off mode; OFF= Hiccup Mode)

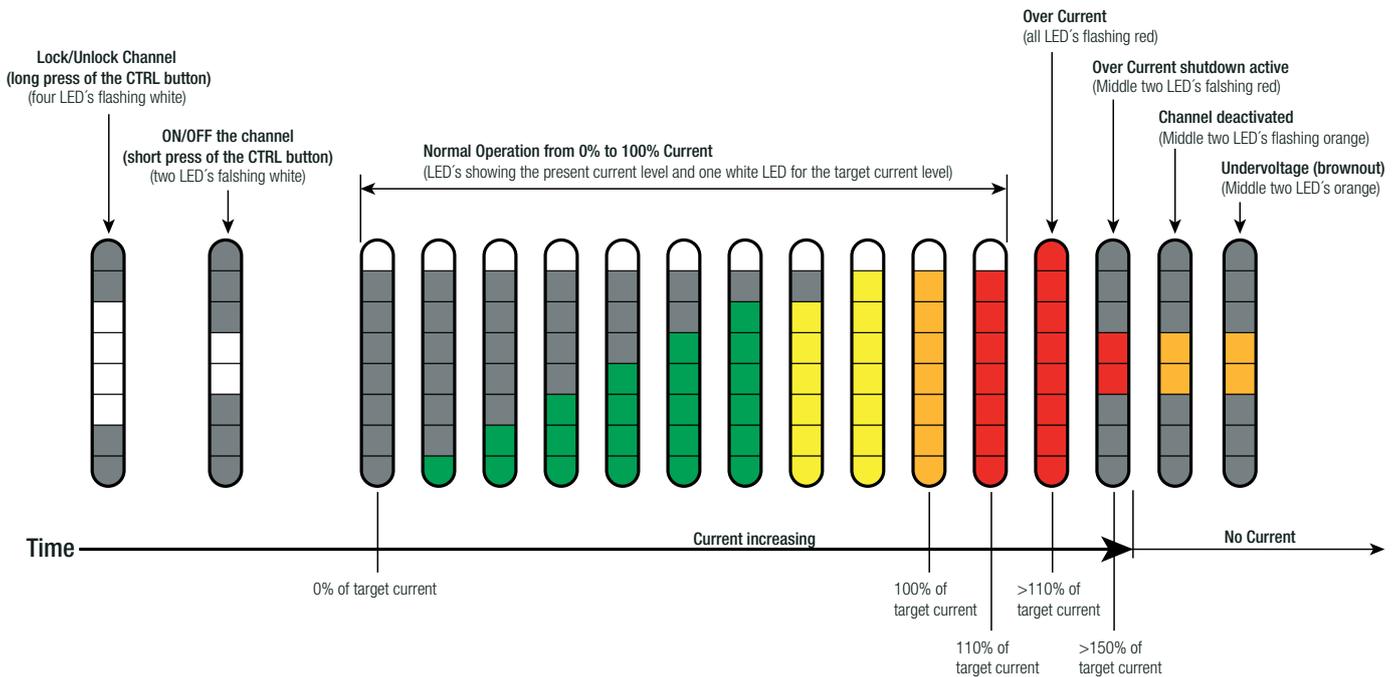
**DIP2:** setting the time delay from Channel [k+1] to Channel [k]

**DIP3:** setting the time delay from Channel [k+1] to Channel [k]

| Description  | DIP-Switch |
|--|------------|
| Overcurrent shutdown hiccup mode<br>5ms time delay   |            |
| Overcurrent shutdown latching<br>5ms time delay      |            |
| Overcurrent shutdown latching<br>25ms time delay     |            |
| Overcurrent shutdown latching<br>200ms time delay    |            |
| Overcurrent shutdown latching<br>500ms time delay    |            |
| Overcurrent shutdown hiccup mode<br>500ms time delay |            |

### LOAD INDICATION LED

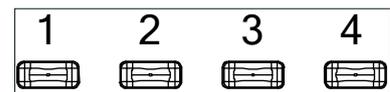
8 LEDs/channel for displaying actual and target current or various status messages of the corresponding channel. Grey LEDs represent deactivated LEDs.



|   |
|---|
| <b>Actual current:</b> Colored LEDs indicate the actual current of 0-110% in relation to the set maximum current. In the picture above the target current is set to its maximum.  |
| <b>Power Boost:</b> During Operation in >110% and <150% Target Current Level the device stays in Overcurrent for about 5s before the Overcurrent shutdown gets active. If the 150% margin is surpassed (e.g. a short) the over current shutdown will get active after around 120ms. |
| <b>Target current:</b> White LED indicates the maximum allowable current, which is set by the user via the potentiometer. In above picture the target current is currently set at its maximum value, the nominal current per channel of the device.                                 |
| <b>Maximum current (Over Current):</b> When actual current > target current, all LEDs from the corresponding channel flash red.   |
| <b>Channel deactivated:</b> When the channel is deactivated, the two middle LEDs flash orange.  |
| <b>Undervoltage:</b> In the event of a brownout (undervoltage), the two middle LEDs light up orange, and the device attempts to automatically restart in a hiccup mode once the voltage is restored.  |

### CONTROL BUTTON

| Description     | Function  |
|-----------------|---|
| short press     | ON/OFF the channel (during operation) or to restart in latching mode after a short circuit. |
| long press (5s) | Lock/Unlock the channel button  |



#### Load LED indications:

|   |
|---|
| <b>Button lock after long press of the button:</b> If the button has been locked/unlocked the four middle LEDs indicate it by flashing white.   |
| <b>Button locked and interaction with the button:</b> If the button has been locked and the button is pressed for a short amount of time (e.g. to disable/enable a channel), the two middle LEDs indicate it by flashing white, but no action on the channel, |

# RACPR01-4SP/10A Series $\diamond$ e-fuse

## 4-Channel 10A $\diamond$ Input: 24VDC

### PROTECTIONS (measured @ $T_{AMB} = 25^{\circ}\text{C}$ , nom $V_{IN} = 24\text{VDC}$ , rated load, unless otherwise stated)

| Parameter                      | Type  |     | Value                         |
|--------------------------------|---|-----|-------------------------------|
| Internal Input Fuse            | per channel   |     | T15A, slow-blow               |
| Short Circuit Protection (SCP) | selectable via Dip-switch, refer to „DIP-SWITCH SETTINGS“                           |     | latch off or hiccup mode      |
| Over Voltage Protection (OVP)  | SELV output   |     | 35VDC, latch off              |
| Return Voltage Immunity        |   |     | 35VDC max.                    |
| Over Current Protection (OCP)  | latch off or hiccup mode, selectable via Dip-switch; refer to „DIP-SWITCH SETTINGS“ | >5s | >150% of rated Output Current |
| Tripping Characteristic        | at short circuit  |     | 120ms max.                    |
|                                |   |     | 5s max. (at 150% load)        |
| Tripping Delay                 |   |     | 115ms typ.                    |
| Class of Equipment             |   |     | Class III                     |

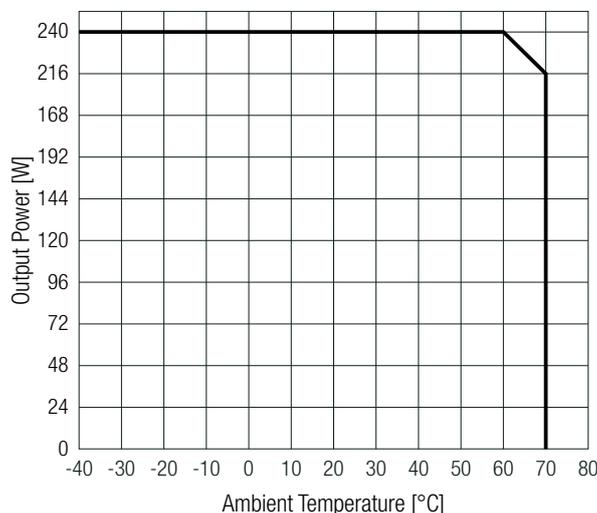
### ENVIRONMENTAL (measured @ $T_{AMB} = 25^{\circ}\text{C}$ , nom $V_{IN} = 24\text{VDC}$ , rated load, unless otherwise stated)

| Parameter                           | Condition                                    |               | Value   |
|-------------------------------------|--|---------------|---|
| Operating Ambient Temperature Range | @ natural convection (0.1m/s), with derating |               | -40°C to +70°C  |
| Operating Altitude <sup>(4)</sup>   |  |               | 5000m   |
| Operating Humidity                  | non-condensing                               |               | 5-95% RH max.   |
| Pollution Degree                    |  |               | PD2   |
| IP Rating                           |  |               | IP20  |
| Shock                               | according to IEC 60068-2-27 Fa               | non-operating | 15G/11ms, 3 times (positive/negative) in all axis   |
| Vibration                           | according to IEC 60068-2-6 Fc                | non-operating | 5 - 8.4Hz @ 3.5mm deflection<br>8.4 -150Hz @ 2G, 10 cycles /axis(min-max-min); 1 octave/min |
| MTBF                                | according to EN/IEC 61709 (SN29500)          |               | 770 x 10 <sup>3</sup> hours   |
| Design Lifetime                     | $T_{AMB} = 40^{\circ}\text{C}$ @ 100% Load   |               | 80 x 10 <sup>3</sup> hours  |

Note4: Recognized by safety agency for safe operation up to 5000m. High altitude operation may impact the performance and lifetime

#### Derating Graph (per channel)

(@ Chamber and natural convection 0.1m/s)



# RACPR01-4SP/10A Series $\diamond$ e-fuse

## 4-Channel 10A $\diamond$ Input: 24VDC

### SAFETY & CERTIFICATIONS

| Certificate Type (Safety)   | Report Number          | Standard   |
|---|------------------------|--|
| Audio/Video, information and communication technology equipment - Part 1: Safety requirements (CB)                                | 24TH0298_62368-1_0     | IEC62368-1:2018 3rd Edition  |
| Audio/Video, information and communication technology equipment - Part 1: Safety requirements                                     |                        | EN IEC 62368-1:2020+A11:2020   |
| Audio/Video, information and communication technology equipment - Part 1: Safety requirements                                     | pending                | UL62368-1:2019 3rd Edition<br>CAN/CSA-C22.2 No. 62368-1-19 3rd Edition |
| Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements (CB)                              | 24TH0298_61010-1_0     | IEC61010-1:2010+A1:2016 3rd Edition                                    |
| Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements                                   |                        | EN61010-1:2010+A1:2019   |
| Electrical Equipment For Measurement, Control, and Laboratory Use; Part 2-201: Particular requirements for control equipment (CB) | 24TH0298_61010-2-201_0 | IEC61010-2-201:2017 2nd Edition  |
| Electrical Equipment For Measurement, Control, and Laboratory Use; Part 2-201: Particular requirements for control equipment      |                        | EN IEC 61010-2-201:2018  |
| RoHS2   |                        | RoHS 2011/65/EU + AM2015/863   |

| EMC Compliance according to IEC/EN61000-6-2/6-3   | Condition  | Standard / Criterion  |
|---|--|---|
| Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments |  | IEC/EN61000-6-2:2019  |
| Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential area        |  | IEC/EN 61000-6-3:2021   |
| ESD Electrostatic discharge immunity test   | Air: $\pm 8\text{kV}$ ; Contact: $\pm 6\text{kV}$  | IEC61000-4-2:2008, Criteria A<br>EN61000-4-2:2009, Criteria A |
| Radiated, radio-frequency, electromagnetic field immunity test  | 10V/m (80-6000MHz)   | IEC/EN61000-4-3:2006+A2:2010, Criteria A                      |
| Fast Transient and Burst Immunity   | DC-Input/Output Ports: $\pm 1\text{kV}$  | IEC/EN61000-4-4:2012 Criteria A                               |
| Surge Immunity  | DC-Input/Output Port:<br>V(+) - V(-), DC-OK(13-14): $\pm 1\text{kV}$<br>V(+)-PE, V(-)-PE: $\pm 2\text{kV}$ | IEC/EN61000-4-5:2014+A1:2017, Criteria A                      |
| Immunity to conducted disturbances, induced by radio-frequency fields   | 10Vrms (0.15-80MHz)  | IEC61000-4-6:2013, Criteria A<br>EN61000-4-6:2014, Criteria A |

### DIMENSION & PHYSICAL CHARACTERISTICS

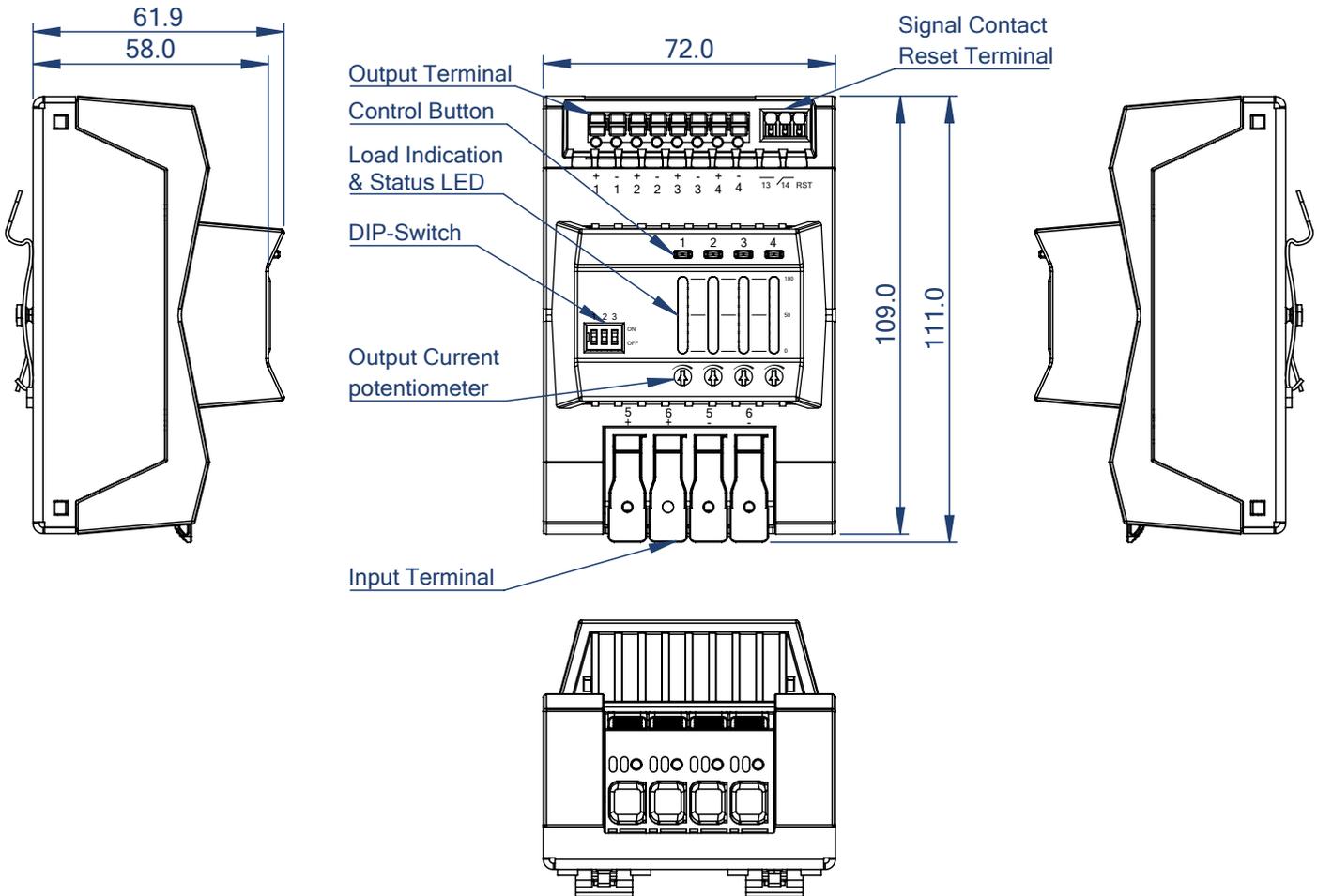
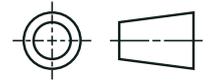
| Parameter         | Type    | Value  |
|-------------------|---------|--|
| Material          | chassis | polycarbonate (UL94 V-0)                         |
| Dimension (HxWxD) |         | 111.0 x 72.0 x 61.9mm<br>4.37 x 2.83 x 2.44 inch |
| Weight            |         | 250g<br>0.55 lbs                                 |

# RACPR01-4SP/10A Series $\diamond$ e-fuse

4-Channel 10A  $\diamond$  Input: 24VDC

## DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing (mm)



| Input Cage Clamp               |      |                 |
|--------------------------------|------|-----------------|
| Function                       | AWG  | mm <sup>2</sup> |
| +Vin                           | 18-4 | 0.75-25         |
| -Vin                           | 18-4 | 0.75-25         |
| Wire stripping length: 18-20mm |      |                 |

| Push-In Output Terminal <sup>(6)</sup> |       |                 |
|--|-------|-----------------|
| Function                               | AWG   | mm <sup>2</sup> |
| -Vout                                  | 20-12 | 0.5-4           |
| +Vout                                  | 20-12 | 0.5-4           |
| Wire stripping length: 10-11mm         |       |                 |

| Push-In Signal/Reset Terminal <sup>(6)</sup> |       |                 |
|--|-------|-----------------|
| Function                                     | AWG   | mm <sup>2</sup> |
| Signal                                       | 28-16 | 0.25-1.5        |
| Wire stripping length: 8-9mm                 |       |                 |
| Do not connect to hazardous voltages         |       |                 |

Note5: Use flexible (stranded wire) or solid cables with above wire cross-section is recommended.

Use copper conductors designed for an operating temperature of at least 105°C.

Note6: Ferrules are required for flexible cable.

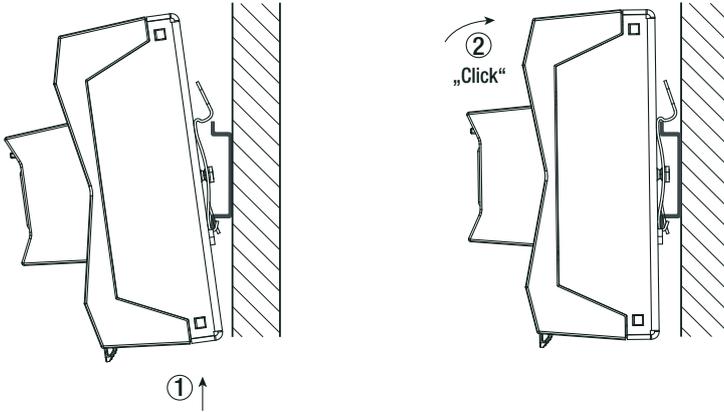
Tolerance:  $\pm 0.5\text{mm}$

### INSTALLATION

#### Mounting Instruction

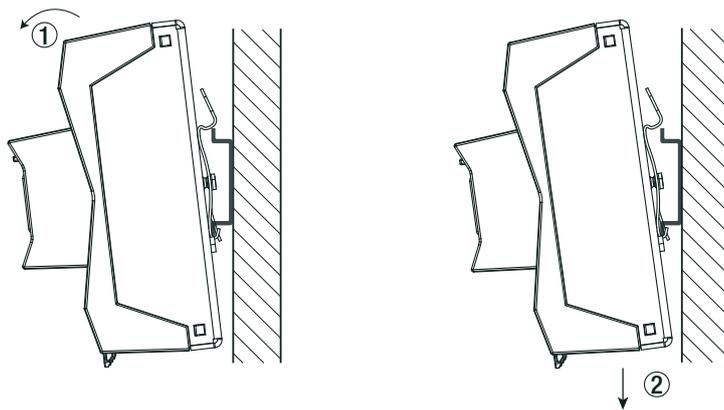
Mounting Rail: Standard TS35 DIN Rail in accordance with EN 60715.  
 No space above, below and between the devices are required.

#### Mounting



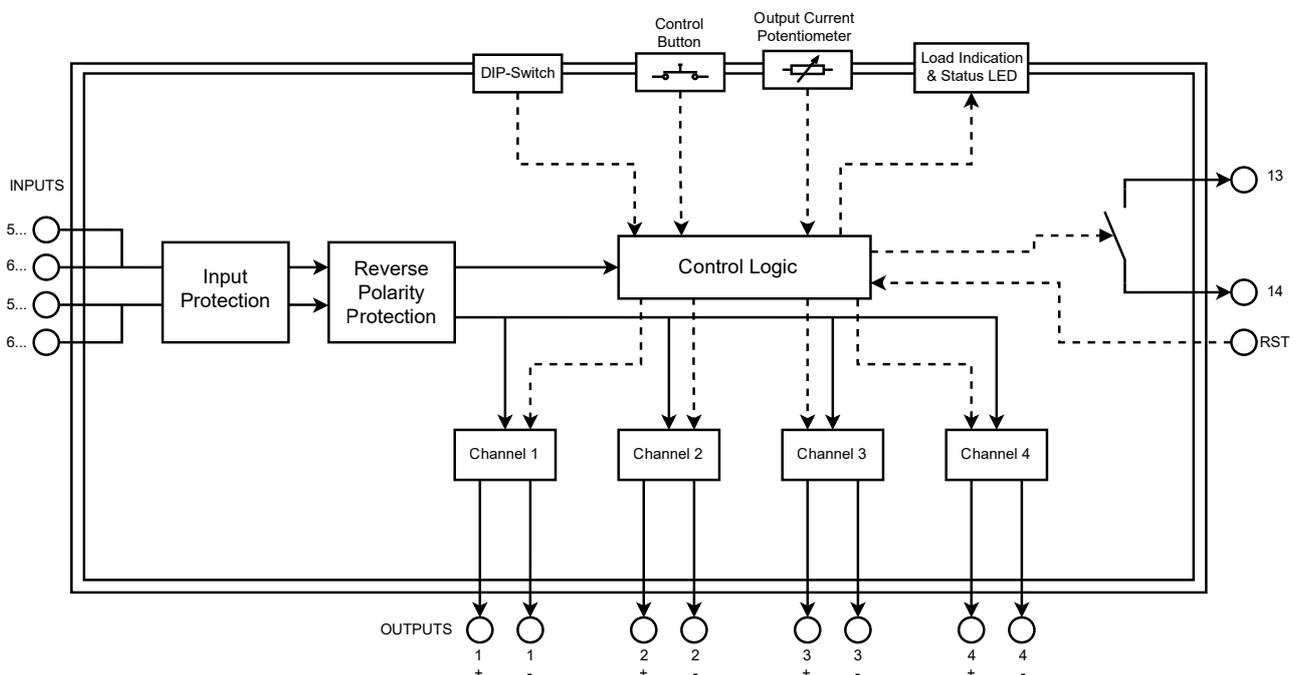
1. Place the device on the DIN rail with a slight downward tilt.
2. Tilt the device upwards until it reaches the upper part of the DIN rail. Snap the device into the DIN rail.

#### Release



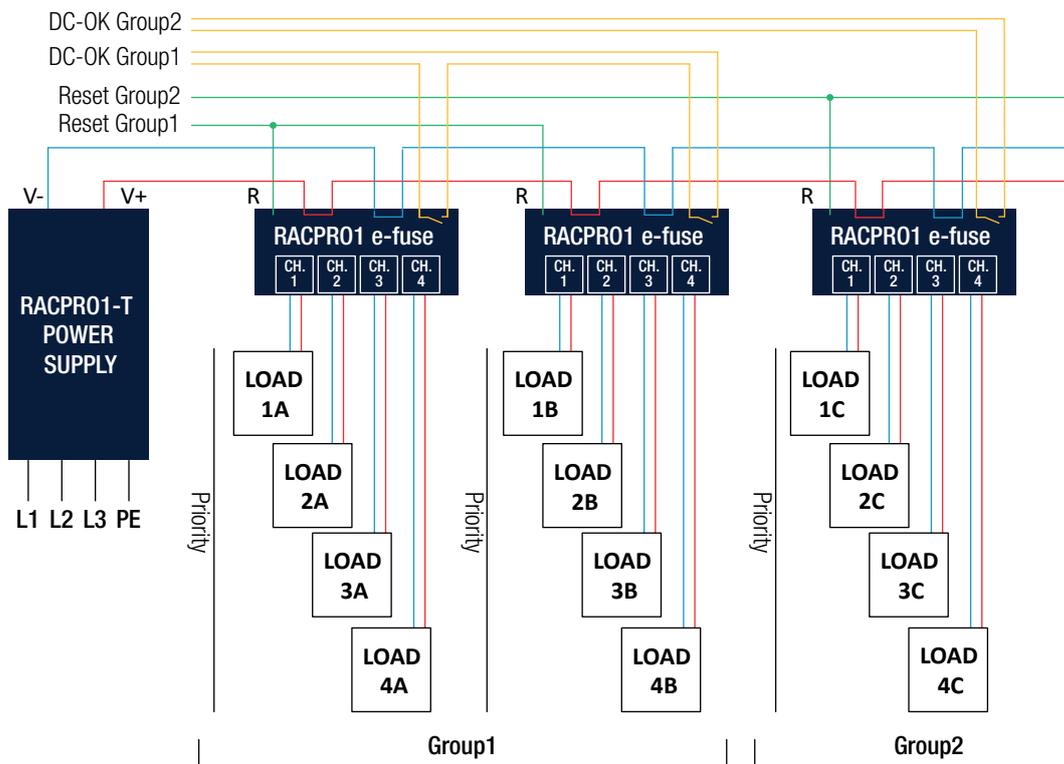
1. Press the upper part of the device forwards to release it from the rail.
2. Pull the device away from the DIN rail by pushing it down.

### BLOCK DIAGRAM



### APPLICATION EXAMPLE

#### Daisy Chaining of multiple modules



- Voltage-free relay contact for DC-OK signal (closed when all active channels are “OK”, open in error mode (one channel or several channels switched off due to overload or UVLO)
- DC-OK can be connected in series with other e-fuse modules for group monitoring
- In latch mode, the e-Fuses can be switched on again by remote resets
- RECOM e-fuses therefore offer easy integration into all standard programmable logic controllers (PLC) and SCADA systems.

### PACKAGING INFORMATION

| Parameter                   | Type           | Value           |
|-----------------------------|----------------|-----------------|
| Packaging Dimension (LxWxH) | cardboard box  | 153 x 97 x 78mm |
| Packaging Quantity          |                | 1 pc            |
| Storage Temperature Range   |                | -40°C to +85°C  |
| Storage Humidity            | non-condensing | 95% RH max.     |

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.