

SBP200L

200W DIN Rail Programmable Output Voltage Power Supply

User Manual



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1 Product description

⚠ Use latest device Documentation, Software and Firmware to ensure reliable operation of the system (downloadable from www.nextys.com).

The SBP200L is a microprocessor controlled adjustable power supply with the following features:

- High efficiency and compact size
- Active PFC
- Digital control
- Wide input voltage range 170...550Vac
- Wide output voltage range 24...120Vdc, user settable
- User settable current limitation threshold
- Remote ON/OFF or other remote control functions possible through ENABLE input
- Modbus over RS-485 interface for control and monitoring
- Multiple protections
- 2 user programmable voltage steps with settable duration
- Can be used as battery charger (lead acid, nickel, lithium)
- Can be used for LED lighting
- Can be paralleled for power or redundancy (with external ORing module)
- Up to 50°C operating temperature with no derating
- Suitable for **POWERMASTER** software (available for Windows and Android)

2 Functional description

This unit works as a constant voltage source or a constant current source depending on the load. The output voltage is constant until the nominal current is reached. If more current is needed by the load the device reduces the output voltage to ensure the nominal current is not exceeded. The U/I behavior of the output is shown on Figure 2, nominal voltage (U_{nom}) and nominal current (I_{nom}) are user settable and, depending on the operating mode (explained below), can be altered by the ENABLE input.



Figure 1: Front view

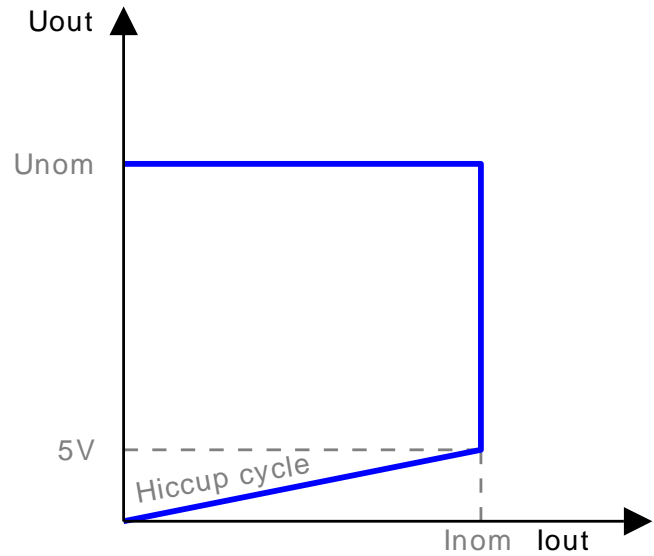
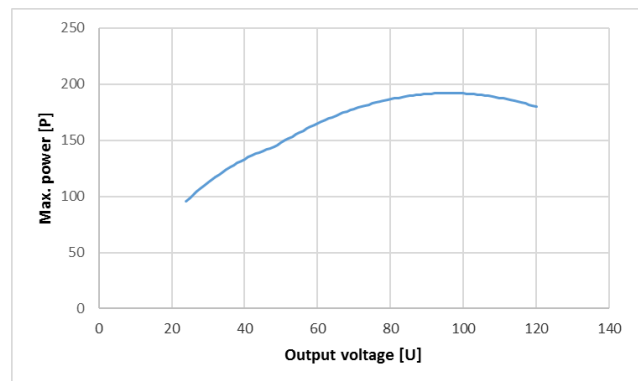
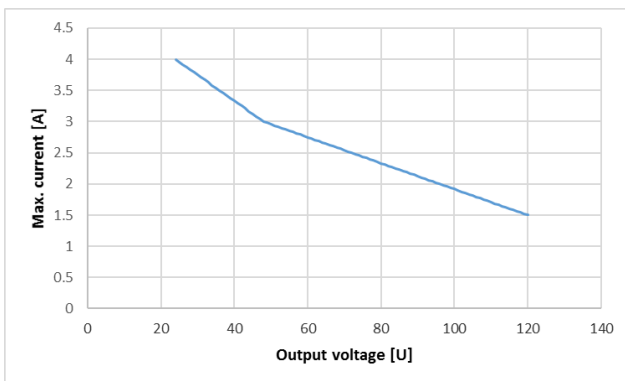


Figure 2: Output voltage vs. Current

The maximum output current is limited depending on the output voltage using the following formula:

Range	Maximum output current
24..48Vdc	$I_{max} = 5A - (U_{nom}/24)$ Example: if $U_{out}=36V$, $I_{max}= 5A - (36/24)= 3.5 A$
48..120Vdc	$I_{max} = 4A - (3*U_{nom}/144)$ Example: if $U_{out}=72V$, $I_{max}= 4A - (3*72/144)= 2.5 A$



The user can define the device behavior using the following parameters (set by HMI or Modbus):

- **Operating mode (OP):** The operating mode defines the main behavior of the device. Each mode is described later on this chapter.
- **Output voltage 1 (U1):** See operating mode description for details of this parameter.
- **Output current 1 (I1):** See operating mode description for details of this parameter.
- **Output voltage 2 (U2):** See operating mode description for details of this parameter.
- **Output current 2 (I2):** See operating mode description for details of this parameter.
- **Delay (Del):** See operating mode description for details of this parameter.
- **Enable polarity (Pol):** Defines the polarity used for the enable input.

2.1 Operating modes

2.1.1 Operating mode 1 (enable/disable)

In operating mode 1 the device output is turned ON/OFF by the ENABLE input (default value= LOW).

By setting the appropriate voltage and current this mode allows using the device as battery charger and LED lighting supply.

Parameters:

OP	1
U1	Nominal voltage with output ON
I1	Nominal current with output ON
U2	Not used
I2	Not used
Del	Not used
Pol	Lo or Hi

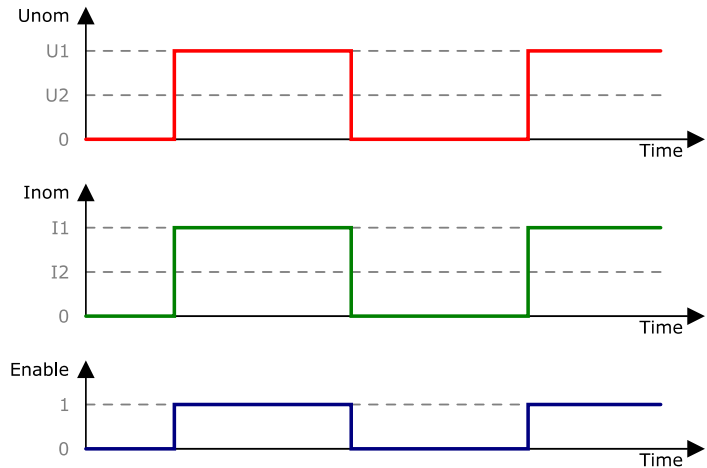


Figure 3: Operating mode 1

2.1.2 Operating mode 2 (external toggle)

In operating mode 2 the device output toggles between 2 sets of voltage and current through the ENABLE input.

Parameters:

OP	2
U1	Nominal voltage with enable 1
I1	Nominal current with enable 1
U2	Nominal voltage with enable 0
I2	Nominal voltage with enable 0
Del	Not used
Pol	Lo or Hi

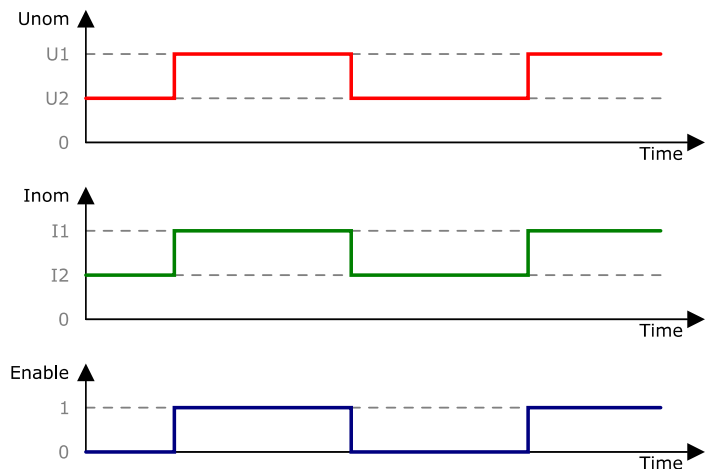


Figure 4: Operating mode 2

2.1.3 Operating mode 3 (enable/disable with timer)

In operating mode 3 the device output is activated by the enable input. The output toggles to the second set of voltage and current after a defined time. Output deactivates when the ENABLE input is disabled.

Parameters:

OP	3
U1	First nominal voltage
I1	First nominal current
U2	Second nominal voltage
I2	Second nominal current
Del	Delay for switching between U1/I1 to U2/I1
Pol	Lo or Hi

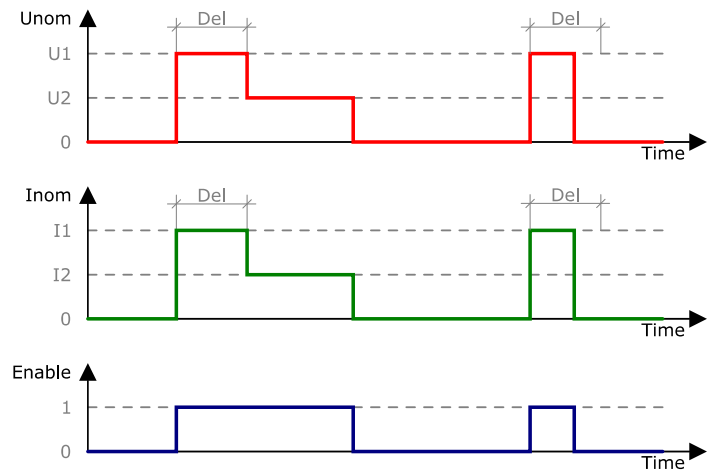


Figure 5: Operating mode 3

2.2 Battery charger

SBP200L can charge batteries in CV (Constant Voltage) / CC (Constant Current) mode. This type of charging is suitable for Lead Acid and some Lithium batteries. For lithium batteries the user must check with the manufacturer if the battery supports this method of charging.

In CV/CC charging when a battery is nearly empty, constant current ("I1" setting) is used to charge it, making sure that charging current is lower than the maximal charging current that battery can accept. During charging the voltage of battery is slowly upping, when battery voltage reaches the maximum charging voltage ("U1" setting) the charging current slowly reduces to 0A.

Battery must be connected to output. The operating mode must be set to 1 while "U1" and "I1" must be set with the values specified on the battery datasheet.

2.3 Interfaces

2.3.1 HMI (Human Machine Interface)

An integrated user interface composed by 3 x 7 segment digits and 3 keys is present on the unit's front panel. Layout of the menu is shown below:

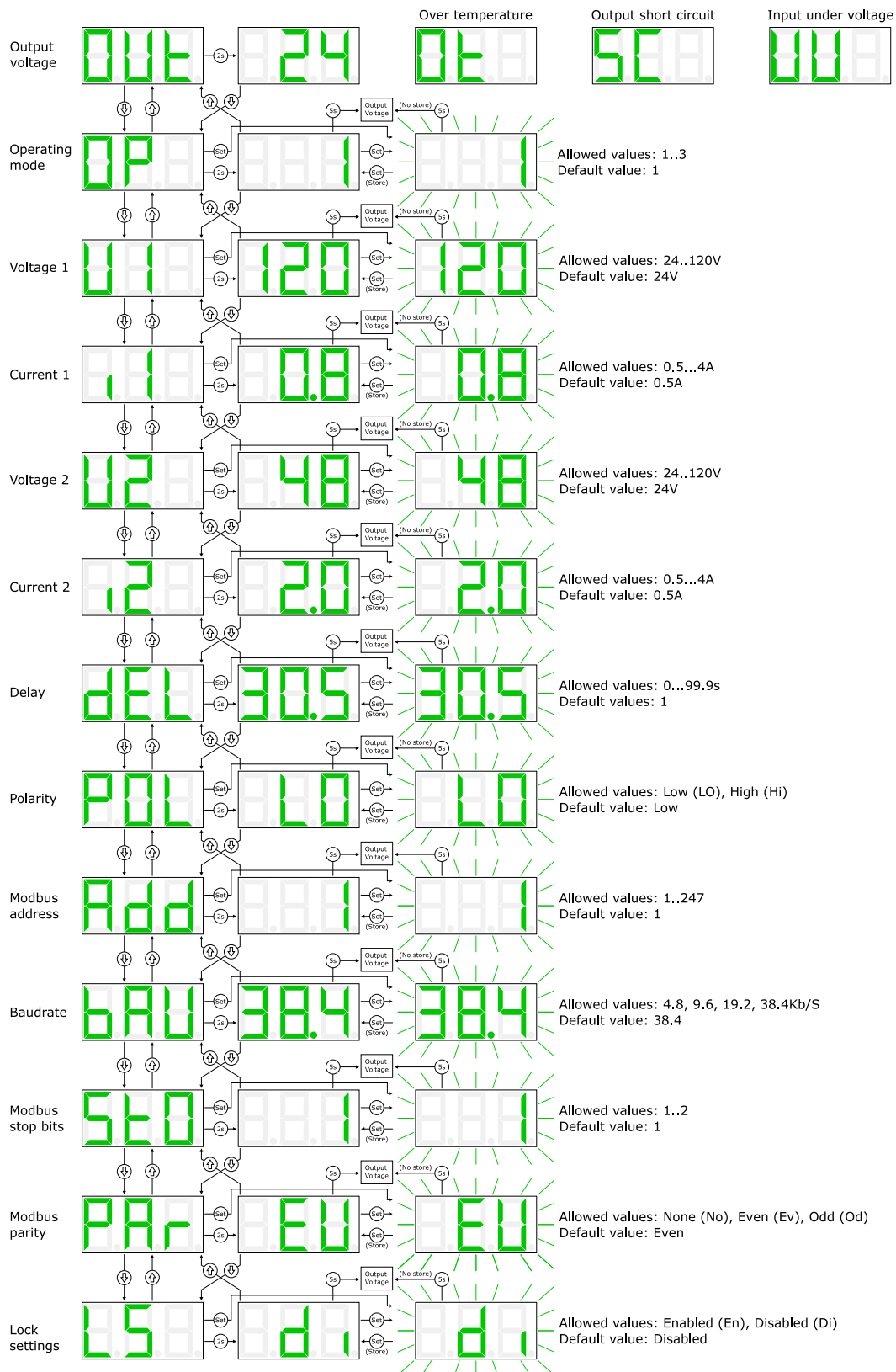


Figure 6: HMI

The locking/unlocking of the settings editing can be done using the field “Lock settings” (*LS*) field into the “Human Machine Interface” menu (§2.3.1) or through the Modbus “Lock settings” field.

The locking/unlocking of the settings editing can also be done keeping pressed simultaneously the \uparrow (Up) and \downarrow (Down) buttons for at least 3 seconds. There are no notifications using this procedure.

When the lock is active, trying to edit a parameter using the device's buttons shows a "SL" (Settings Locked) message for a couple of seconds. It is always possible to edit the setting through Modbus regardless the status of the lock.

2.3.2 Modbus

SBP200L supports Modbus over RS-485 interface. The following Modbus table is implemented:

Name	Address Hex (dec)	Modbus type	Function code	Res.	Min.	Max.	Comment
Device settings							
Operating mode	0x1000 (4096)	Hold register	3,4,6,16	1	1	3	1: enable/disable 2: external toggle 3: enable/disable with timer See §2.1 for details
Voltage 1	0x1001 (4097)	Hold register	3,4,6,16	0.1V	22V	122V	
Current 1	0x1002 (4098)	Hold register	3,4,6,16	0.1A	0A	4.5A	
Voltage 2	0x1003 (4099)	Hold register	3,4,6,16	0.1V	22V	122V	
Current 2	0x1004 (4100)	Hold register	3,4,6,16	0.1A	0A	4.5A	
Delay	0x1005 (4101)	Hold register	3,4,6,16	0.1s	2s	99.9s	
Enable polarity	0x1006 (4102)	Hold register	3,4,6,16	1	1	2	1: active low polarity 2: active high polarity
Lock settings	0x1007 (4103)	Hold register	3,4,6,16	1	0	1	0: Disabled 1: Enabled
Modbus settings (loaded on next startup)							
Address	0x1100 (4352)	Hold register	3,4,6,16	1	1	247	
Baudrate	0x1101 (4353)	Hold register	3,4,6,16	1	1	4	1: 4800 2: 9600 3: 19200 4: 38400
Parity	0x1102 (4354)	Hold register	3,4,6,16	1	1	3	1: None 2: Even 3: Odd
Stop bits	0x1103 (4355)	Hold register	3,4,6,16	1	1	2	1: 1 stop bits 2: 2 stop bits
Metering							
Output voltage	0x2000 (8192)	Input register	3,4	0.1V	0V	148V	Measured output voltage
Input enable state	0x2001 (8193)	Input register	3,4	1	0	1	Logical state of the enable input
States							
Input under voltage	0x4000 (16384)	Discrete input	1,2	1	0	1	1 when the input voltage is too low
Output short circuit	0x4001 (16385)	Discrete input	1,2	1	0	1	1 when a short circuit is detected on the output
Over temperature	0x4002 (16386)	Discrete input	1,2	1	0	1	1 when device is too hot

3 Installation

READ THIS CAREFULLY BEFORE INSTALLATION!	VOR DER INSTALLATION BITTE FOLGENDE SICHERHEITSHINWEISE BEACHTEN	LEGGERE ATTENTAMENTE PRIMA DELL'INSTALLAZIONE!	A LIRE ATTENTIVEMENT AVANT L'INSTALLATION!
<p>Before operating, read this document thoroughly and retain it for future reference. Non-respect of these instructions may reduce performances and safety of the devices and cause danger for people and property. The products must be installed, operated, serviced and maintained by qualified personnel in compliance with applicable standards and regulations. Don't open the device, it does not contain replaceable components, the tripping of the internal fuse (if included) is caused by an internal failure. Don't repair or modify the device, if malfunction or failure should occur during operation, send unit to the factory for inspection. TDK-Lambda Switzerland SA assumes no responsibility for any consequences deriving from the use of this material.</p>	<p>Lesen Sie dieses Dokument vor der Inbetriebnahme sorgfältig durch und bewahren Sie es zum späteren Nachschlagen auf. Die Nichtbeachtung dieser Anweisungen kann die Funktion und Sicherheit der Geräte beeinträchtigen und birgt Gefahren für Personen und Eigentum. Die Geräte müssen von qualifiziertem Personal unter Einhaltung der geltenden Normen und Vorschriften installiert, betrieben, gewartet und instand gehalten werden. Öffnen Sie das Gerät nicht, es enthält keine austauschbaren Komponenten, das Auslösen der internen Sicherung (falls vorhanden) ist stets auf tieferegehende Fehler im Schaltkreis zurück zu führen. Reparieren oder modifizieren Sie das Gerät nicht. Sollte während des Betriebs eine Fehlfunktion oder ein Defekt auftreten, schicken Sie das Gerät zur Überprüfung ins Werk. TDK-Lambda Switzerland SA übernimmt keine Haftung für die Folgen, die sich aus dem Einsatz dieses Gerätes ergeben.</p>	<p>Prima dell'installazione, leggere attentamente questo documento istruzioni e conservarle per future consultazioni. L'inosservanza delle presenti istruzioni può compromettere le caratteristiche e la sicurezza dell'apparecchio e causare pericolo per le persone e le cose. Il prodotto deve essere installato, utilizzato e riparato da personale qualificato e nel rispetto delle normative vigenti. Non aprire il prodotto, esso non contiene componenti sostituibili, il guasto del fusibile interno (se previsto) è causato da un guasto interno. Non tentare di riparare o modificare il prodotto, se durante il funzionamento si verificano guasti o anomalie, inviarlo al produttore per il controllo. TDK-Lambda Switzerland SA non si assume nessuna responsabilità per qualunque conseguenza derivante dall'uso di questo materiale.</p>	<p>Lisez ces instructions avant l'installation, conservez ce manuel pour référence future. Défaut de se conformer à ces instructions peut affecter les caractéristiques et la sécurité du dispositif de danger et de causer aux personnes ou aux biens. Les produits doivent être installés, exploités et entretenus par personnel qualifié et en conformité avec les règlements. N'ouvrez pas le produit, il ne contient aucune pièce réparable, le déclenchement du fusible interne (le cas échéant) est causé par un défaut interne. Ne pas essayer de réparer ou modifier le produit ; si des défaillances se produisent pendant le fonctionnement ou les dysfonctionnements, le retourner au fabricant pour inspection. TDK-Lambda Switzerland SA n'assume aucune responsabilité des conséquences éventuelles découlant de l'utilisation des produits.</p>
CAUTION	ACHTUNG	ATTENZIONE	AVERTISSEMENT
<p>RISK OF BURNS, EXPLOSION, FIRE, ELECTRICAL SHOCK, PERSONAL INJURY. Never carry out work on live parts! Danger of fatal injury! The product's enclosure may be hot, allow time for cooling product before touching it. Do not allow liquids or foreign objects to enter into the products. To avoid sparks, do not connect or disconnect the device before having previously turned-off input power and wait for internal capacitors discharge (minimum 1 minute).</p>	<p>GEFAHR VON VERBRENNUNGEN, EXPLOSIONEN, FEUER, STROMSCHLAG, PERSONENSCHÄDEN. Führen Sie niemals Arbeiten an spannungsführenden Teilen durch! Gefahr von tödlichen Verletzungen! Das Gehäuse des Gerätes kann heiß sein, lassen Sie Zeit zum Abkühlen des Gerätes, bevor Sie es berühren. Lassen Sie keine Flüssigkeiten oder Fremdkörper in die Geräte eindringen. Um Überschläge zu vermeiden, schließen Sie das Gerät nicht an oder trennen Sie es nicht ohne vorher die Eingangsspannung abgeschaltet zu haben, und warten Sie die Entladung der internen Kondensatoren ab (mindestens 1 Minute).</p>	<p>RISCHIO USTIONI, ESPLOSIONE, INCENDIO, SCOSSA, LESIONI GRAVI. Non effettuare mai operazioni sulle parti sotto tensione! Pericolo di lesioni letali! Il contenitore può scottare, lasciar quindi raffreddare il dispositivo prima di toccarlo. Non far entrare liquidi o oggetti estranei nel dispositivo. Per evitare scintille, non collegare o scollegare l'apparecchiatura prima di avere tolto tensione di ingresso e prima che sia avvenuta la scarica dei condensatori interni (min. 1 minuto).</p>	<p>RISQUE DE BRULURES, EXPLOSION, INCENDIE, ELECTROCUTION, DOMMAGE AUX PERSONNES. Ne jamais effectuer des opérations sur les parties sous tension! Danger de mort! Le récipient peut produire des brulures, le laisser refroidir avant de toucher l'appareil. Ne faites pas pénétrer des liquides ou des corps étrangers dans l'appareil. Pour éviter des étincelles, ne pas connecter ou déconnecter l'équipement jusqu'à ce que vous avez supprimé la tension d'entrée et avant qu'elle n'ait lieu de décharge des condensateurs internes (minimum 1 minute).</p>

Connections				
		Input Connection: Single phase <ul style="list-style-type: none"> ▪ L1 = Line ▪ N = Neutral ▪ ⊕ = Earth ground 2 phases <ul style="list-style-type: none"> ▪ L1 = Phase 1 ▪ L2 = Phase 2 ▪ ⊕ = Earth ground DC: <ul style="list-style-type: none"> ▪ L1 = + Positive DC ▪ L2 = - Negative DC ▪ ⊕ = Earth ground ENABLE: (5...30Vdc) <ul style="list-style-type: none"> ▪ + = Positive DC ▪ - = Negative DC 	Output Connection: <ul style="list-style-type: none"> ▪ + = Positive DC ▪ - = Negative DC 	Signaling: DC OK dry contact 24Vdc / 1A <ul style="list-style-type: none"> ▪ + = NO ▪ - = COM RS-485 <ul style="list-style-type: none"> ▪ PIN4 = TX/RX D1 ▪ PIN5 = TX/RX D0 ▪ PIN8 = GND
(1) AC input (2) Enable input (3) DC OK dry contact (4) DC output (load) (5) SET button menu		(6) UP button menu (7) DOWN button menu (8) Display (9) RS-485 Comm. port		
Dimensions		Distances		
Dimensions W D H	mm 80.0 100.0 120.0	Distance A B	mm 20 50	

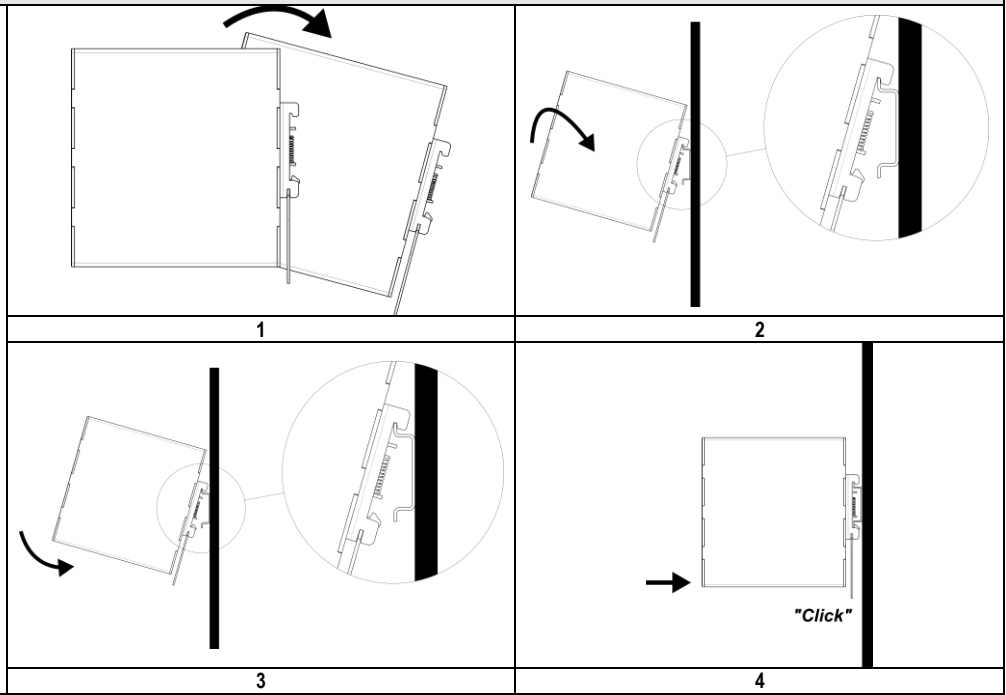
Mounting / Dismounting Instructions

For DIN rail fastening according to IEC 60715 TH35-7.5(-15)

Mounting as shown in figure, with input terminals on lower side, with suitable cooling and maintaining a proper distance between adjacent devices as specified in the above section.

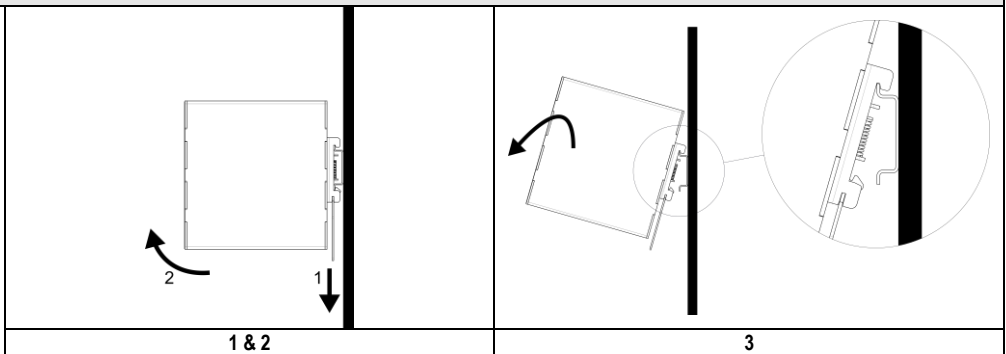
Mounting:

1. Tilt the unit slightly backwards.
2. Fit the unit over the top edge of the rail.
3. Slide it downward until it hits the stop.
4. Press against the bottom for locking.

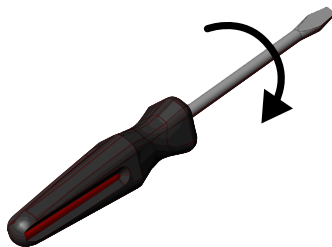
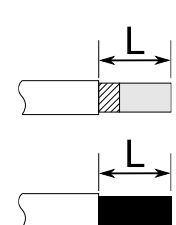


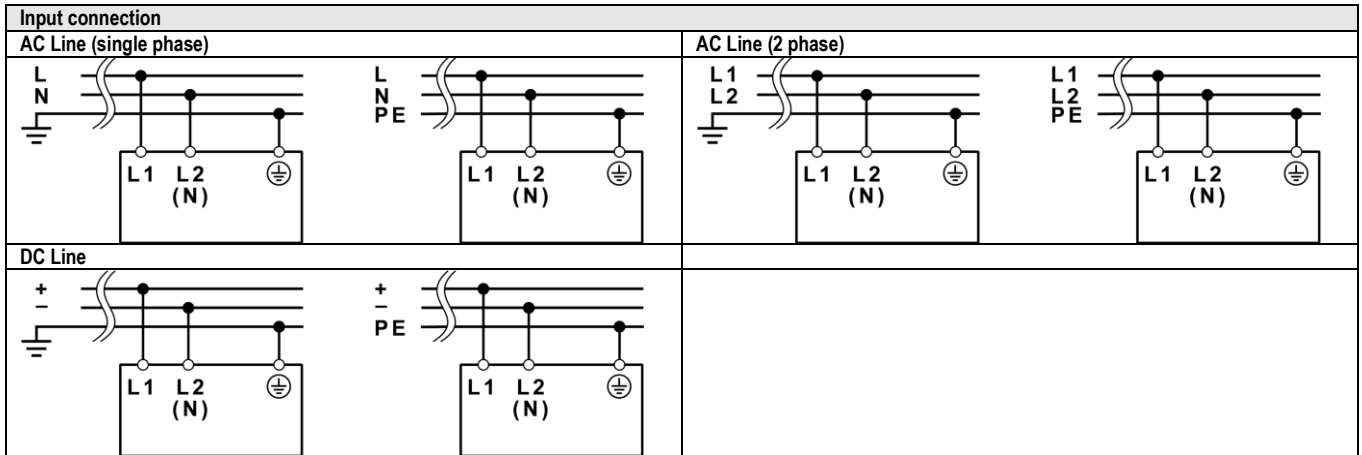
Dismounting:

1. Pull down the slide clamp lever
2. Tilt the unit upward
3. Unhook the unit from the rail



Recommended connecting cable

	<p>Recommended Tightening torque</p> <p>Input / output connections 0.5-0.6Nm 4.42-5.30 lbf in</p> <p>Auxiliary connections Insertion force per pole Max 3N or 0.674 lbf</p> <p>Withdrawal force per pole Min 1.5N or 0.337 lbf</p>		<p>Input / output connections Solid: 2.5mm² / 12AWG Stranded: 1.5mm² / 12AWG L: 6.0-7.5mm / 0.24-0.30in</p> <p>Auxiliary connections Solid: 0.5mm² / 20AWG Stranded: 0.5mm² / 20AWG L: 7.0-8.0mm / 0.27-0.315in</p>
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Input protection
 Fuses MCB 10A C curve
 For USA and Canada, use the fuse type closest to the European equivalent type.
Surge protection: it is strongly recommended to provide external surge arresters (SPD) according to local regulations.

Environment	
Operating temperature - 40°C...70°C 5...95% r.H. non condensing Overtemperature protection	Derating Over 60Vdc: - 1.5W/°C over 50°C Under 60Vdc: - 3.0W/°C over 50°C

