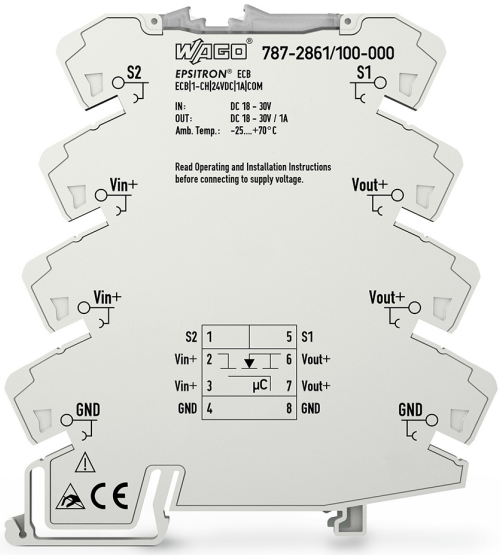
TECHDOCS

Manual



787-2861(/xxxx-xxxx)

Electronic Circuit Breaker

24 VDC, 0.5 ... 8 A

Version 1.3.1

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

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We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

WAGO is a registered trademark of WAGO Verwaltungsgesellschaft mbH.

Table of Contents

1 Notes about this Documentation

Note

Always retain this documentation!
This documentation is part of the product. Therefore, retain the documentation during the entire service life of the product. Pass on the documentation to any subsequent user. In addition, ensure that any supplement to this documentation is included, if necessary.

1.1 Validity of this Documentation

This documentation applies to the electronic circuit breaker 787-2861 and the versions listed in the following table.

Table 1: Versions

Item No./Version	Description
787-2861/0050-0000	Electronic Circuit Breaker, 24 VDC, 0.5 A
787-2861/0100-0000	Electronic Circuit Breaker, 24 VDC, 1 A
787-2861/0200-0000	Electronic Circuit Breaker, 24 VDC, 2 A
787-2861/0400-0000	Electronic Circuit Breaker, 24 VDC, 4 A
787-2861/0600-0000	Electronic Circuit Breaker, 24 VDC, 6 A
787-2861/0800-0000	Electronic Circuit Breaker, 24 VDC, 8 A
787-2861/0108-0020	Electronic Circuit Breaker, adjustable 24 VDC, 1 … 8 A

Note

Documentation Validity for Variants
Unless otherwise indicated, the information given in this documentation applies to listed variants.

1.2 Copyright

1.3 Symbols

⚠ DANGER

Personal Injury!
Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ DANGER

Personal Injury Caused by Electric Current!
Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Personal Injury!
Indicates a moderate-risk, potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Personal Injury!
Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Damage to Property!
Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

NOTICE

Damage to Property Caused by Electrostatic Discharge (ESD)!
Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

Note

Important Note!
Indicates a potential malfunction which, if not avoided, however, will not result in damage to property.

Information

Additional Information:
Refers to additional information which is not an integral part of this documentation (e.g., the Internet).

1.4 Number Notation

Table 2: Number Notation

Number Code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated with dots (.)

1.5 Font Conventions

Table 3: Font Conventions

Font Type	Indicates
italic	Names of paths and data files are marked in italic-type. e.g.: *C:\Program Files\WAGO Software*
Menu	Menu items are marked in bold letters. e.g.: **Save**
>	A greater-than sign between two names means the selection of a menu item from a menu. e.g.: **File** > **New**
Input	Designation of input or optional fields are marked in bold letters, e.g.: **Start of measurement range**
“Value”	Input or selective values are marked in inverted commas. e.g.: Enter the value “4 mA” under **Start of measurement range**.
[Button]	Pushbuttons in dialog boxes are marked with bold letters in square brackets. e.g.: **[Input]**
[Key]	Keys are marked with bold letters in square brackets. e.g.: **[F5]**

2 Important Notes

This section includes an overall summary of the most important safety requirements and notes that are mentioned in each individual section. To protect your health and prevent damage to devices as well, it is imperative to read and carefully follow the safety guidelines.

2.1 Legal Bases

2.1.1 Subject to Changes

WAGO Kontakttechnik GmbH & Co. KG reserves the right to provide for any alterations or modifications. WAGO Kontakttechnik GmbH & Co. KG owns all rights arising from the granting of patents or from the legal protection of utility patents. Third-party products are always mentioned without any reference to patent rights. Thus, the existence of such rights cannot be excluded.

2.1.2 Personnel Qualifications

All sequences implemented on 787 Series devices may only be carried out by electrical specialists with sufficient knowledge in automation. The specialists must be familiar with the current norms and guidelines for the devices and automated environments.

2.1.3 Use of the 787 Series in Compliance with Underlying Provisions

The 787 Series power supply system provides DC voltage to electric or electronic devices, such as industrial control systems or display, communication and measuring devices.

The devices have been developed for use in an environment that meets the IP20 protection class criteria. Protection against finger injury and solid impurities up to 12.5 mm diameter is assured; protection against water damage is not ensured. Unless otherwise specified, operation of the components in wet or dusty environments is prohibited.

The devices are designed for installation in an enclosure. Under no circumstances may they be used in control systems for planes or in nuclear facilities, as any malfunction in these applications could result in severe injuries or risk of death.

2.1.4 Technical Condition of Specified Devices

The devices to be supplied ex works are equipped with hardware and software configurations, which meet the individual application requirements. These modules contain no parts that can be serviced or repaired by the user. The following actions will result in the exclusion of liability on the part of WAGO Kontakttechnik GmbH & Co. KG:

- Repairs,
- Changes to the hardware or software that are not described in the operating instructions,
- Improper use of the components.

Further details are given in the contractual agreements. Please send your request for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

2.2 Safety Advice (Precautions)

For installing and operating purposes of the relevant device to your system the following safety precautions shall be observed:

DANGER

Do not work on devices while energized!
All power sources to the device shall be switched off prior to performing any installation, repair or maintenance work.

DANGER

Live parts are likely to be touched!
The party setting up the device is responsible for providing appropriate touch guards. The installation regulations must be observed for each individual application.

DANGER

Installation only in appropriate housings, cabinets or in electrical operation rooms!
Always install devices of the 787 Series in enclosures, cabinets or electrical equipment rooms which can be closed and locked. Ensure that access to this equipment/these rooms is possible only by authorized specialists with the appropriate key or tools.

DANGER

Do not use these devices in control systems for planes, trains or nuclear facilities!
Never use these devices in control systems for planes, trains or nuclear facilities, as any malfunction in these applications can result in severe injuries or risk of death!

DANGER

Ensure a standard connection!
To minimize any hazardous situations resulting in personal injury or to avoid failures in your system, the data and power supply lines shall be installed according to standards, with careful attention given to ensuring the correct terminal assignment. Always adhere to the EMC directives applicable to your application.

NOTICE

Switch off power supply to defective device!
Switch off power supply to the device immediately if the device malfunctions or is damaged! Control systems connected to the device may also be damaged! Return the defective device directly to WAGO.

NOTICE

Use strain relief!
Electronic contacts can be damaged by high vibration levels or shock impacts! Provide appropriate strain relief means to attach and cap any free ends of the conductors.

⚠ CAUTION

Do not touch hot surfaces!
The surface of the housing can become hot during operation. If the device was operated at high ambient temperatures, allow it to cool off before touching it.

NOTICE

Protect the components against materials having seeping and insulating properties!
The components are not resistant to materials having seeping and insulating properties such as: aerosols, silicones and triglycerides (found in some hand creams). If you cannot exclude that such materials will appear in the component environment, then install the components in an enclosure being resistant to the above-mentioned materials. Clean tools and materials are imperative for handling devices/modules.

NOTICE

Clean only with permitted materials!
Clean housing and soiled contacts with propanol.

NOTICE

Do not use any contact spray!
Do not use any contact spray. The spray may impair contact area functionality in connection with contamination.

NOTICE

Do not reverse the polarity of connection lines!
Avoid reverse polarity of data and power supply lines, as this may damage the devices involved.

NOTICE

Avoid electrostatic discharge!
The devices are equipped with electronic components that may be destroyed by electrostatic discharge when touched. Please observe the safety precautions against electrostatic discharge per DIN EN 61340-5-1/-3. When handling the devices, please ensure that environmental factors (personnel, work space and packaging) are properly grounded.

3 Device Description

The 787-2861/0xx0-0000 electronic circuit breaker reliably protects load circuits against short circuiting and overloading. The 24 VDC input voltage can be provided with fuse protection for the following current values:

Table 4: Output Fuse Protection

Version	Fuse Protection	Color Coding
787-2861/0050-0000	0.5 A	Green
787-2861/0100-0000	1 A	Brown
787-2861/0200-0000	2 A	Red
787-2861/0400-0000	4 A	Yellow
787-2861/0600-0000	6 A	Blue
787-2861/0800-0000	8 A	Gray
787-2861/0108-0020	1 A ... 8 A	-

The electronics can accommodate brief current peaks.

LEDs indicate the respective status of the output and current setting.

In the event of a short circuit or overloading, the individual channel is de-energized after a defined trip time.

Note

Wait for temperature to return to normal!
If a channel has been de-activated due to short-circuiting or overloading, wait until the temperature returns to its normal range (cooling period) before re-activating the channel.

The device has a control input and a signal output.

- **Control input:** The channel can be switched ON and OFF from here.
- **Signal output:** The operating status can be read from here.

The 787-2861/0108-0020 electronic circuit breaker variably protects load circuits with current levels from 1 A … 8 A. The trip current and behavior of the signal output can be configured using the push and slide switch. LEDs indicate the respective status of the channel and current setting.

The terms “switched ON” and “switched OFF”, as well as “tripped” are used in this manual. To clearly delineate these terms, they are explained as follows:

Table 5: Definition of Terms

Designation	Definition
Switched ON	The user has activated the electronic circuit breaker manually from the push and slide switch or via a corresponding signal at the control input. The load circuit is closed, the current flows.
Switched OFF	The user has deactivated the electronic circuit breaker manually from the push and slide switch or via a corresponding signal at the control input. The load circuit is open, the current flow is interrupted.
Tripped	The electronics of the electronic circuit breaker has been tripped due to overcurrent, undervoltage or overvoltage. The load circuit is open, the current flow is interrupted.

3.1 View

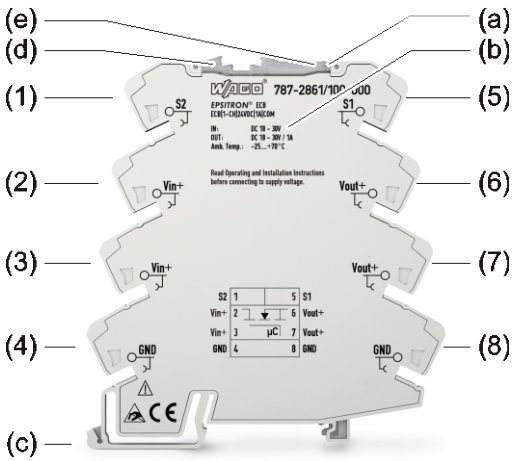

Figure 1: View

Table 6: Legend for „View“ Figure

Position	Designation
(1)	Connections (see section “Connections”)
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
(8)	
(a)	**787-2861/0xx0-0000:** Transparent cover with labeling area and color coding stripes. The LEDs (d) and (e) and the push and slide switch (see “Operating Elements”) are located under the transparent cover. **787-2861/0108-0020:** Transparent cover with labeling area. The LEDs (d) and (e) and the push and slide switch (see “Operating Elements”) are located under the transparent cover.
(b)	Technical data
(c)	Snap-in mounting foot
(d)	Status LED
(e)	Configuration LED

3.2 Connectors

DANGER

Do not wire connections under load!
The connections can be damaged or electric arcing can be caused by wiring the device under tension!
Only wire the electrical connections when the device is disconnected from the power supply!

NOTICE

Use strain relief!
Electronic contacts can be damaged by high vibration levels or shock impacts!
Provide appropriate strain relief means to attach and cap any free ends of the conductors.

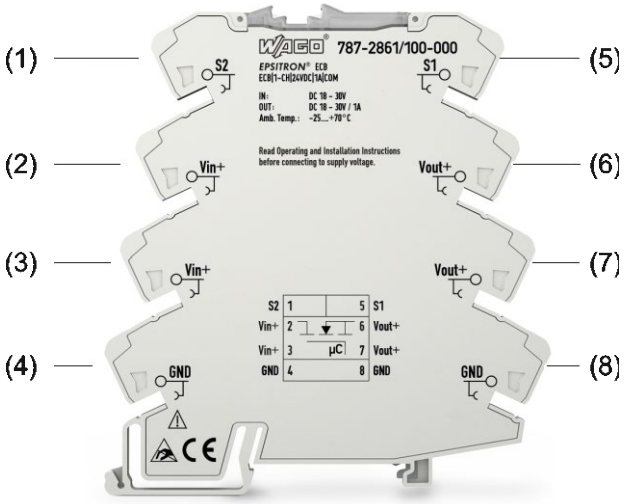

Figure 2: Connections

Table 7: Legend for “Connections” Figure

Position	Designation
(1)	S2 (signal output)
(2)	V_{IN}+
(3)	V_{IN}+
(4)	GND
(5)	S1 (control input)
(6)	V_{OUT}+
(7)	V_{OUT}+
(8)	GND

3.3 Display Elements

The electronic circuit breaker has a status LED (d) and a configuration LED (e).

- **Status LED:** The LED indicates the current operating status of the channel (see Section “General Operating Statuses”).
- **Configuration LED:** The LED indicates the respective configuration status (see Section “Configuration (787-2861/0108-0020 only)”).

Note

787-2861/0xx0-0000: Non-adjustable configuration!
The configuration of the 787-2861/0xx0-0000 electronic circuit breaker is non-adjustable and cannot be changed. The configuration LED indicates only the device-specific configuration.

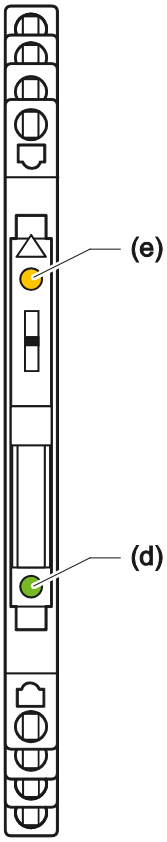

Figure 3: Display Elements

Table :8 Legend for the “Display Elements” Figure

Position	Description
(d)	Status LED
(e)	Configuration LED

3.4 Operating Elements

The device can be operated and configured with the push and slide switch. The push and slide switch is located under the transparent cover (a); see Section “View” in this connection.

The push and slide switch has the following basic functions:

Table 9: Basic Functions of the Push and Slide Switch

Push and slide switch	LED indication	Description
Press	–	**During operation:** Switch channel ON and OFF
		In case of error: Reset channel
Slide up (towards the configuration LED)	Configuration LED	**During operation:** Set current value is displayed once.
Slide down (towards the status LED)		**During operation:** Set configuration of the signal output is displayed once.

The 787-2861/0108-0020 device can also be configured. More information is available in Section “Configuration (787-2861/0108-0020 only)”.

3.5 Technical Data

Table 10: Device

Dimensions (mm) W × H × L	6 × 97.8 × 94 Height from top edge of DIN rail
Weight	37 g
Degree of protection	IP20

Table 11: Electrical Data

Input	
Nominal input voltage	24 VDC (SELV)
Input voltage range	18 VDC … 30 VDC
Required input voltage at which the channel is activated (activation threshold)	20 VDC
Input voltage at which the channel is tripped (trip threshold)	18 VDC (20.4 VDC with simultaneous overcurrent at the channel) A possible undervoltage is permitted for ca. 10 ms.
Maximum continuous current for the device	Corresponds to the nominal current of the device used: 0.5 A, 1 A, 2 A, 3 A, 4 A, 5 A, 6 A, 7 A, 8 A
Overvoltage protection	33 V (suppressor diode at the input)
Zero-signal current for open-circuit operation at 24 V	12.5 mA
Power dissipation for open-circuit operation at 24 V (default)	< 300 mW
Output	
Nominal output voltage	Nominal input voltage minus voltage drop
Trip current (787-2861/0xx0-0000 only)	Corresponds to the nominal current of the device used: 0.5 A, 1 A, 2 A, 4 A, 6 A, 8 A
Trip current adjustable (787-2861/0108-0020 only)	1 A, 2 A, 3 A, 4 A, 5 A, 6 A, 7 A, 8 A
Voltage drop between input and output	At a nominal current between 0.5 A … 2 A: < 50 mV/A At a nominal current ≥ 3 A: 20 mV/A
Wait time after a channel has tripped (temperature returns to normal)	Maximum 10 s (depending on the trip current)
Efficiency $_{typ.}$	98 %
Maximum load capacity	> 50000 µF [1]
Integrated fuse	15 A (slow)
ON delay	Minimum 170 ms, maximum 500 ms

Feedback voltage	Maximum 35 VDC
Parallel connection	Prohibited
Series connection	Prohibited
Control input	
Control input	Non-electrically isolated 24 VDC input (relative to the device 0 V input) Voltage level “active high”: minimum 18 VDC, maximum 30 VDC Voltage level “active low”: minimum -3 VDC, maximum 5 VDC
Signal output	
Signal output	Non-electrically isolated 24 VDC output, short-circuit-protected, bridgeable across 30 devices High level: 15 … 24 V at maximum current carrying capacity 4 mA
Safety and Protection	
Protection class	III
Pollution degree	2
Insulation class	A (105 °C)
Overvoltage categorie	II

[1] The power supply must be able to deliver the maximum required power without the voltage falling below 20.4 VDC.

Table 12: Wiring

Connection technology	Push-in CAGE CLAMP®
Solid “s” [2]	0.08 mm² … 2.5 mm² / AWG 28 … 14
Fine-stranded “f-st” [2]	0.34 mm² … 2.5 mm² / AWG 22 … 14
Strip length	9 mm … 10 mm / 0.37 in

[2] The conductor may reach a temperature of up to 90 °C. Use only conductors that can withstand the anticipated temperature.

Table 13: Ambient Conditions

Surrounding air temperature, operation	See table “Mounting Positions and Ambient Temperatures”
Surrounding air temperature, storage	-40 °C … +85 °C
Relative humidity	≤ 95 %
Operating altitude above sea level	Max. 2000 m

Table 14: Mounting Positions and Ambient Temperatures

Mounting position	Ambient temperature range		
	0.5 A … 4 A	5 A … 6 A	7 A … 8 A
Control cabinet, series connected	−25 °C … +70 °C	−25 °C … +60 °C	−25 °C … +35 °C
Control cabinet, 6 mm distance to the adjacent module	−25 °C … +70 °C	−25 °C … +70 °C	−25 °C … +65 °C
Horizontally mounted, series connected *	−25 °C … +70 °C	−25 °C … +50 °C	–
Horizontally mounted, 6 mm distance to the adjacent module *	−25 °C … +70 °C	−25 °C … +60 °C	−25 °C … +35 °C

* Horizontal mounting position: The device is mounted upright on the horizontal DIN-rail.

3.6 Approvals

The following approvals have been granted for the 787-2861 electronic circuit breaker:

CE	Conformity Marking	
cULus	cULus	UL61010-1
cULus	Ordinary Locations	UL61010-2-201

The following approvals are in preparation for the 787-2861 electronic circuit breaker:

UR	UR	UL2367

Ship approvals are in preparation for the 787-2861 electronic circuit breaker.

3.7 Standards and Guidelines

The 787-2861 electronic circuit breaker is in compliance with the following standards and guidelines:

EU EMC Directive	2014/30/EU
Safety requirements for electrical equipment for measurement, control and laboratory use Part 2-201: Particular requirements for control equipment	IEC 61010-2-201
Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments	DIN EN 61000-6-2
Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments	DIN EN 61000-6-3 + A1

4 Function Description

4.1 Tripping Characteristics

The electronic circuit breaker verifies that the output current is greater than the nominal current setting. As soon as the output current exceeds this nominal current, the channel is switched off. The trip time depends on the magnitude of the overcurrent. The figure below depicts the respective trip times:

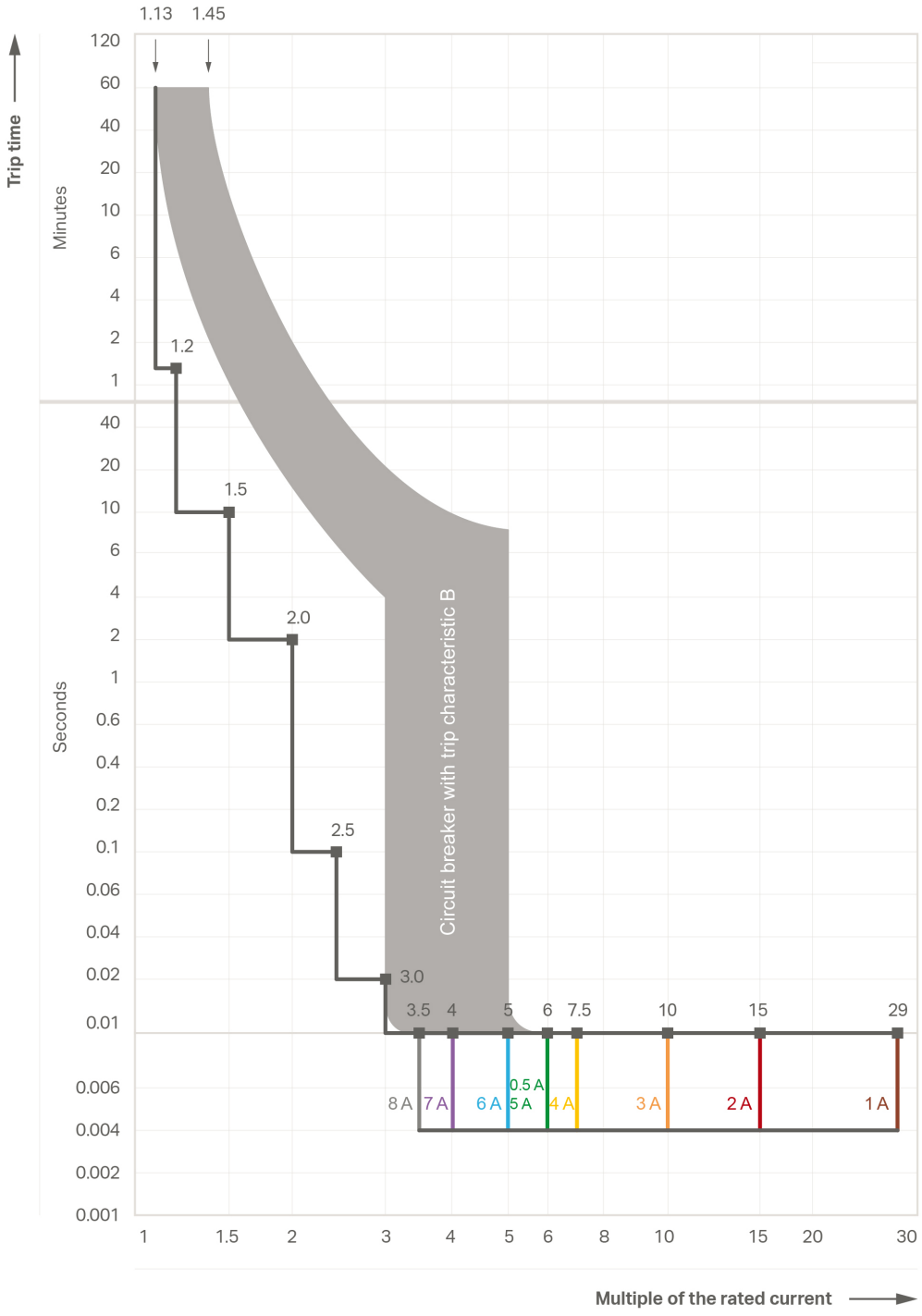

Figure 4: Trip Characteristics (with Trip Characteristic of a Circuit Breaker, Characteristic B)

4.2 Undervoltage and Overvoltage Detection

The device only operates in a voltage range of 18 VDC … 30 VDC. A minimum voltage of 20 V is required to switch on the channel.

Undervoltage detection: If the voltage during operation falls below 18 V, the status LED flashes blue and the channel is tripped to protect the downstream load. If the voltage returns to the nominal range, the channel is switched on again and the LED lights up green. The device is also protected against brief voltage drops that can occur in the power supply. A dead time of a few milliseconds is implemented to ensure that the device is not inadvertently switched off in such a situation.
If the device detects an overcurrent (> 100 % nominal current) and the voltage falls below 20.4 V at the same time, the channel trips after a few milliseconds. This prevents paralleled channels from being affected by a longer voltage drop and switching off. This mainly occurs if the power supply is not adequately dimensioned. If the trip time is shorter according to the tripping characteristics, the electronic circuit breaker trips prioritized after this time. This is the case, for example, in the event of a short circuit.

Overvoltage detection: If the input voltage of the device rises above 31 V, the status LED flashes red and the channel trips to protect the downstream load. If the voltage returns to the nominal range, the channel is switched on again automatically and the LED lights up green.

Table 15: Undervoltage and Overvoltage Detection

Output status	Response of the device at		Response of the device at voltage recover after	
	Undervoltage	Overvoltage	Undervoltage	Overvoltage
Status 1: Channel switched on.	**Status 8:** Channel tripped. Undervoltage	**Status 9:** Channel tripped. Overvoltage	**Status 1, 2 or 3 (depending on load current):** Channel switched on.	**Status 1, 2 or 3 (depending on load current):** Channel switched on.
Status 2: Channel switched on. Load current > 90 % nominal current	**Status 8:** Channel tripped. Undervoltage	**Status 9:** Channel tripped. Overvoltage	**Status 1, 2 or 3 (depending on load current):** Channel switched on.	**Status 1, 2 or 3 (depending on load current):** Channel switched on.
Status 3: Channel switched on. Load current > 100 % nominal current	**Status 7:** Channel tripped. Undervoltage with simultaneous overcurrent.	**Status 9:** Channel tripped. Overvoltage	**Status 7:** Channel tripped. Undervoltage with simultaneous overcurrent.	**Status 1, 2 or 3 (depending on load current):** Channel switched on.
Status 4: Channel switched off manually or through control input S1.	**Status 8:** Channel tripped. Undervoltage	**Status 9:** Channel tripped. Overvoltage	**Status 4:** Channel switched off manually or through control input S1.	**Status 4:** Channel switched off manually or through control input S1.
Status 6: Channel tripped. Temperature returned to normal.	**Status 8:** Channel tripped. Undervoltage	**Status 9:** Channel tripped. Overvoltage	**Status 6:** Channel tripped. Temperature returned to normal.	**Status 6:** Channel tripped. Temperature returned to normal.

4.3 Activating Capacitive Loads

High capacitive loads can be applied using the electronic circuit breaker. The resulting high inrush currents strain the feeding power supply. The power supply must be able to deliver the maximum required power without the voltage falling below 20.4 VDC.

The capacity value to be reached depends on elementary factors, such as the already mentioned feeding power supply, cable length and conductor cross-section, as well as the properties of the load to be supplied.

4.4 ON delay

The channel is activated time delayed as soon as a minimum input voltage is present. This requires that the channel was ON before switching off the input voltage.

Information

Behavior upon restoration of the input voltage
The circuit breaker channel adopts the state before the input voltage was switched off. A channel that was manually switched OFF or triggered is not automatically switched ON.

The channel is randomely activated time delayed within 170 ms … 500 ms. If several electronic circuit breakers are connected to a power supply, larger current spikes are avoided when switching ON.

4.5 Control Input S1

A signal (18 V … 30 V) between the control input and GND allows the state of the electronic circuit breaker to be changed. Which status is evoked depends on the signal duration and previous status of the electronic circuit breaker.

Table 16: Control Input S1

Signal	Duration	Status	Previous Status
Signal 1: Reset channel.	300 ms … 1500 ms	**Status 1, 2 or 3 (depending on load current):** Channel switched ON.	**Status 6 or 7:** Channel tripped.
Signal 2: Switch channel ON.	2000 ms … 4000 ms	**Status 1, 2 or 3 (depending on load current):** Channel switched ON.	**Status 4:** Channel switched OFF.
Signal 3: Switch channel OFF.	5000 ms … 7000 ms	**Status 4:** Channel switched OFF.	**Status 1, 2 or 3 (depending on load current):** Channel switched ON.

More information on individual signals and status is available in the diagram “General Operating Statuses”.

4.6 Signal Output S2

The channel status can be queried at the signal output. This signal output is short-circuit-proof and has a common potential with the power supply ground.

If the electronic circuit breaker is triggered, the signal output signals this by a low signal (0 V). The signal outputs of up to 30 devices can be connected in parallel and serve as a common signal.

With the 787-2861/0108-0020 electronic circuit breaker, the behavior of the signal output can be modified. For more information about this refer to the Section “Configuration (only 787-2861/0108-0020).”

Table 17: Signal Output S2 – Indicators 787-2861/0108-0020

Status	Explanation	Status LED	Signal Output S2						
			Tripped	Current Following Monitoring	Early Monitoring 90 %	Early Monitoring 80 %	Early Monitoring 70 %	External Relay Control	Tripped/Manually Switched Off
Switched OFF	**Status 0:** Initialization of the device (boot routine).	OFF	24 V	24 V	24 V	24 V	24 V	24 V	24 V
	Status 4: Channel switched OFF manually or through control input S1.	Red	24 V	0 V	24 V	24 V	24 V	24 V	0 V
Switched ON	**Status 1:** Channel switched ON. Load current < approx. 100 mA	Green	24 V	0 V	24 V	24 V	24 V	0 V	24 V
	Status 1: Channel switched ON. Load current > approx. 100 mA	Green	24 V	24 V	24 V	24 V	24 V	0 V	24 V
	Status 1: Channel switched ON. Load current > 70% nominal current	Green	24 V	24 V	24 V	24 V	0 V	0 V	24 V
	Status 1: Channel switched ON. Load current > 80% nominal current	Green	24 V	24 V	24 V	0 V	0 V	0 V	24 V
	Status 2: Channel switched ON. Load current > 90% nominal current	Green, flashing (1 Hz)	24 V	24 V	0 V	0 V	0 V	0 V	24 V
	Status 3: Channel switched ON. Load current > 100% nominal current	Green, flashing (5 Hz)	24 V	0 V	0 V	0 V	0 V	0 V	24 V
Tripped	**Status 5:** Channel tripped. Wait for temperature to return to normal.	Red, flashing (1 Hz)	0 V	0 V	0 V	0 V	0 V	24 V	0 V
	Status 6: Channel tripped. Temperature returned to normal. Channel can be switched ON again.	Yellow, flashing (1 Hz)	0 V	0 V	0 V	0 V	0 V	24 V	0 V
	Status 7: Channel tripped. Undervoltage with simultaneous overcurrent.	Blue, flashing (1 Hz)	0 V	0 V	0 V	0 V	0 V	24 V	0 V
	Status 8: Channel tripped. Undervoltage	Blue, flickering (1 Hz)	0 V	0 V	0 V	0 V	0 V	24 V	0 V
	Status 9: Channel tripped. Overvoltagte	Red, flickering (1 Hz)	0 V	0 V	0 V	0 V	0 V	24 V	0 V
	Status 10: Device error, wiring error, feedback voltage	Red/blue, flashing (1 Hz)	24 V/ 0 V (5 Hz)	24 V/ 0 V (5 Hz)	24 V/ 0 V (5 Hz)	24 V/ 0 V (5 Hz)	24 V/ 0 V (5 Hz)	24 V/ 0 V (5 Hz)	24 V/ 0 V (5 Hz)

Note

Use signal output with a PLC!

Connect the supply ground of the electronic circuit breaker with the ground of the PLC when you use the signal output with a PLC!

5 Mounting

NOTICE

Avoid electrostatic discharge!
The devices are equipped with electronic components that may be destroyed by electrostatic discharge when touched. Please observe the safety precautions against electrostatic discharge per DIN EN 61340-5-1/-3. When handling the devices, please ensure that environmental factors (personnel, work space and packaging) are properly grounded.

5.1 DIN-35 Rail

The device is designed for mounting on a DIN-35 rail.

5.1.1 Mounting on DIN-Rail

Install the device as per EN 60715 by snapping it onto the DIN-rail. (see figure “Mounting”):

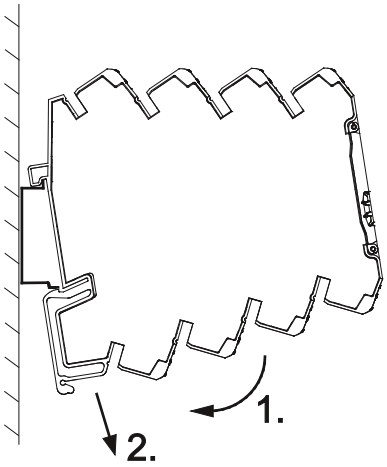

Figure 5: Mounting

1. Place the device with its DIN-rail guide on the top edge of the DIN rail.

2. Press the device onto the DIN-rail [1] while simultaneously pulling on the snap-in mounting foot (c) [2] until it locks into place.

3. To ensure secure fastening on the DIN-rail, fit end clips (e.g., Item No. **249-116**) on either side of the device (with a block arrangement: on either side of the devices).

Use separators (Item No. **209-191**) between adjacent contacts for safe disconnection when devices have been snapped in on each side.

5.1.2 Removal from the DIN-Rail

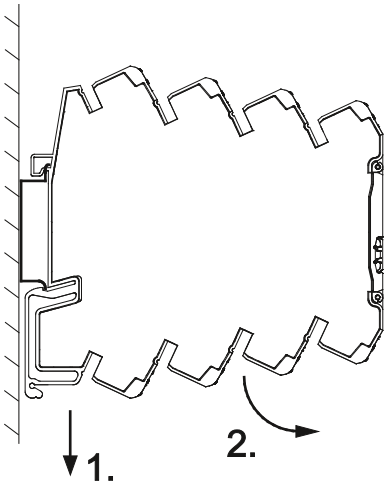

Figure 6: Removal

1. To remove (see figure “Removal”), pull down the snap-in mounting foot (c) [1]. Use a screwdriver or an operating tool for this.

2. Tilt the device forward [2] and unhook it from the DIN-rail.

6 Connect Devices

DANGER

Do not wire connections under load!
The connections can be damaged or electric arcing can be caused by wiring the device under tension!
Only wire the electrical connections when the device is disconnected from the power supply!

6.1 Connection Example

6.1.1 Connection Example 787-2861/0xx0-0000

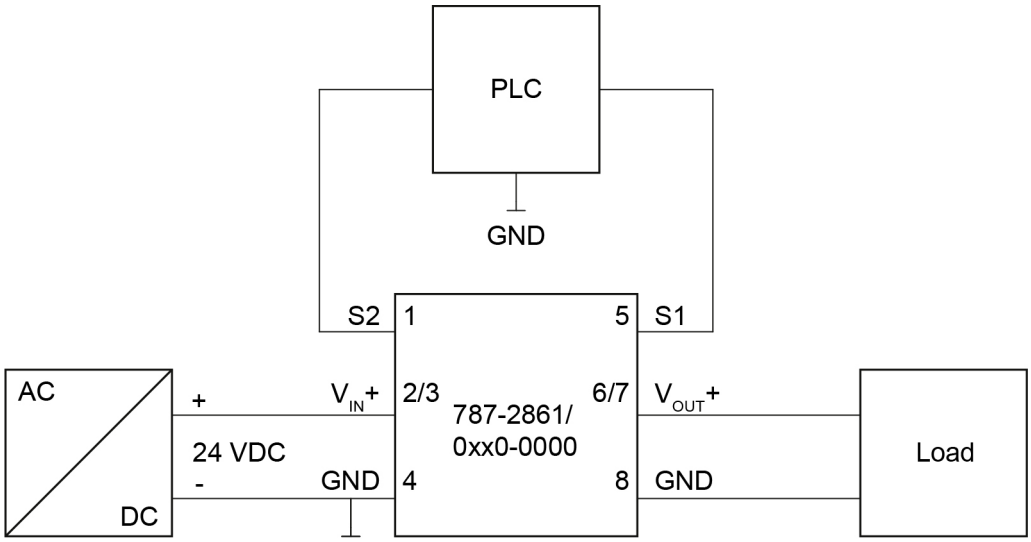

Figure 7: Connection Example 787-2861/0xx0-0000

6.1.2 Connection Example 787-2861/0108-0020

In the connection examples given below, additional relays are connected through signal output S2. To control a relay, the signal output S2 must be configured to setting “External Relay Control”.
This setting is described in section “Configuration (787-2861/0108-0020 only)”.
The resulting behavior for signal output S2 is described in section “Signal Output S2”, Table “Signal Output S2 – Indicators 787-2861/0108-0020”, column “External Relay Control”.

WAGO offers the following relays for both versions:

Table 18: Relay

Item Number	Description
857-304	Socket with a miniature switching relay for TS 35
788-304	Socket with miniature switching relay for TS 35

Connection Example 1: Load Circuit Switched OFF When Device Tripped

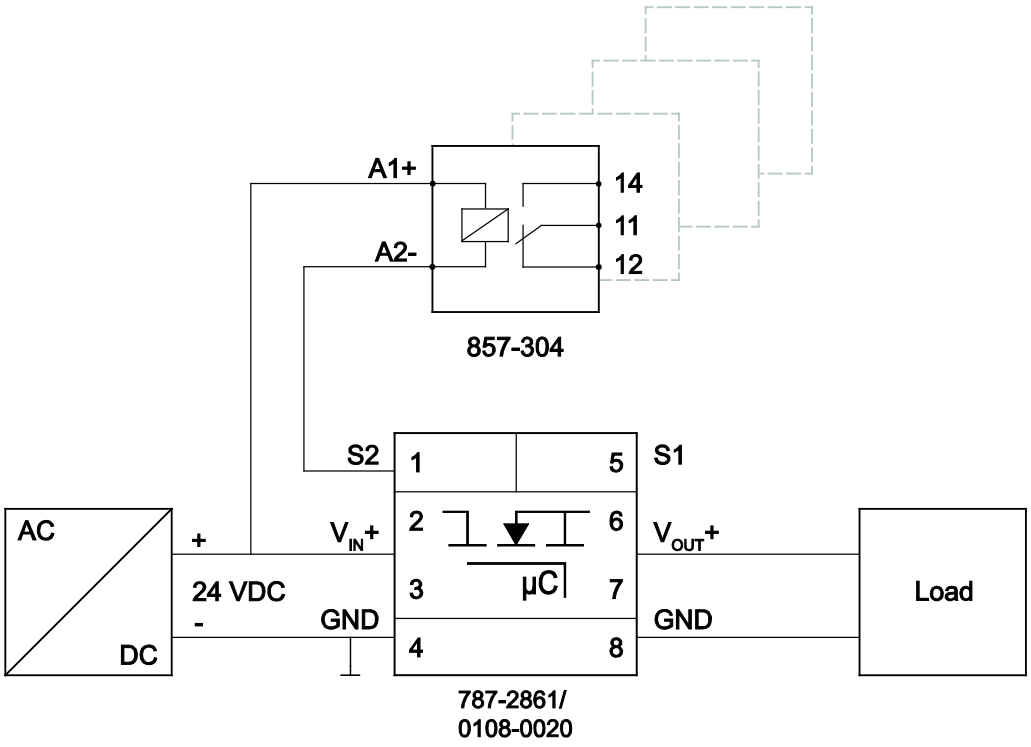

Figure 8: Connection Example 1 – 787-2861/0108-0020

In this version, the relay serves also to switch OFF other load circuits if the device has tripped.

Connection Example 2: Galvanic Isolation between Load Circuit and Input Potentials

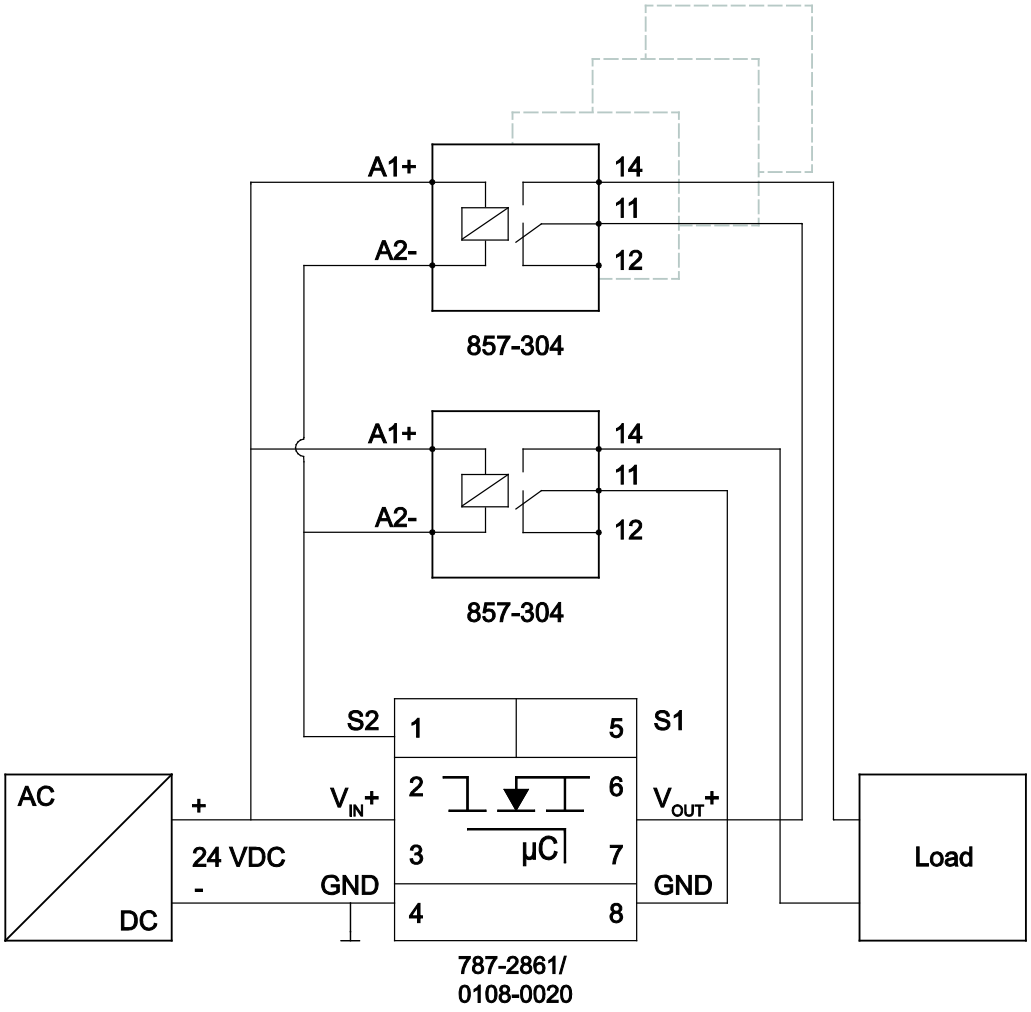

Figure 9: Connection Example 2 – 787-2861/0108-0020

In this version, two relays ensure that the load circuit is galvanically isolated from the input potentials if the device has tripped.

6.2 Distribute Potential

The devices have two connection points for the positive output (connections 6 and 7) and two connection points for the negative input/output (connections 4 and 8).

Once the device is powered by a push-in type jumper bar, two load circuits can be connected to the device directly (V_{OUT}+/GND). Additional terminal blocks can be omitted.

Observe the following note if you would like to common potentials with relays:

NOTICE

Connected relay: Only common equal potentials!
Damage to the device may occur if different potentials are commoned! If you use the 857-304 relay, the potentials must only be commoned via the connections VIN+ (connection 3) and GND (connection 8)!

6.3 Bridging Voltage or Signal

Push-in type jumper bars can be used to distribute an applied voltage or signal to several 787-2861 electronic circuit breakers.

- **Bridging the power supply:**
  The maximum supply current per connection point is 20 A. A current of 40 A can be distributed to multiple electronic circuit breakers if the potential is supplied and bridged via two connection points in parallel.

- **Bridging signal output S2:**
  The signal outputs of up to 30 devices can be bridged and serve as a common signal.

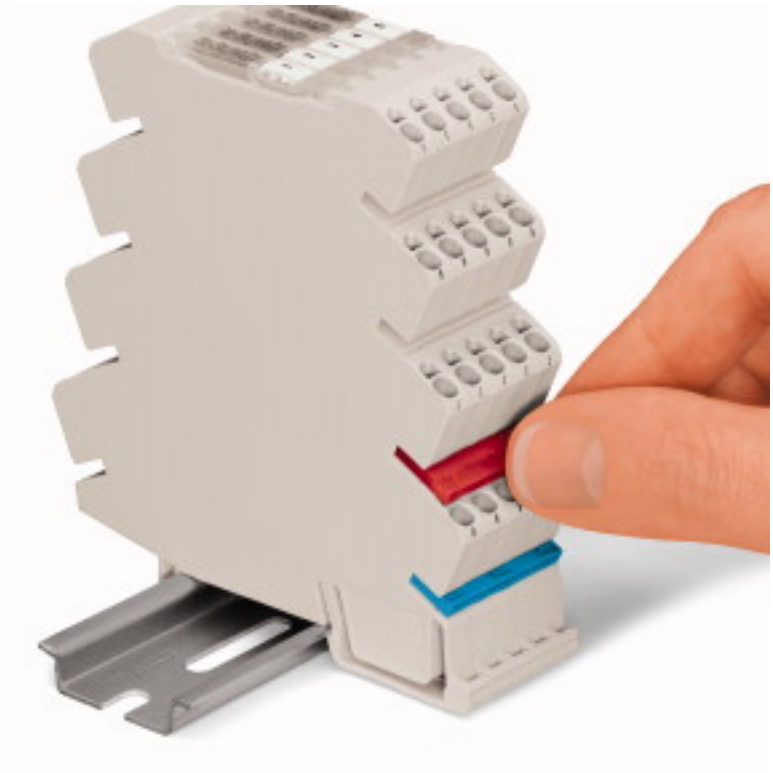

Figure 10: Push-in type jumper bars

7 Configuration (787-2861/0108-0020 only)

For this version, current level and signal output S2 can be configured from the push and slide switch. The configuration LED shows the respective configuration status.

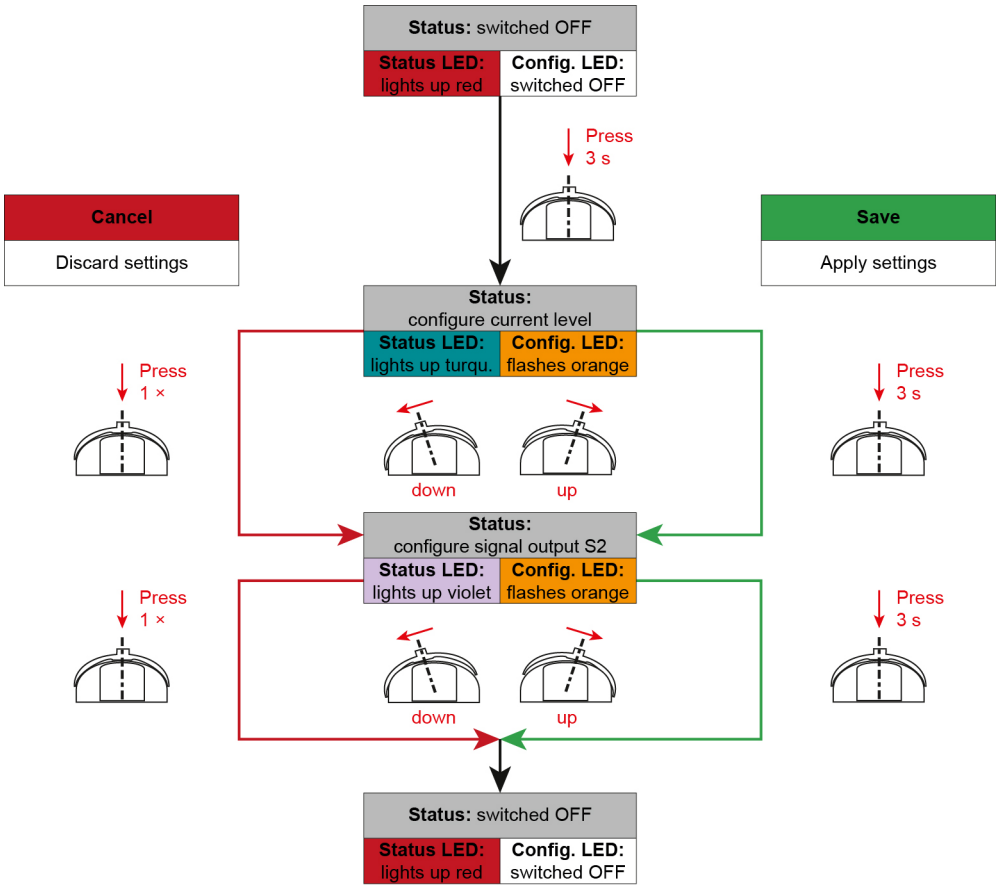

Figure 11: Status Diagram

Table 19: Flash Codes for Configuration via Push and Slide Switch

Flash code (x) *	Current level	Signal output S2
Config. LED flashing	Status LED illuminated	
orange	turquoise	violet
1	1 A	Triggered
2	2 A	Current flow monitoring
3	3 A	Early warning 90 %
4	4 A	Early warning 80 %
5	5 A	Early warning 70 %
6	6 A	Option: External relay control
7	7 A	Triggered and switched OFF manually
8	8 A	-

* The flash code is displayed cyclically: x flash signal(s), followed by a pause of 1.5 s

8 Diagnostics

8.1 General Operating Statuses

Table 20: General Operating Statuses

Operating Status	Status LED	Level at signal output S2 [1]	Push and slide switch is pressed	Signal at control input S1
Status 0: Initialization of the device (boot routine) [2]	OFF	0 V	-	-
Status 1: Channel switched ON.	Green	24 V	**Status 4**	**Signal 3 → Status 4**
Status 2: Channel switched ON. Load current > 90% nominal current	Green, flashing (1 Hz)	24 V	**Status 4**	**Signal 3 → Status 4**
Status 3: Channel switched ON. Load current > 100 % nominal current [3]	Green, flashing (5 Hz)	24 V	**Status 4**	**Signal 3 → Status 4**
Status 4: Channel switched OFF manually or through control input S1. [4]	Red	24 V	**Status 1**	**Signal 2 → Status 1**
Status 5: Channel tripped. Wait for temperature to return to normal. [5]	Red, flashing (1 Hz)	0 V	-	-
Status 6: Channel tripped. Temperature returned to normal. Channel can be switched ON again. [6]	Yellow flashing	0 V	**Status 4**	**Signal 1 → Status 1**
Status 7: Channel tripped. Undervoltage with simultaneous overcurrent.	Blue, flashing (1 Hz)	0 V	**Status 4**	**Signal 1 → Status 1**
Status 8: Channel tripped. Undervoltage	Blue, flickering (1 Hz)	0 V	-	-
Status 9: Channel tripped. Overvoltage	Red, flickering (1 Hz)	0 V	**-**	**-**
Status 10: Device error, wiring error, feedback voltage	Red/blue flickering (1 Hz)	0 V	-	-

[1] This status may differ for the 787-2861/0108-0020 device. More information is available in the “Signal Output S2 – Indicators”.

[2] The channel is activated again time delayed (170 ms … 500 ms) once the device initialization has concluded.

[3] The channel is deactivated automatically in accordance with the given trip curve. The device then switches to Status 5.

[4] The status is saved when the input voltage is switched OFF.

[5] After a cooling (waiting) period, the channel switches to Status 6.

[6] The channel can be re-activated as follows:
- The push and slide switch is pressed twice or
- a pulse (signal 1) is applied at the control input (see section “Control Input S1”).

The device then switches to Status 1.

The following diagram “General Operating Statuses” visually displays the listed operating statuses. However, not all operating statuses are shown.

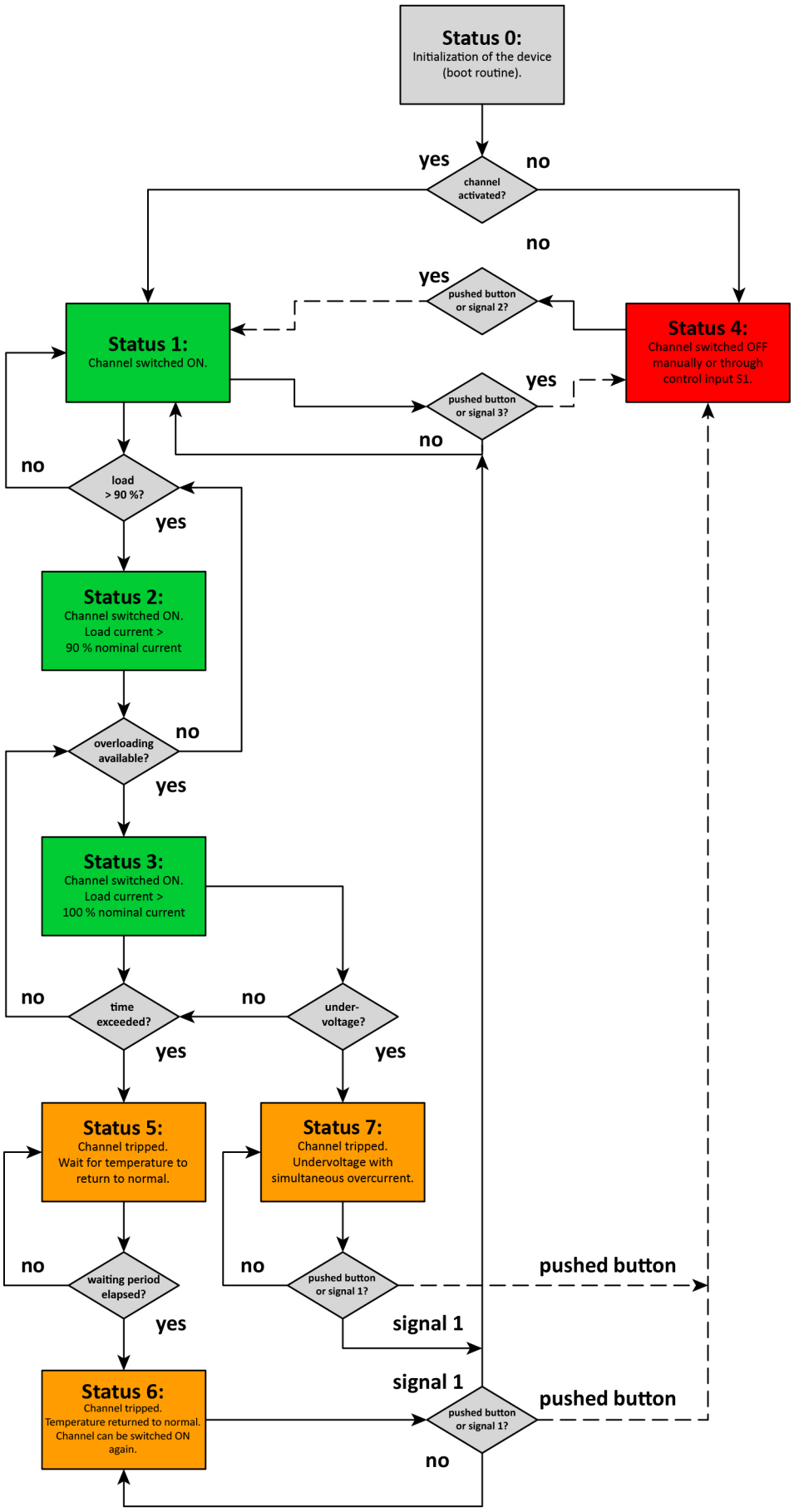

Figure 12: General Operating Statuses

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