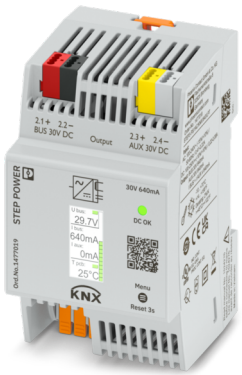
STEP3-PS/1AC/KNX/640/LPT

Bus power supply



Data sheet
111453_en_00

 2024-03-04

1 Description

The STEP POWER KNX bus power supplies with integrated color display and an active KNX choke circuit for greater efficiency are the professional solution for smart building automation with KNX. The compact devices are economical, space-saving, and flexible in application.

Features

- Device design for use in surface-mounted or flush-mounted distributors (VDE 0603-1, DIN 43871)
- Easy analysis, thanks to integrated color display with all relevant KNX status information
- Slim-line design saves space in the control cabinet
- Worldwide use, thanks to AC and DC wide-range input with comprehensive international approval package
- Flexible assembly - can be snapped onto the DIN rail or screwed onto a level surface
- Tool-free connection via push-in connection technology

Technical data (short form)	
Input voltage range	100 V AC ... 240 V AC -15 % ... +10 % 100 V DC ... 250 V DC -10 % ... +10 %
Mains buffering time	typ. 100 ms (100 V AC) typ. 100 ms (230 V AC)
Nominal output voltage (U_N)	30 V DC
Nominal output current (I_N)	640 mA ()
Output power (P_N)	19.2 W
Efficiency (for nominal values)	> 86 % (120 V AC) > 86 % (230 V AC)
Residual ripple	typ. 100 mV_{PP}
MTBF (IEC 61709, SN 29500)	230 V AC / > 1718000 h (25 °C) 230 V AC / > 1052000 h (40 °C) 230 V AC / > 750000 h (50 °C)
Ambient temperature (operation)	-10 °C ... 70 °C (Derating > 45 °C: 2 %/K)
Startup type tested	-25 °C
Dimensions (W x H x D)	54 x 90 x 61 mm
Horizontal pitch (DIN 43880)	3 Div.
Weight	207 g

All technical specifications are nominal and refer to a room temperature of 25 °C and 70 % relative humidity at 100 m above sea level.

2 Table of contents

3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Primary-switched bus power supply, STEP POWER, Lever Push-in connection, DIN rail or direct mounting, input: 1-phase, output: 30 V DC / 640 mA	STEP3-PS/1AC/KNX/640/ LPT	1477019	1

Accessories	Type	Item no.	Pcs./Pkt.
PCB connector, nominal cross section: 0.5 mm², nominal current: 6 A, rated voltage (III/2): 320 V, contact connection type: Socket, number of rows: 1, number of positions: 2, product range: PTS 0,5/..-PH, connection method: Push-in spring connection, conductor/PCB connection direction: 0 °, locking clip: - without locking clip, plug-in system: COMBICON PST 1,0, locking: without, mounting: without, type of packaging: packed in cardboard	PTS 0,5/ 2-PH-5,75 BKRD KNX	1574300	250
PCB connector, nominal cross section: 0.5 mm², nominal current: 6 A, rated voltage (III/2): 320 V, contact connection type: Socket, number of rows: 1, number of positions: 2, product range: PTS 0,5/..-PH, connection method: Push-in spring connection, conductor/PCB connection direction: 0 °, locking clip: - without locking clip, plug-in system: COMBICON PST 1,0, locking: without, mounting: without, type of packaging: packed in cardboard	PTS 0,5/ 2-PH-5,75 GY35YE KNX	1574299	250

The range of accessories is being continuously extended. The current range of accessories can be found in the download area for the product.

4 Technical data

Input data	
Unless otherwise stated, all data applies for 25°C ambient temperature, 230 V AC input voltage, and nominal output current (I_N).	
Input voltage range (for DC, connect a suitable fuse)	100 V AC ... 240 V AC -15 % ... +10 % 100 V DC ... 250 V DC -10 % ... +10 %
Frequency range (f_N)	50 Hz ... 60 Hz ±10 %
Typical national grid voltage	120 V AC / 230 V AC
Network type	TN, TT, IT (PE)
Current consumption 100 V AC / 240 V AC 100 V DC / 250 V DC	 0.41 A / 0.22 A 0.22 A / 0.09 A
Discharge current to PE	< 3.5 mA
Mains buffering time 100 V AC / 230 V AC	 typ. 100 ms / typ. 100 ms
Switch-on time	typ. 2 s
Inrush current (25 °C)	typ. 35 A
Inrush current integral (I^2t)	typ. 1.3 A^2s
Device mains fuse , internal (device protection), slow-blow	4 A

During the first few microseconds, the current flow into the filter capacitors is excluded.

The SCCR (short-circuit current rating) value of the power supply unit corresponds to the SCCR value of the backup fuse.

Input protection, AC/DC (to be connected externally upstream)

Input current I_{In} Input protection	Circuit breaker					Neozed fuse or equivalent	Power switch
Characteristics	A	B	C	D	K	gG	≤ 13 x I_{In} (maximum magnetic tripping)
6 A	-	✓	✓	✓	✓	-	-
8 A	-	✓	✓	✓	✓	-	-
10 A	-	✓	✓	✓	✓	-	-
13 A	-	✓	✓	✓	✓	-	-
16 A	-	✓	✓	✓	✓	-	-
20 A	-	✓	✓	✓	✓	-	-

Protective circuit	
Type of protection	Transient surge protection
Protective circuit/component	Varistor

Connection data: Input	Connection capacity Terminal block	recommended
Position	1.x	
Position identifier	1.1 (⏚), 1.2 (N), 1.3 (L)	
Connection method	Lever Push-in connection	
Stripping length	10 mm (solid) / 10 mm (Ferrule)	
1-conductor rigid	0.2 mm² ... 4 mm²	1.5 mm²
1-conductor flexible	0.2 mm² ... 4 mm²	1.5 mm²
1-conductor flexible with ferrule without plastic sleeve	0.2 mm² ... 2.5 mm²	1.5 mm²
1-conductor flexible with ferrule with plastic sleeve	0.2 mm² ... 2.5 mm²	1.5 mm²
1-conductor rigid (AWG) (Cu)	24 ... 12	16

Output data BUS	
Nominal output voltage (U_N)	30 V DC
Nominal output current (I_N)	640 mA (total current I_{BUS} + I_{AUX})
Output power (P_N)	19.2 W
Short-circuit-proof	yes
Residual ripple	typ. 100 mV_{PP}
Connection in parallel	yes, 2
Connection in series	No
Feedback voltage resistance	35 V DC
Protection against overvoltage at the output (OVP)	35 V DC
Rise time U_{Out} = 10 % ... 90 %	typ. 100 ms

Output data AUX	
Nominal output voltage (U_N)	30 V DC
Nominal output current (I_N)	640 mA (total current I_{BUS} + I_{AUX})
Output power (P_N)	19.2 W
Control deviation Static load change 10 % ... 90 % Dynamic load change 10 % ... 90 %, (10 Hz) change in input voltage ±10 %	 < 0.5 % < 3 % < 0.1 %
Short-circuit-proof	yes
Residual ripple	typ. 100 mV_{PP}
Connection in parallel	yes, for increased efficiency and redundancy
Connection in series	No
Feedback voltage resistance	35 V DC
Protection against overvoltage at the output (OVP)	35 V DC
Rise time U_{Out} = 10 % ... 90 %	typ. 100 ms

Connection data: Output	Connection capacity Terminal block	recommended
Position	2.x	
Position identifier	2.1 (BUS +), 2.2 (BUS -), 2.3 (AUX +), 2.4 (AUX -)	
Connection method	Push-in connection	
1-conductor rigid	0.34 mm² ... 0.5 mm²	0.5 mm²
1-conductor rigid (AWG) (Cu)	22 ... 20	20

LED DC OK AUX	
Function	Visual operating state display
Color	green
LED Off	< 24 V DC
LED	> 24 V DC

Display DC OK BUS	
Function	Visual operating state display
Color	red, yellow, green (multicolor LED)
LED lights up green	28 V DC ≥ U_{OUT} ≤ 31 V DC
LED lights up red	U_{OUT} ≥ 31 V DC
LED lights up yellow	23 V DC ≥ U_{OUT} ≤ 28 V DC

Display temperature LED	
Function	Visual operating state display
Color	red, green
LED lights up green	≤ 75 °C
LED lights up red	> 75 °C

Display bar graph	
Function	Visual operating state display
Color	red, yellow, green
LED Bar graph green	I_{OUT} ≤ 640 mA
LED Bar graph green, yellow	641 mA ≥ I_{OUT} ≤ 900 mA
LED Bar graph green, yellow, red	901 mA ≥ I_{OUT} ≤ 1200 mA

Reliability	25 °C	40 °C	50 °C
MTBF (IEC 61709, SN 29500)			
230 V AC	> 1718000 h	> 1052000 h	> 750000 h

Life expectancy (electrolytic capacitors) Output current (I_{Out})	120 V AC	230 V AC
	> 87600 h (40 °C)	> 87600 h (40 °C)

The expected service life is based on the capacitors used. If the capacitor specification is observed, the specified data will be ensured until the end of the stated service life. For runtimes beyond this time, error-free operation may be reduced. The specified service life of more than 15 years is simply a comparative value.

General data	
Degree of protection	IP20
Protection class	I
Flammability rating UL 94 Housing, terminal blocks, base latches	V0
Housing material	Polycarbonate
Foot latch material	Polyamid
Dimensions (W x H x D)	54 x 90 x 61 mm
Device depth (DIN rail mounting)	55 mm
Horizontal pitch	3 Div. (DIN 43880)
Weight	207 g

Power dissipation	120 V AC	230 V AC
No load	< 0.4 W	< 0.4 W
Nominal load	< 3.05 W	< 3.13 W

Efficiency	120 V AC	230 V AC
	> 86 %	> 86 %

Ambient conditions	
Ambient temperature (operation)	-10 °C ... 70 °C (Derating > 45 °C: 2 %/K)
The ambient temperature (operation) refers to IEC 61010 surrounding air temperature.	
Ambient temperature (start-up type tested)	-25 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	≤ 95 % (non-condensing)
Installation height	≤ 5000 m (> 2000 m, Derating: 10 %/1000 m)
Vibration (operation) IEC 60068-2-6	< 15 Hz, amplitude ±2.5 mm 15 Hz ... 150 Hz, 2.3g, 90 min.
Shock (operation) IEC 60068-2-27	18 ms, 30g, per spatial direction
Degree of pollution	2
Climate class EN 60721	3K3
Overvoltage category EN 61010-2-201 / EN 62368-1 EN 62477-1 / IEC 60664-1 / IEC 63044-3	II (≤ 5000 m) III (≤ 2000 m)

Standards/specifications	
Electrical safety	IEC 61010-1 (SELV)
Protective extra-low voltage	IEC 61010-1 (SELV) IEC 61010-2-201 (PELV)
Safe isolation	IEC 61558-2-16
Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS): General Requirements	IEC 63044-3
Safety requirements for electrical equipment for measurement, control, and laboratory use	IEC 61010-1
Information technology - Home electronic system (HES) architecture (KNX stanard)	IEC 14543-3

Conformance/Approvals	
UL	UL/C-UL Listed UL 61010-1 UL/C-UL Listed UL 61010-2-201

Current approvals/permissions for the product can be found in the download area under phoenixcontact.com/products.

Electromagnetic compatibility Conformance with EMC Directive 2014/30/EU		
Interference emission in accordance with EN 61000-6-3 (residential and commercial) and EN 61000-6-4 (industrial)		
CE basic standard	**Minimum normative requirements**	**Higher requirements in practice (covered)**
Conducted noise emission EN 55016	EN 61000-6-4 (Class A)	EN 61000-6-3 (Class B)
Noise emission EN 55016	EN 61000-6-4 (Class A)	EN 61000-6-3 (Class B)
Harmonic currents EN 61000-3-2	EN 61000-3-2 (Class A)	EN 61000-3-2 (Class A)
Flicker EN 61000-3-3	not required	0 kHz ... 2 kHz

EN 61000-6-2:2005		
CE basic standard	**Minimum normative requirements of EN 61000-6-2 (CE)**	**Higher requirements in practice (covered)**
Electrostatic discharge EN 61000-4-2		
Housing contact discharge	4 kV (Test Level 2)	6 kV (Test Level 3)
Housing air discharge	8 kV (Test Level 3)	8 kV (Test Level 3)
Comments	Criterion B	Criterion A
Electromagnetic HF field EN 61000-4-3		
Frequency range	80 MHz ... 1 GHz	80 MHz ... 1 GHz
Test field strength	10 V/m (Test Level 3)	10 V/m (Test Level 3)
Frequency range	1.4 GHz ... 6 GHz	1 GHz ... 6 GHz
Test field strength	3 V/m (Test Level 2)	10 V/m (Test Level 3)
Comments	Criterion A	Criterion A
Fast transients (burst) EN 61000-4-4		
Input	asymmetrical 2 kV (Test Level 3)	asymmetrical 2 kV (Test Level 3)
Output	asymmetrical 1 kV (Test Level 2)	asymmetrical 1 kV (Test Level 2)
Comments	Criterion B	Criterion A
Surge voltage load (surge) EN 61000-4-5		
Input	symmetrical 1 kV (Test Level 3) asymmetrical 2 kV (Test Level 3)	symmetrical 1 kV (Test Level 3) asymmetrical 2 kV (Test Level 3)
Output	asymmetrical 1 kV (Test Level 2)	asymmetrical 2 kV (Test Level 3)
Comments	Criterion B	Criterion A

EN 61000-6-2:2005			
CE basic standard		**Minimum normative requirements of EN 61000-6-2 (CE)**	**Higher requirements in practice (covered)**
Conducted interference EN 61000-4-6			
	Input/output	asymmetrical	asymmetrical
	Frequency range	0.15 MHz ... 80 MHz	0.15 MHz ... 80 MHz
	Voltage	10 V (Test Level 3)	10 V (Test Level 3)
	Comments	Criterion A	Criterion A
Voltage dips EN 61000-4-11			
Input voltage (230 V AC, 50 Hz)			
	Voltage dip	70 %, 25 periods (Class 3)	70 % , 25 periods (Class 3)
	Comments	Criterion C	Criterion A
	Voltage dip	40 %, 10 periods (Class 3)	40 %, 10 periods (Class 3)
	Comments	Criterion C	Criterion A
	Voltage dip	0 %, 1 period (Class 3)	0 %, 1 period (Class 3)
	Comments	Criterion B	Criterion A

Key	
Criterion A	Normal operating behavior within the specified limits.
Criterion B	Temporary impairment to operational behavior that is corrected by the device itself.
Criterion C	Temporary adverse effects on the operating behavior, which the device corrects automatically or which can be restored by actuating the operating elements.

5 Safety and installation notes

Symbols used

Instructions and possible hazards are indicated by corresponding symbols in this document.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety measures that follow this symbol to avoid possible personal injuries.

There are different categories of personal injury that are indicated by a signal word.

WARNING

This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The following symbols are used to indicate potential damage, malfunctions, or more detailed sources of information.

NOTE

This symbol together with the signal word NOTE and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.

This symbol and the accompanying text provide the reader with additional information or refer to detailed sources of information.

Safety notes and warning instructions

WARNING: Danger to life by electric shock!

- Only skilled persons may install, start up, and operate the device.
- Never carry out work when voltage is present.
- Establish connection correctly and ensure protection against electric shock.
- Cover termination area after installation in order to avoid accidental contact with live parts (e. g., installation in control cabinet).

NOTE

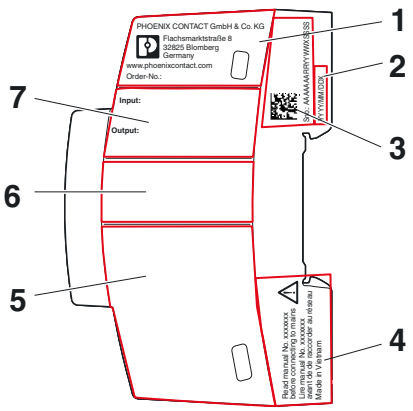
- Observe the national safety and accident prevention regulations.
- Assembly and electrical installation must correspond to the state of the art.
- The bus power supply is a built-in device and is designed for mounting in a control cabinet.
- The IP20 degree of protection of the device is intended for use in a clean and dry environment.
- Observe mechanical and thermal limits.
- Mount the bus power supply in the normal mounting position. Position of input terminals at the bottom.
- Make sure that the wiring on the primary side and the secondary side is adequately dimensioned and protected.
- For the connection parameters for wiring the bus power supply, such as the required stripping length with and without ferrule, refer to the technical data section.
- Use copper cables with an operating temperature of
  > 60°C (ambient temperature ≤ 45°C),
  > 70°C (ambient temperature < 55°C), and
  > 90°C (ambient temperature ≤ 70°C).
- The bus power supply is approved for connection to TN, TT, and IT power grids (star networks) with a maximum phase-to-phase voltage of 240 V AC.
- Protect the device against foreign bodies penetrating it, e.g., paper clips or metal parts.
- The bus power supply is maintenance-free. Repairs may only be carried out by the manufacturer. Opening the housing invalidates the warranty.
- Protection may be impaired if the equipment is used in a manner not specified by the manufacturer.

6 Design

6.1 Rating plate

The rating plate for the bus power supply is located on the right-hand side of the housing (front view).

Figure 1 Rating plate information



Key

No.	Designation
1	Identification of the provider
2	Date of manufacture
3	Bar code and serial number for device identification
4	Designation of product-related device documentation
5	Device approvals
6	Ambient conditions
7	Device connection data

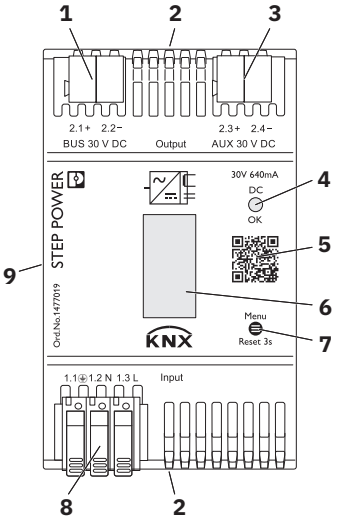
6.2 Device connections and functional elements

Device connections are labeled with connection tags to ensure clear and definitive identification.

The connection tags are split into the following connection levels:

Connection level	Description
1.x	Input
2.x	Output

Figure 2 Location of functional elements and device connections

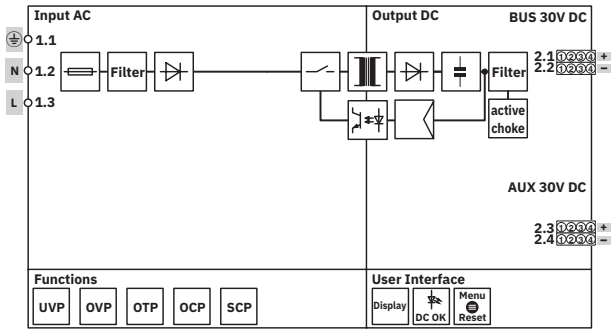


Key

No.	Designation	Connection labeling
1	Connection terminal block BUS output voltage: output DC +/-	2.1 ... 2.2
2	Mounting flange for wall mounting (back of device)	--
3	Connection terminal block AUX output voltage: output DC +/-	2.3 ... 2.4
4	Signaling DC OK LED	--
5	QR code web link	--
6	Color display: multi-page menu for function monitoring	--
7	Menu control/reset button	--
8		1.1 ... 1.3
9	Integrated snap-on foot for DIN rail mounting (back of device)	--

6.3 Block diagram

Figure 3 Block diagram



Key

Symbol	Designation – Input AC, Output DC
	Input fuse, internal device protection
Filter	EMC filter
	Rectification
	Switching transistor
	Transmitter with electrical isolation
	Smoothing capacitor
	Optocoupler (electrically isolating)
	Control equipment
active choke	Electronic choke circuit

Symbol	Designation – Functions
UVP	Undervoltage protection protects the AC input of the bus power supply against damage in the event of an AC undervoltage.
OVP	Overvoltage protection protects the DC output of the bus power supply and the connected load against damage in the event of a device-internal overvoltage.
OTP	Overtemperature protection protects the bus power supply against damage in the event of impermissibly high intrinsic external heating.
OCP	Overcurrent protection protects the DC output of the bus power supply against damage in the event of an impermissibly high current load.
SCP	Short-circuit protection protects the DC output of the bus power supply against damage in the event of an output-side short circuit.

Symbol	Designation – User interface
Display	Display, displays status information of the bus power supply
DC OK	DC OK LED, indicates the operating status of the AUX output of the bus power supply
Menu Reset	Button for operating the menu (display) and resetting the bus power supply

6.4 Device dimensions and minimum keep-out areas

Figure 4 Device dimensions (dimensions in mm)

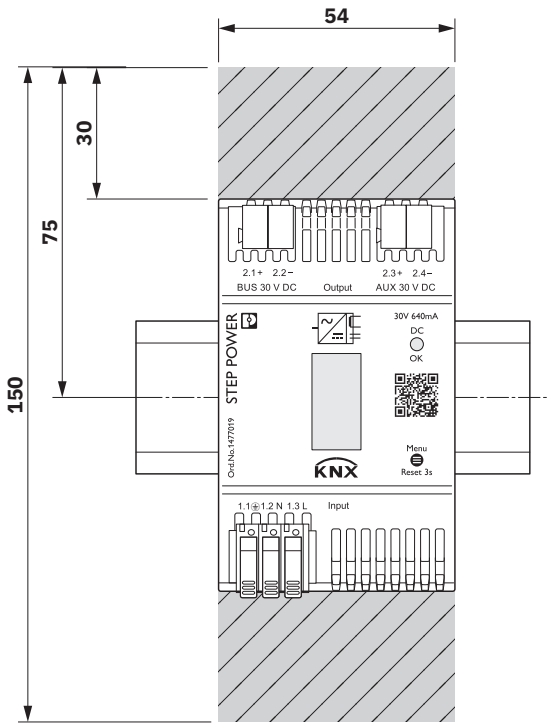
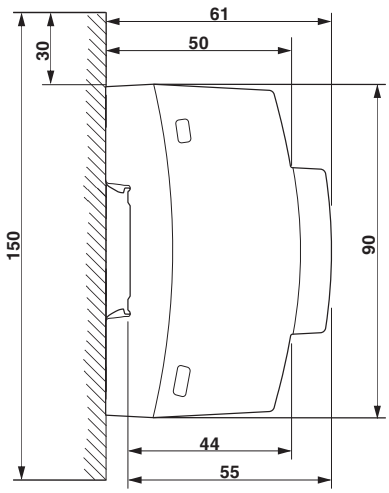


Figure 5 Device dimensions (dimensions in mm)



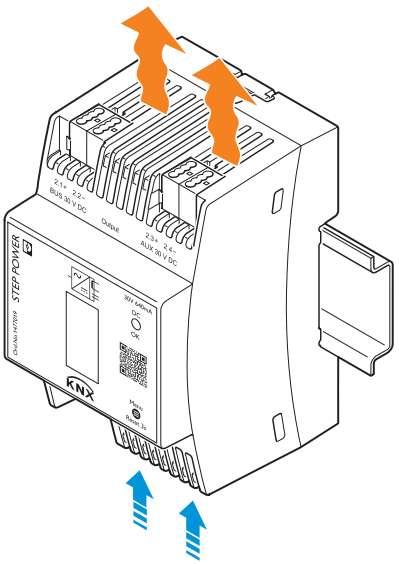
7 Mounting/remove

The fanless convection-cooled bus power supply can be snapped onto 35 mm DIN rails with a top hat profile (TH 35-7.5/TH 35-15) in accordance with EN 60715.

7.1 Convection

To ensure sufficient convection, a minimum clearance is necessary between the bus power supply and above/below the installed devices. The minimum clearances are rated based on the normal mounting position with nominal bus power supply operation (see section: Device dimensions and minimum keep-out areas).

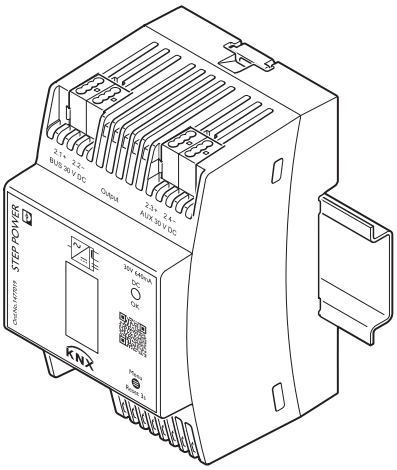
Figure 6 Schematic diagram of the convection cooling



7.2 Mounting position

The specified technical data for the bus power supply is based on nominal operation in the normal mounting position. Any different technical data based on deviating mounting positions or other ambient conditions is labeled accordingly (see section: Derating).

Figure 7 Bus power supply mounted in the normal mounting position



7.3 Installation height

You can operate the bus power supply without power limitations up to an installation altitude of 2000 m. For altitudes higher than 2000 m, different specifications apply due to the differing air pressure and the reduced convection cooling associated with this (see section: Derating).

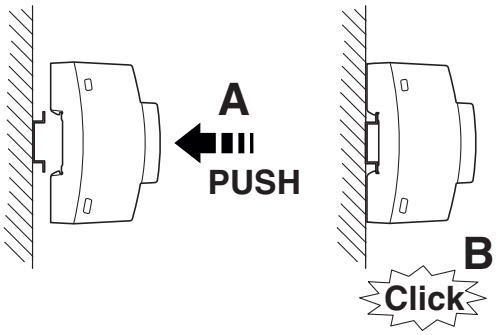
7.4 Mounting the bus power supply

7.4.1 Mounting on a DIN rail (integrated snap-on foot)

To mount the bus power supply on a DIN rail, proceed as follows:

1. In the normal mounting position, the power supply is mounted on the DIN rail from the front. When doing so, ensure that the snap-on foot rests completely on the DIN rail (A).
2. Then push the bus power supply onto the DIN rail until the snap-on foot audibly snaps into place (B).
3. Check that the bus power supply is securely attached to the DIN rail.

Figure 8 Snapping the power supply onto the DIN rail



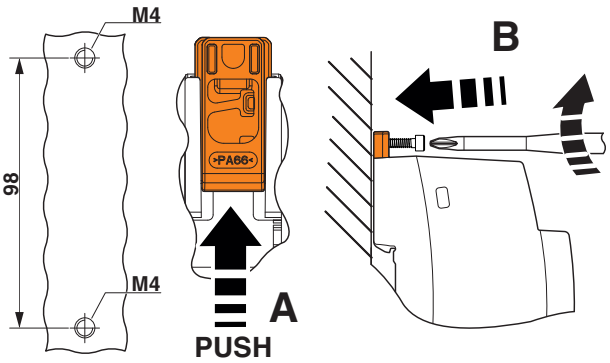
The bus power supply housing has been designed so that it can also be mounted and operated in a surface-mounted or flush-mounted distributor in accordance with VDE 0603-1 or DIN 43871. The bus power supply is mounted directly onto the DIN rail of the surface-mounted or flush-mounted distributor via the integrated snap-on foot.

7.4.2 Screw fixing to the mounting surface (mounting flanges)

To mount the bus power supply with screws directly on the mounting surface, proceed as follows:

1. Two M4 cylinder screws (DIN EN ISO 1207) are needed to screw-mount the bus power supply.
2. Drill two fixing holes with M4 threads and a hole clearance of 98 mm in the mounting location.
3. Push the mounting flanges (orange base latch) for fixing to the mounting surface upwards and downwards out of the housing base.
4. Screw the bus power supply onto the mounting surface using the two M4 cylinder screws.
5. Check that the bus power supply is securely attached to the mounting surface.

Figure 9 Screw fixing of the bus power supply to the mounting surface



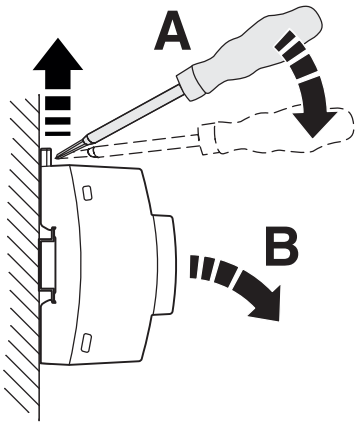
7.5 Removing the bus power supply

7.5.1 DIN rail end mounting (integrated snap-on foot)

To remove the bus power supply from the DIN rail, proceed as follows:

1. Take a suitable screwdriver and insert it into the interlock opening on the snap-on foot.
2. Release the latch by levering the screwdriver downwards (A).
3. Carefully swivel the bus power supply downward (B) and let the interlock slide back into the starting position.
4. Then lift the bus power supply from the DIN rail.

Figure 10 Lifting the bus power supply from the DIN rail



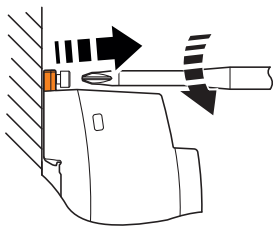
7.5.2 Removal from the mounting surface (mounting flanges)

WARNING: Danger due to short circuit
When unscrewing and removing the M4 cylinder screws, ensure that none fall into your application.

To remove the bus power supply from the mounting surface, proceed as follows:

1. Unscrew one of the two M4 cylinder screws used to attach the bus power supply.
2. Remove the M4 cylinder screw.
3. Unscrew the second M4 cylinder screw and then remove the bus power supply.

Figure 11 Loosening the screw fixing of the bus power supply



8 Device connection terminal blocks

The AC input and DC output terminal blocks of the bus power supply feature Push-in connection technology. No tools are necessary for wiring the primary- and secondary-side connection terminal blocks.

For the necessary connection parameters for the connection terminal blocks, refer to the technical data section.

8.1 AC input terminal blocks

The bus power supply is designed such that it can be operated on single-phase AC supply systems or on two line conductors of three-phase systems. Here, the star network supports various supply system configurations, for example, TT, TN, and IT systems.

The bus power supply is connected on the primary side via the Input AC connection terminal blocks (connection level 1.x, input).

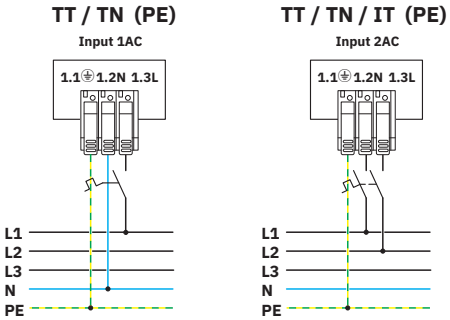
The bus power supply is approved for connection to TN, TT, and IT power grids with a maximum phase-to-phase voltage of 240 V AC.

8.2 Primary side connection and fuse protection

The installation of the bus power supply must conform to the regulations of EN 61010. It must be possible to switch the bus power supply off from outside using a suitable disconnection device. The line protection on the primary side, for example, is suitable for doing so (see section: Technical data).

8.2.1 AC supply network

Figure 12 Schematic diagram, switching the input terminals



DANGER: Hazardous voltage

When operating the bus power supply on a three-phase system, observe the maximum permissible phase-to-phase voltage (see section: Technical data).

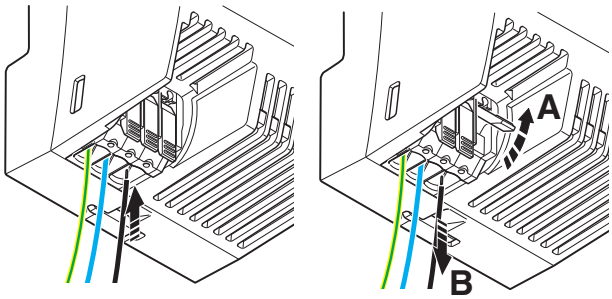
The primary-side fuse protection in two-phase operation must be cover all poles.

If the device is connected to the IT system or in accordance with IEC?61558, a two-pole miniature circuit breaker is required in the application.

8.2.2 Connecting and releasing the connecting cables

– Connect: Strip the connecting cable and insert it into the terminal block.
– Release: Open the lever and pull the cable from the terminal block.

Figure 13 Connecting and releasing the connecting cable



8.2.3 DC supply network

DANGER: Hazardous voltage

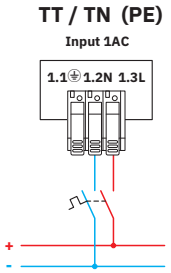
When operating the bus power supply on a DC voltage system, observe the maximum permissible input voltage (see section: Technical data).

The primary-side fuse protection in DC operation must cover all poles.

NOTE: Damage possible if an incorrect fuse is used

In DC operation, only use fuses that are approved for DC voltages.

Figure 14 Schematic diagram, two-phase fuse protection



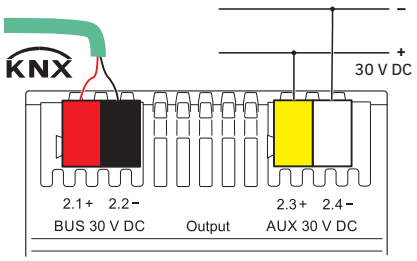
8.3 DC output terminal blocks

Connect the DC load to be supplied to the output DC connection terminal blocks (connection level 2.x, output). By default, the bus power supply is preset to the nominal output voltage of 30 V DC. The level of the DC output voltage cannot be changed.

8.3.1 Wiring principle for DC output terminals

The bus power supply has two separate connection terminal blocks with positive and negative potentials for supplying DC loads. Connect the DC loads to be supplied to these connection terminal blocks.

Figure 15 Wiring principle for DC output terminal blocks



8.3.2 Protection of the secondary side

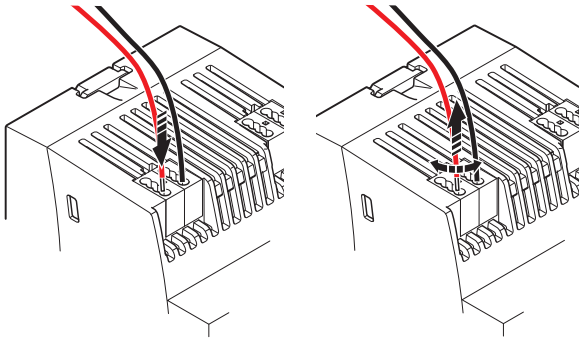
The bus power supply is electronically short-circuit-proof and idling-proof. In the event of a fault, the output voltage is limited.

If sufficiently long connecting cables are used, fuse protection does not have to be provided for each individual load.

8.3.3 Connecting and releasing the bus line

– Connect: Strip the cable and insert it into the terminal block.
– Release: Rotate the cable back and forth and pull it from the terminal block at the same time.

Figure 16 Connecting and releasing the output cable



9 Function elements

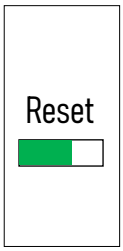
The functional elements of the bus power supply are located on the front of the housing and are categorized as follows:

- Menu control/reset button
- Indication element DC OK-LED
- Color display with status information

9.1 Menu control/reset button

“Menu/Reset 3s” enables menu control and a reset of the bus power supply. The menu pages of the integrated color display are called up by simply pressing the button. If the button is pressed continuously for 3 seconds, the bus power supply is reset.

Bild 17 Reset der Busspannungsversorgung



9.2 Indication element - DC OK LED

A DC OK LED is available for preventive function monitoring of the AUX output voltage of the bus power supply. Through various different signals, the DC OK LED provides information on the operating status of the AUX output.

The possible DC OK statuses are to be found in the following table:

DC OK LED	Description
○	Primary-side AC supply is not available or too low.
	Overload mode U_{OUT} < 24 V DC
●	Normal operation U_{OUT} > 24 V DC

○ = off, ● = on (green)

Figure 18 DC OK LED

9.3 Color display with status information

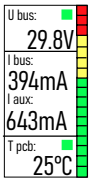
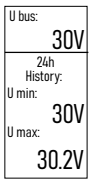
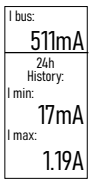
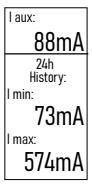
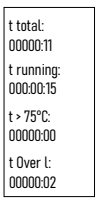
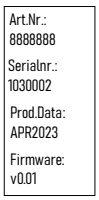
On the integrated color display of the bus power supply, you can read relevant status information on the current utilization of the bus system by the connected KNX loads.

The display has a main screen and six other menu pages. The menu pages can be called one after the other by pressing the “Menu/Reset 3s” button. The following table provides the information displayed for each menu page.

After 10 minutes, the color display automatically switches to sleep mode. The display can be switched on again at any time by pressing the “Menu/Reset 3s” button.

Display tolerances:

- U_{BUS}: ±0,1 V
- I_{BUS}: ±6 mA
- I_{AUX}: ±6 mA
- T_{PCB}: ±1°C

Figure	Menu page	Description
	Main screen	Bus voltage [U bus] with visual LED status indicator
		Bus current [I bus] and aux current [I aux] with visual bar graph as total current display
		Temperature value of the PCB [T pcb] with visual LED status indicator
	Menu page 1	Current bus voltage [U bus]
		Smallest bus voltage [U bus] of the last 24 hours
		Largest bus voltage [U bus] of the last 24 hours
	Menu page 2	Current bus current [I bus]
		Smallest bus current [I bus] of the last 24 hours
		Largest bus current [I bus] of the last 24 hours
	Menu page 3	Current aux current [I aux]
		Smallest aux current [I aux] of the last 24 hours
		Largest aux current [I aux] of the last 24 hours
	Menu page 4	Current temperature of the PCB [T pcb]
		Smallest aux current [I aux] of the last 24 hours
		Largest temperature of the PCB [T pcb] of the last 24 hours
	Menu page 5	Total operating time
		Operating time without mains interruption
		Operating time in overtemperature (>75°C)
		Operating time in overload current
	Menu page 6	Item No.
		Serial number
		Production date
		Firmware revision

10 Output characteristic curve

The bus power supply works with a U/I characteristic curve according to the KNX standard. In the event of a secondary-side short circuit or overload, the output current is limited to IMAX. The module does not switch off, but instead delivers a continuous output current. The secondary voltage is then reduced until the short circuit is eliminated.

U_N = 30 V

I_N = 0,64 A

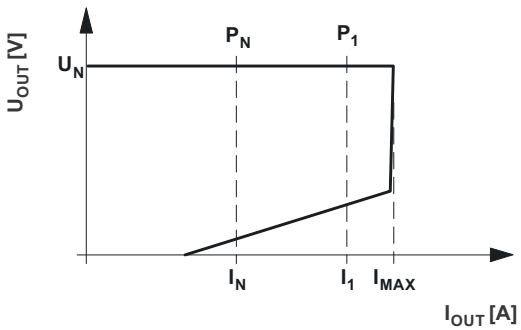
I_1 = 1,2 A

I_{MAX} = 1,5 A

P_N = 19,2 W

P_1 = 36 W

Figure 19 U/I characteristic curve



11 Connection versions

Depending on how you intend to use your bus power supply, there are different ways of connecting the DC output side.

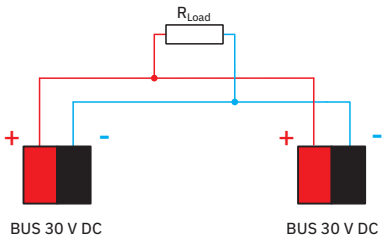
A distinction is made between the following modes of use:

– Parallel operation for power increase
– Redundancy operation

11.0.1 Parallel operation

When two bus power supply DC outputs are connected in parallel, the output current is increased to 2 x IN. Parallel connection for increased power is used when extending existing systems. If the individual bus power supply does not cover the current consumption of the most powerful load, parallel connection of bus power supplies is recommended.

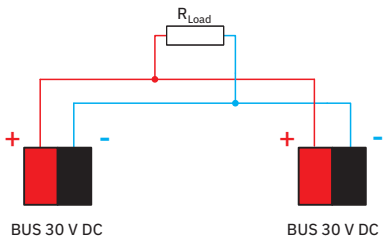
Figure 20 Schematic diagram, power increase in parallel operation



11.1 Redundant operation

Redundant circuits are suitable for the DC supply of systems and system parts which place particularly high demands on operational safety. If the DC load is to be supplied with 1+1 redundancy, bus power supplies of the same type and performance class with identical configurations must be used.

In the event of a fault, it must be ensured that one of the bus power supplies is able to provide the total required output power for the DC load to be supplied. The output power required for normal operation is thus provided by two bus power supplies connected in parallel on the output side. In normal operation, each bus power supply will be utilized by up to 50%.



11.2 Fundamental prerequisites for parallel operation (power increase, redundancy operation)

In order to ensure correct parallel operation, observe the following rules:

Cable lengths: To ensure the symmetrical utilization of the bus power supplies, the connecting cables for supplying the DC load must be identical in length.

Cable cross-sections: The connecting cables for supplying the DC load must be rated for the maximum occurring total current of all bus power supplies. This also applies for redundancy operation, whereby the individual bus power supply only supplies 50% of the DC load.

Ambient conditions: Select the installation location of the bus power supplies such that the prevailing ambient conditions are identical. This is of particular importance if the bus power supplies are installed in different installation locations. Large temperature differences between installation locations have a negative effect on the operating points of the power modules. This will result in the operating behavior of the bus power supplies no longer being identical.

12 Derating

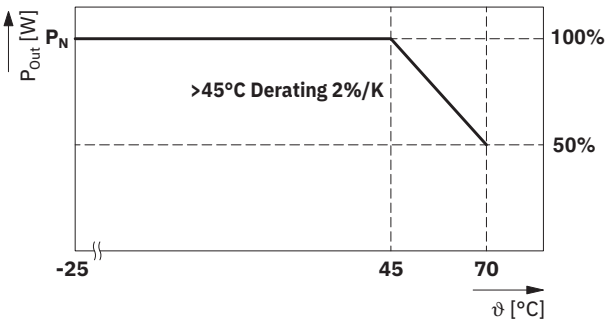
12.1 Ambient temperature

When mounted in the normal mounting position and operated within the permissible temperature range for nominal operation, the bus power supply provides full output power. If the bus power supply is operated outside the temperature range for nominal values, note the reduced output power for the supply of DC loads.

NOTE: Damage due to thermal overload

If the bus power supply is operated in a different temperature range, only a reduced amount of power can be drawn. Otherwise, the bus power supply will be thermally loaded disproportionately and the device service life significantly reduced. This thermal load may even damage the bus power supply to the extent that it is no longer operational.

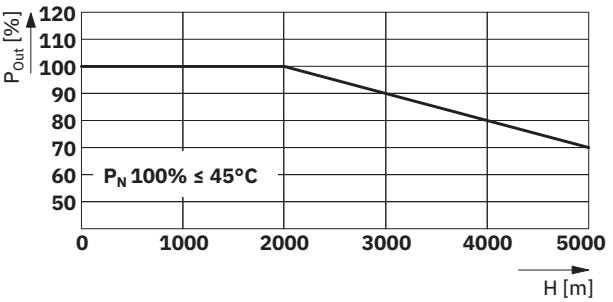
Figure 21 Output power depending on the ambient temperature



12.2 Installation height

The bus power supply can be operated at an installation altitude of up to 2000 m without any limitations. Different data applies for installation locations above 2000 m due to the differing air pressure and the reduced convection cooling associated with this.

Figure 22 Output power depending on the installation height



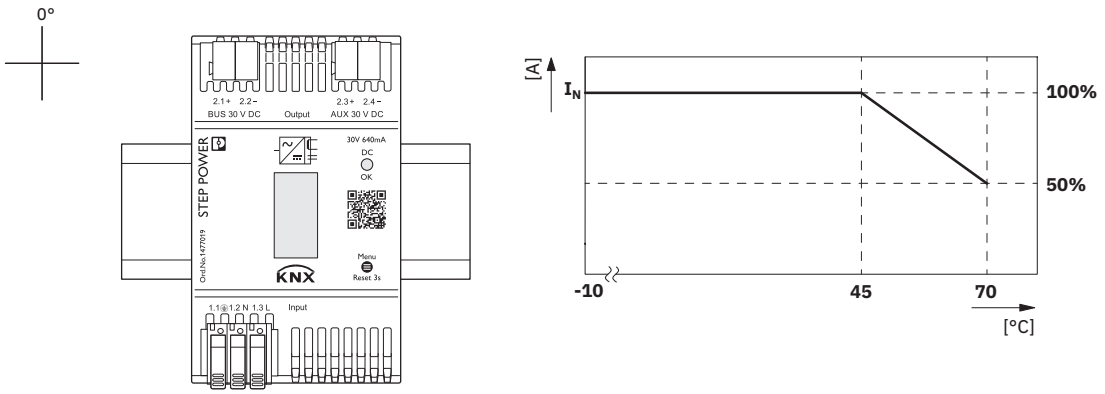
12.3 Position-dependent derating

In order that you can use the nominal power of the bus power supply without limitation, the bus power supply should always be mounted in the normal mounting position. If the device is mounted in the normal mounting position and the required keep-out areas are observed, sufficient device-side convection is always ensured.

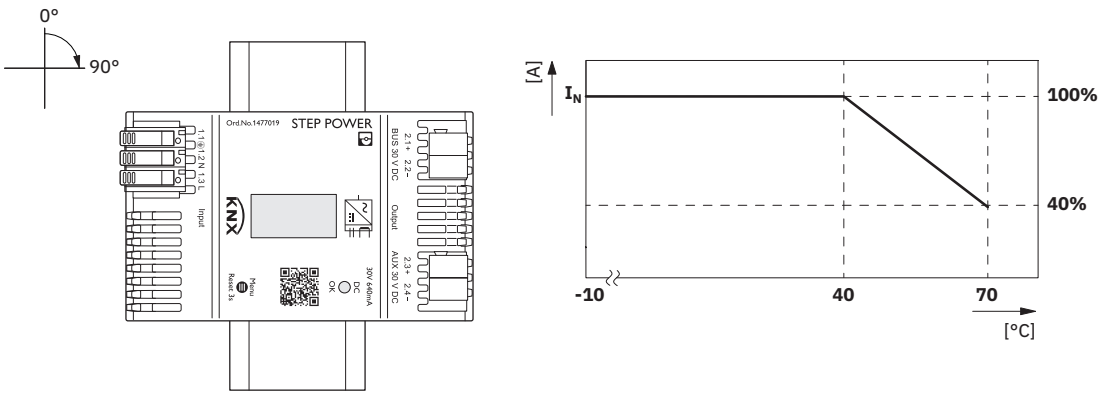
NOTE: Damage due to thermal overload

If the device is mounted in a different mounting position, only a reduced amount of power can be drawn. Otherwise, the bus power supply will be thermally loaded disproportionately and the device service life significantly reduced.

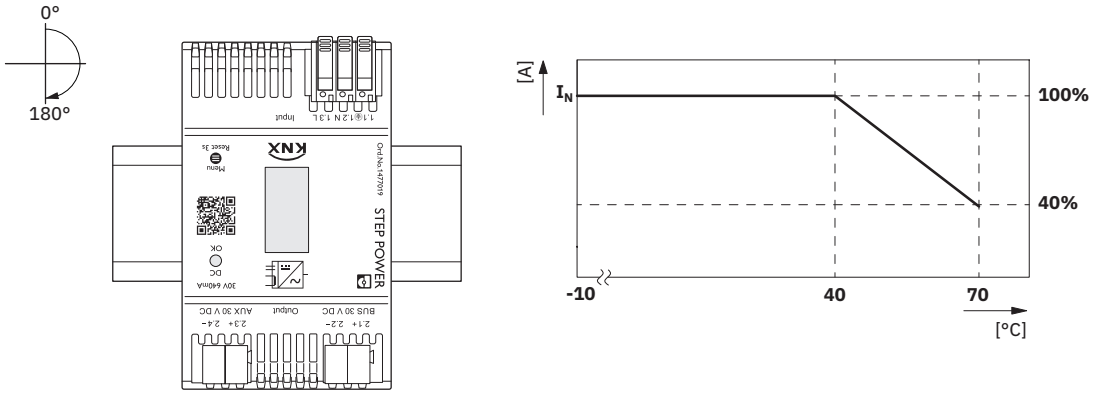
12.3.1 Normal mounting position



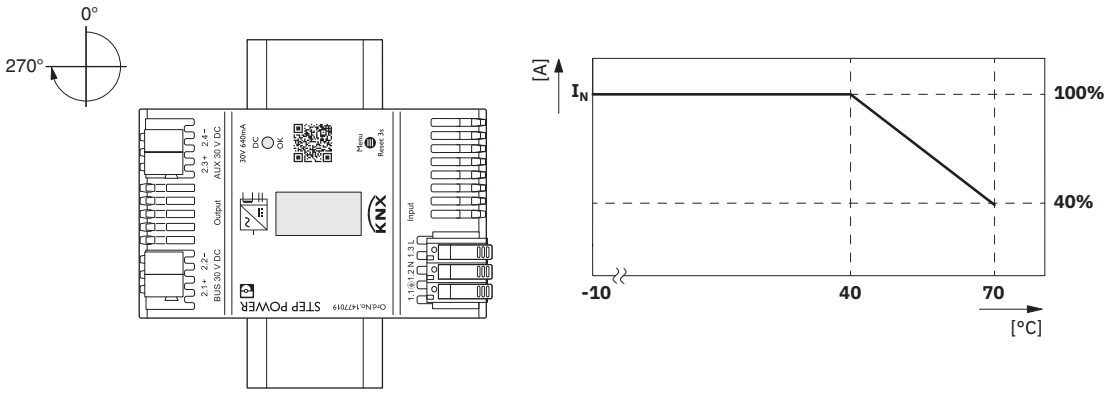
12.3.2 Rotated mounting position 90° Z-axis



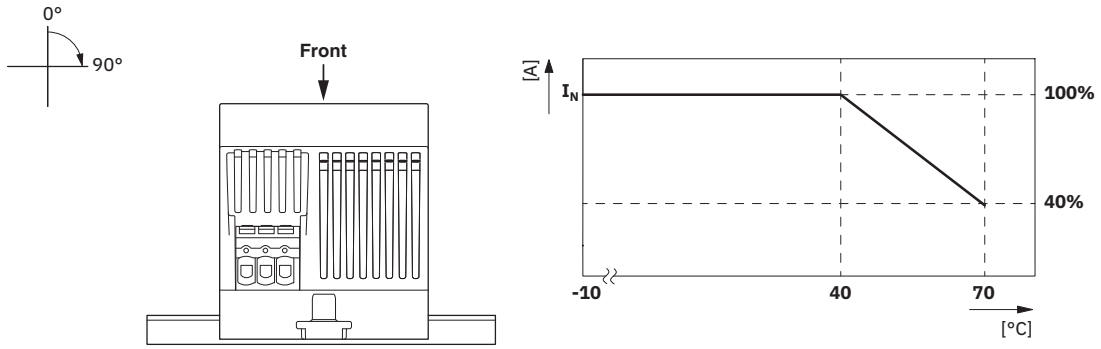
12.3.3 Rotated mounting position 180° Z-axis



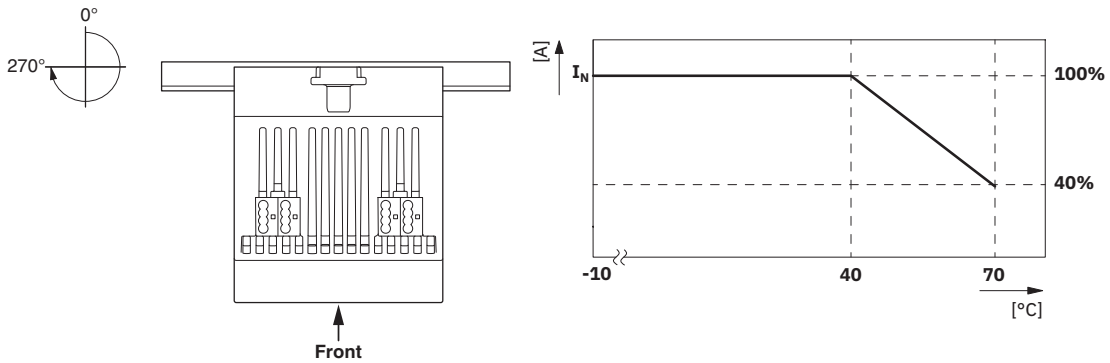
12.3.4 Rotated mounting position 270° Z-axis



12.3.5 Rotated mounting position 90° X-axis



12.3.6 Rotated mounting position 270° X-axis



13 Disposal and recycling

Ensure the correct disposal of electronic components

Do not dispose of the bus power supply as household waste.

Observe the applicable national standards and regulations.

Ensure correct disposal or recycling

Dispose of or recycle packaging material that is no longer needed as household waste.

Observe the applicable national standards and regulations.