TRIO-PS-2G/230AC-400DC/48DC/5

Power supply unit

Data sheet
110674_en_01

1 Description

TRIO POWER - power supplies with standard functionality
The power supplies of the TRIO POWER family convince due to their slim and robust design. The dynamic boost (1.5 x I_N for 5 seconds) absorbs starting currents and short overload situations securely during operation and without a drop in output voltage. The push-in connection technology on the front enables fast and tool-free wiring of the devices.

Features

- Tool-free connection via push-in connection technology
- Safe operation, thanks to electrically and mechanically robust design
- Especially slim design
- Worldwide use, thanks to wide-range input
- Reliable starting of heavy loads, thanks to dynamic boost (1.5 x I_N for 5 seconds)
- Simplified error diagnostics for remote signaling via DC-OK signal contact
- OVP (overvoltage protection) limits overvoltage to ≤58 V DC

Technical data (short form)	
Input voltage range	220 V AC ... 240 V AC -15 % ... +10 % 220 V DC ... 400 V DC -15 % ... +5 %
Nominal input voltage range	220 V AC ... 240 V AC 220 V DC ... 400 V DC
Mains buffering	> 20 ms (190 V AC) > 20 ms (230 V AC) > 20 ms (185 V DC) > 25 ms (400 V DC)
Nominal output voltage (U_N)	48.5 V DC ±1 %
Nominal output current (I_N) Dynamic Boost ($I_{Dyn.Boost}$)	5 A 7.5 A (5 s)
Output power (P_N) Output power ($P_{Dyn. Boost}$)	240 W 360 W
Efficiency	typ. 92.5 % (230 V AC) typ. 94 % (400 V DC)
Residual ripple with nominal values	< 20 mV_{PP}
MTBF (IEC 61709, SN 29500)	> 2220000 h (25 °C) / 230 V AC > 1280000 h (40 °C) / 230 V AC > 560000 h (60 °C) / 230 V AC > 2220000 h (25 °C) / 400 V DC > 1280000 h (40 °C) / 400 V DC > 560000 h (60 °C) / 400 V DC
Ambient temperature (operation)	-25 °C ... 70 °C (>60°C derating: 1.6%/K)
Startup type tested	-40 °C
Dimensions W/H/D	42 mm / 130 mm / 160 mm
Weight	0.9 kg

Make sure you always use the latest documentation.
It can be downloaded from the product at phoenixcontact.net/products.

2 Table of contents

3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Primary-switched TRIO power supply for DIN rail mounting, input: 230 V AC/400 V DC, output: 48 V DC / 5 A, dynamic boost, tool-free fast-connection technology for rigid and flexible conductors with ferrule	TRIO-PS-2G/230AC-400DC/ 48DC/5	1157806	1

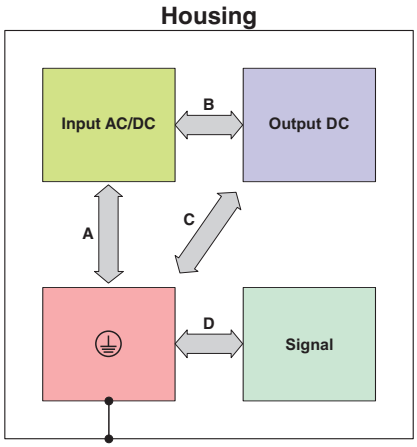
Accessories	Type	Item no.	Pcs./Pkt.
VARIOFACE module, with two equipotential busbars (P1, P2) for potential distribution, for mounting on NS 35 rails. Module width: 70.4 mm	VIP-2/SC/PDM-2/24	2315269	1
VARIOFACE module with push-in connection and two equipotential busbars (P1, P2) for potential distribution, for mounting on NS 35 rails. Module width: 57.1 mm	VIP-3/PT/PDM-2/24	2903798	1
Type 2/3 surge protection, consisting of protective plug and base element with Push-in connection. For single-phase power supply network with integrated status indicator and remote signaling. Nominal voltage: 230 V AC/DC	PLT-SEC-T3-230-FM-PT	2907928	5

You will find the latest accessories for the item at phoenixcontact.com/products.

4 Technical data

Input data	
Unless otherwise stated, all data applies for 25°C ambient temperature, 230 V AC or 400 V DC input voltage, and nominal output current (I_N).	
Input voltage range	220 V AC ... 240 V AC -15 % ... +10 % 220 V DC ... 400 V DC -15 % ... +5 %
Switch-on voltage	typ. 70 V AC / typ. 95 V DC
Shut-down voltage	typ. 50 V AC / typ. 50 V DC
Electric strength, max.	≤ 300 V AC 15 s / ≤ 420 V DC
Supply system configuration	Star network (TN, TT, IT (PE))
Frequency range (f_N)	50 Hz ... 60 Hz ±10 %
Current consumption (for nominal values) typ.	1.3 A (230 V AC) 1.3 A (220 V DC) 0.7 A (400 V DC)
Discharge current to PE typ.	< 3.5 mA < 1.7 mA (264 V AC, 60 Hz)
Mains buffering	> 20 ms (190 V AC) > 20 ms (230 V AC) > 20 ms (185 V DC) > 25 ms (400 V DC)
Inrush current integral (I^2t)	< 0.3 A^2s
Inrush current limitation after 1 ms	< 13.5 A
During the first few microseconds, the current flow into the filter capacitors is excluded.	
Input fuse internal (device protection)	3.15 A
Recommended breaker for input protection	4 A ... 16 A (Characteristic B, C, Z)
The external backup fuse must be approved for the (AC/DC) supply voltage used and the voltage level.	

Electric strength of the insulation



Test voltage	A	B	C	D
Type test (IEC/EN 61010-1)	3.5 kV AC	3.5 kV AC	0.5 kV AC	0.5 kV AC
Production test	1.5 kV AC	1.5 kV AC	--	--

POWER factor	230 V AC
	> 0.9

Input connection data	
Connection method	Push-in connection
Stripping length	10 mm (rigid/flexible) / 8 mm (Ferrule)
Conductor cross section, rigid	0.2 mm² ... 4 mm²
Conductor cross section, flexible	0.2 mm² ... 2.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve	0.25 mm² ... 1.5 mm²
Conductor cross section flexible, with ferrule without plastic sleeve	0.25 mm² ... 2.5 mm²
Cross section AWG	24 ... 12

Output data	
Nominal output voltage (U_N)	48.5 V DC ±1 %
Nominal output current (I_N)	5 A
Dynamic Boost ($I_{Dyn.Boost}$)	7.5 A (5 s)
Short-circuit current	< 7 A DC (Permanent)
Control deviation change in load, static 10 % ... 90 %	< 1.5 %
Control deviation Dynamic load change 10 % ... 90 %, 10 Hz	< 4 %
Control deviation change in input voltage ±10 %	< 0.1 %
Short-circuit-proof	yes
No-load proof	yes
Residual ripple (with nominal values)	< 20 mV_{PP}
Peak switching voltages	< 15 mV_{PP}
Connection in parallel	yes, for redundancy and increased capacity
Protection against overvoltage at the output (OVP)	≤ 58 V DC
Feedback voltage resistance	≤ 60 V DC
Rise time typical	20 ms (U_{OUT} (10 % ... 90 %))

Output connection data	
Connection method	Push-in connection
Stripping length	10 mm (rigid/flexible) / 8 mm (Ferrule)
Conductor cross section, rigid	0.2 mm^2 ... 4 mm^2
Conductor cross section, flexible	0.2 mm^2 ... 2.5 mm^2
Conductor cross section flexible, with ferrule with plastic sleeve	0.25 mm^2 ... 1.5 mm^2
Conductor cross section flexible, with ferrule without plastic sleeve	0.25 mm^2 ... 2.5 mm^2
Conductor cross section AWG	24 ... 12

LED signaling	
Signalization designation	DC OK
Status indicator	LED
Color	green
Signal threshold	U_{OUT} > 0.7 x U_N (U_N = 48 V DC)

Relay output	
Signalization designation	DC OK
Contact assignment	13/14 (closed)
Maximum contact load	30 V AC / 30 V DC (100 mA)
Signal threshold	U_{OUT} > 0.7 x U_N (U_N = 48 V DC)

Signal connection data	
Connection method	Push-in connection
Stripping length	8 mm (rigid/flexible) / 8 mm (Ferrule)
Conductor cross section, rigid	0.2 mm² ... 0.75 mm²
Conductor cross section, flexible	0.2 mm² ... 1.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve	0.2 mm² ... 0.75 mm²
Conductor cross section flexible, with ferrule without plastic sleeve	0.2 mm² ... 1 mm²
Conductor cross section AWG	24 ... 18

Reliability	230 V AC	400 V DC
MTBF (IEC 61709, SN 29500)	> 2220000 h (25 °C) > 1280000 h (40 °C) > 560000 h (60 °C)	> 2220000 h (25 °C) > 1280000 h (40 °C) > 560000 h (60 °C)

General data	
Degree of protection	IP20
Protection class	I (in closed control cabinet)
Inflammability class in acc. with UL 94 (housing / terminal blocks)	V0
Type of housing	Aluminum (AlMg3)
Hood version	Polycarbonate
Dimensions W / H / D (state of delivery)	42 mm / 130 mm / 160 mm
Weight	0.9 kg

Power dissipation	230 V AC	400 V DC
Maximum no-load power dissipation	typ. 4 W	typ. 4 W
Power loss nominal load max.	typ. 20 W	typ. 15 W

Efficiency	230 V AC	400 V DC
	typ. 92.5 %	typ. 94 %

Ambient conditions	
Ambient temperature (operation)	-25 °C ... 70 °C (>60°C derating: 1.6%/K)
The ambient temperature (operation) refers to UL 508 surrounding air temperature.	
Ambient temperature (start-up type tested)	-40 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Installation height	≤ 2000 m
Vibration (operation)	5 Hz ... 2 kHz, 2.3 m/s² (0.23g) (RMS) 5 h (DIN EN 50125-3, DIN EN 60068-2-64)
Shock	20 m/s² (2g), 11 ms, ± 100 Schocks (DIN EN 50125-3, DIN EN 60068-2-27)
Degree of pollution	2
Climatic class	3K3 (EN 60721)
Overvoltage category EN 62477-1	 II (≤ 2000 m) III (≤ 2000 m)

Standards	
Safety of power supply units up to 1100 V (insulation distances)	DIN EN 61558-2-16
Electrical safety (of information technology equipment)	EN 61010-1 VDE 0805 (SELV)
Protective extra-low voltage	IEC 61010-1 (SELV) IEC 61010-2-201 (PELV)
Safe isolation	IEC 61010-2-201 IEC 61558-2-16
Limitation of mains harmonic currents	EN 61000-3-2
Rail applications	EN 50121-3-2 EN 50121-4 EN 50124-1 EN 50125-3 IEC 62236-3-2 IEC 62236-4 IEC 62236-5

Approvals	
UL	UL 61010-1 UL 61010-2-201
You will find the latest approvals for the item at phoenixcontact.com/products.	

Electromagnetic compatibility Conformance with EMC Directive 2014/30/EU		
Noise emission according to 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	Class B	Class A
Flicker EN 61000-3-3	not required	0 kHz ... 2 kHz

Immunity according to EN 61000-6-1 (residential), EN 61000-6-2 (industrial)		
CE basic standard	**Minimum normative requirements of EN 61000-6-2 (CE) (immunity for industrial environments)**	**Higher requirements in practice (covered)**
Electrostatic discharge EN 61000-4-2		
Housing contact discharge	4 kV (Test Level 2)	6 kV (Test Level 4)
Housing air discharge	8 kV (Test Level 3)	8 kV (Test Level 4)
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)	20 V/m (Test Level 3)
Frequency range	1.4 GHz ... 2 GHz	1 GHz ... 2 GHz
Test field strength	3 V/m (Test Level 2)	10 V/m (Test Level X)
Frequency range	2 GHz ... 2.7 GHz	2 GHz ... 2.7 GHz
Test field strength	1 V/m (Test Level 1)	10 V/m (Test Level 3)
Comments	Criterion B	Criterion A
Fast transients (burst) EN 61000-4-4		
Input	2 kV (Test Level 3 - asymmetrical)	4 kV (Test Level 4 - asymmetrical)
Output	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
Signal	1 kV (Test Level 1 - asymmetrical)	2 kV (Test Level 4 - asymmetrical)
Comments	Criterion B	Criterion A

Immunity according to EN 61000-6-1 (residential), EN 61000-6-2 (industrial)		
CE basic standard	**Minimum normative requirements of EN 61000-6-2 (CE) (immunity for industrial environments)**	**Higher requirements in practice (covered)**
Surge voltage load (surge) EN 61000-4-5		
Input	1 kV (Test Level 1 - symmetrical) 2 kV (Test Level 1 - asymmetrical)	2 kV (Test Level 4 - symmetrical) 4 kV (Test Level 4 - asymmetrical)
Output	0.5 kV (Test Level 1 - symmetrical) 0.5 kV (Test Level 1 - asymmetrical)	1 kV (Test Level 3 - symmetrical) 2 kV (Test Level 3 - asymmetrical)
Signal	0.5 kV (Test Level 2 - asymmetrical)	1 kV (Test Level 2 - asymmetrical)
Comments	Criterion B	Criterion A
Conducted interference EN 61000-4-6		
Input/Output/Signal	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 (Test Level 2)	70 % , 25 periods (Test Level 2)
Comments	Criterion C	Criterion A
Voltage dip	40 % , 10 periods (Test Level 2)	40 % , 10 periods (Test Level 2)
Comments	Criterion C	Criterion A
Voltage dip	0 % , 1 period (Test Level 2)	0 % , 1 period (Test Level 2)
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

5.1 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.

This symbol and the accompanying text provide additional information on the proper disposal of electronic components.

This symbol and the accompanying text provide additional information on recycling.

This symbol indicates a specialist product that requires specialist knowledge during installation.

5.2 Safety and warning notes

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

- Use this power supply to convert the electrical energy fed in by the power grid. When doing so, electrically isolate either the AC or DC input voltage from the DC output voltage. The DC output voltage U_{Out} is a safety extra-low voltage.
- Protection may be impaired if the equipment is used in a manner not specified by the manufacturer.
- Observe the national safety and accident prevention regulations.
- The power supply is maintenance-free. Repairs may only be carried out by the manufacturer. The warranty no longer applies if the housing is opened.
- Assembly and electrical installation must correspond to the state of the art.
- The power supply is a built-in device and is designed for mounting in a control cabinet.
- A suitable electrical and fire enclosure shall be provided in the end equipment.
- The IP20 degree of protection of the power supply is intended for a clean and dry environment.
- Observe mechanical and thermal limits.
- Mount the power supply in the normal mounting position. The L(+)/N(-)/⏚ connection terminal blocks are located at the bottom.
- The power supply is approved for connection to TN, TT, and IT power grids (star networks) with protective conductor connection (PE) and a maximum phase-to-phase voltage of 240 V AC.
- The power supply is approved for connection to a DC power grid with a maximum of 400 V DC.

- Connect the housing to ground via protective conductor device terminal block ⏚.
- Ensure that the primary-side wiring and secondary-side wiring are the correct size and have sufficient fuse protection.
- Use copper cables for operating temperatures of
  >75 °C (ambient temperature <55 °C)
  >90 °C (ambient temperature <75 °C).
- Refer to the corresponding tables (see Section: Technical data) for the connection parameters, such as the necessary stripping length for wiring with and without ferrule.
- Protect the device against foreign bodies penetrating it, e.g., paper clips or metal parts.
- When wiring the floating switch contact, observe the maximum permissible contact load.

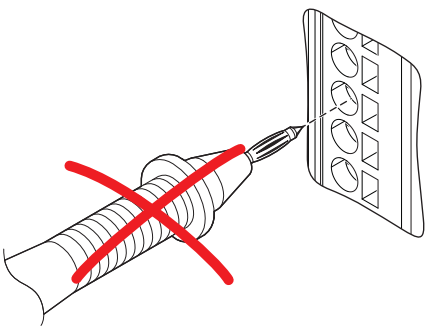
NOTE: Damage to the Push-in connection terminal blocks is possible

If you need to perform measurements with a multimeter, for example, do not insert the test probe directly into the Push-in connection terminal block.

The maximum pluggable depth of the wiring space of the Push-in connection terminal blocks is limited. In addition, when the test probe is inserted, the opening for release may be covered, meaning that it is not possible to insert a screwdriver sufficiently in order to activate the release mechanism.

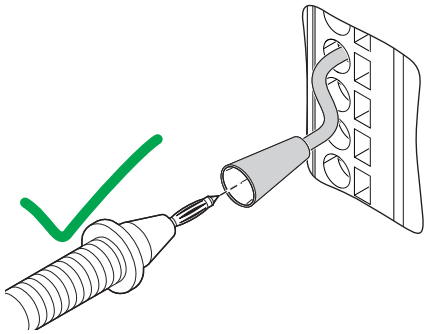
The Push-in connection terminal block will be damaged if the release mechanism is not pressed correctly when removing the connecting cable. Use a suitable screwdriver to release the Push-in connection terminal block.

Figure 1 Incorrect use of a test probe



Only use test probes in combination with a conductive test adapter.

Figure 2 Correct use of a test probe



6 High-voltage test (HIPOT)

This protection class I power supply is subject to the Low Voltage Directive and is factory tested. During the HIPOT test (high-voltage test), the insulation between the input circuit and output circuit is tested for the prescribed electric strength values, for example. The test voltage in the high-voltage range is applied at the input and output terminal blocks of the power supply. The operating voltage used in normal operation is a lot lower than the test voltage used.

The test voltage should rise and fall in ramp form. The relevant rise and fall time of the ramp should be at least two seconds.

6.1 High-voltage dielectric test (dielectric strength test)

In order to protect the user, power supplies, as electronic components with a direct connection to potentially hazardous voltages, are subject to more stringent safety requirements. For this reason, permanent safe electrical isolation between the hazardous input voltage and the output voltage must always be ensured.

In order to ensure permanent safe isolation of the AC input circuit and DC output circuit, high-voltage testing is performed as part of the safety approval process (type test) and manufacturing (routine test).

6.2 High-voltage dielectric test during the manufacturing process

During the manufacturing process for the power supply, a high-voltage test is performed as part of the dielectric test in accordance with the specifications of IEC/UL/EN 61010-1. The high-voltage test is performed with a test voltage of at least 1.5 kV AC / 2.2 kV DC or higher. Routine manufacturing tests are inspected regularly by a certification authority.

6.3 High-voltage dielectric test performed by the customer

Apart from routine and type tests to guarantee electrical safety, the end user does not have to perform another high-voltage test on the power supply as an individual component. According to EN 60204-1 (Safety of machinery - Electrical equipment of machines) the power supply can be disconnected during the high-voltage test and only installed once the high-voltage test has been completed.

6.4 Performing high-voltage testing

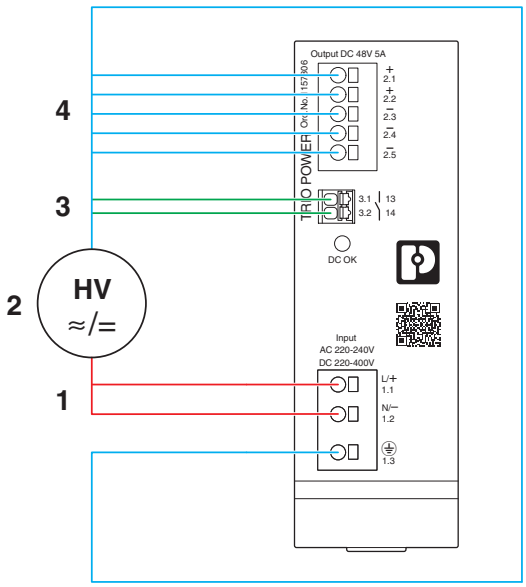
If high-voltage testing of the control cabinet or the power supply as a stand-alone component is planned during final inspection and testing, the following features must be observed.

- The power supply wiring must be implemented as shown in the wiring diagram.
- The maximum permissible test voltages must not be exceeded.

Avoid unnecessary loading or damage to the power supply due to excessive test voltages.

For the relevant applicable test voltages and insulation distances, refer to the corresponding table (see technical data: electric strength of the insulation section).

Figure 3 Potential-related wiring for the high-voltage test



Key

No.	Designation	Color coding	Potential levels
1	AC input circuit	Red	Potential 1
2	High-voltage tester	--	--
3	Signal contacts	Green (optional)	Potential 2
4	DC output circuit	Blue	Potential 2

7 Design

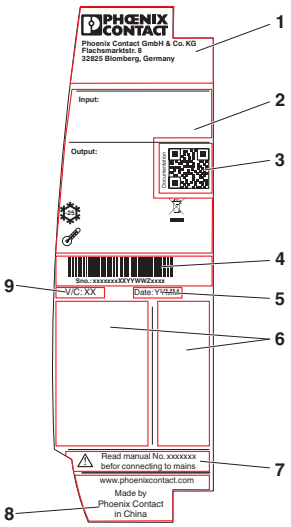
7.1 Rating plate

In accordance with the German Product Safety Law (ProdSG) it is only permissible to make such products available on the market if they meet certain safety standards. It must be ensured at all times that users are not exposed to hazards.

In accordance with ProdSG, every device must therefore be fitted with a rating plate. All relevant information on the safe use of the device must also be included.

The power supply device rating plate is located on the right-hand side of the housing (as viewed from the front).

Figure 4 Rating plate information



Key

No.	Designation
1	Identification of the provider
2	Device connection data
3	QR code as web link to the device documentation
4	Bar code and serial number for device identification
5	Date of manufacture
6	Device approvals
7	Designation of product-related device documentation
8	Production site of the Phoenix Contact Group
9	Designation of device revision

7.2 Device connections and functional elements

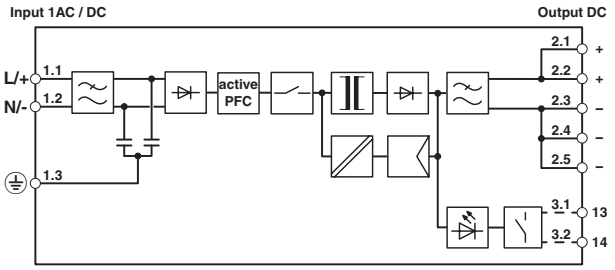
Device connections are labeled with connection tags to ensure clear and definitive identification.

The connection tags are split into the following connection levels:

Connection level	Description
1.x	Input
2.x	Output
3.x	Signals

8 Block diagram

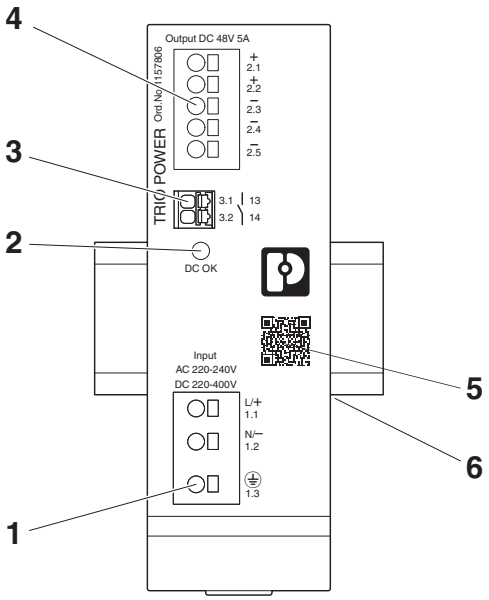
Figure 5 Basic circuit diagram



Key:	
	Rectification
	Switch
	Electrically isolated signal transmission
	Regulation
	Transformer
	Filter
	Floating switching output
	LED signaling

9 Structure

Figure 6 Function elements

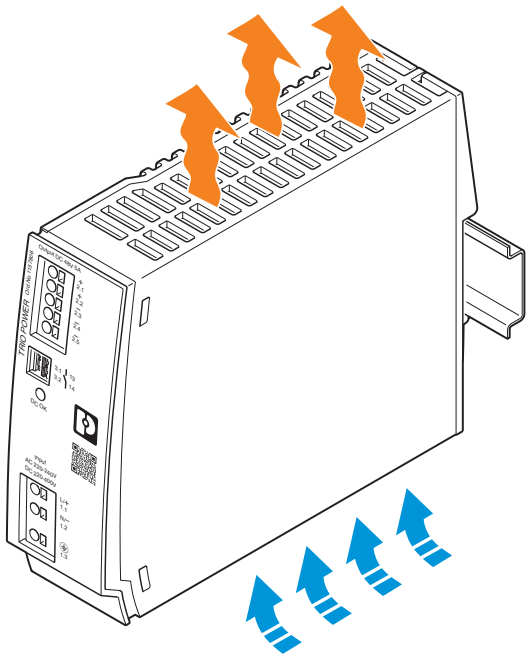


No.	Designation	Connection labeling
1.	Connection terminal block input voltage: Input L/N/⏚	1.1 ... 1.3
2.	Signaling DC OK LED	--
3.	Floating switch contact: max. 30 V AC/DC, 100 mA	3.1, 3.2
4.	Connection terminal block output voltage: Output DC +/-	2.1 ... 2.5
5.	QR code web link	--
6.	Integrated snap-on foot for DIN rail mounting (back of device)	--

10 Cooling

Heat is dissipated from the power supply via the heatsinks integrated into the housing surfaces. Convection to dissipate heat from the power supply only takes place in small dimensions above the housing openings.

Figure 7 Convection



NOTE: Alignability dependent on the load and ambient temperature at the mounting location

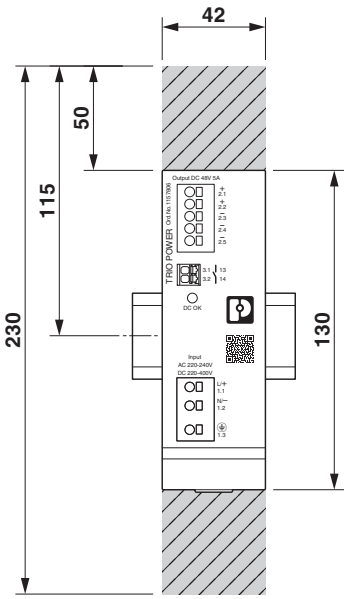
At nominal conditions and an ambient temperature ≤40°C, the power supply can be aligned to neighboring devices without a lateral minimum clearance. Within the temperature range of >60°C to ≤70°C, the load may not exceed 75% of the nominal power.

To ensure sufficient wiring space to wire the power supply, we recommend a vertical minimum clearance from other devices of 50 mm. Depending on the cable duct used, a smaller clearance may be possible.

11 Mounting position and dimensions

11.1 Mounting position

Figure 8 Keep-out areas

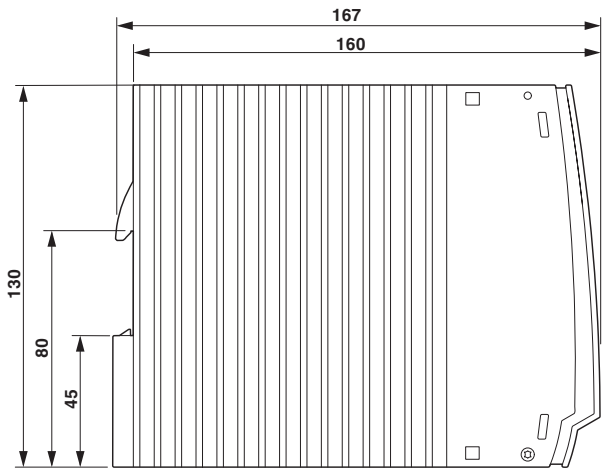


Possible mounting positions:

Normal mounting position, installation depth 160 mm (+ DIN rail)

11.2 Device dimensions

Figure 9 Device dimensions



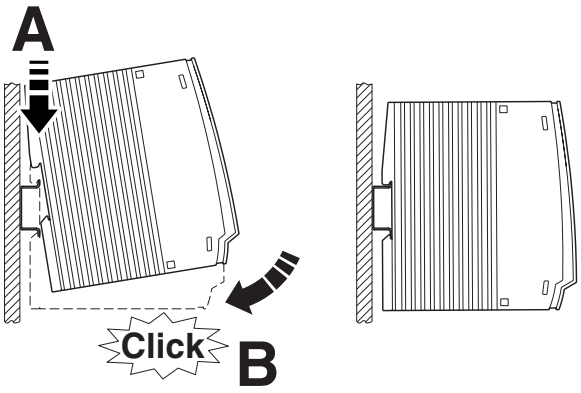
12 Mounting/removal

The power supply unit can be snapped onto all 35 mm DIN rails (EN 60715).

12.1 Mounting

Position the module with the DIN rail guide on the upper edge of the DIN rail, and snap it in with a downward motion.

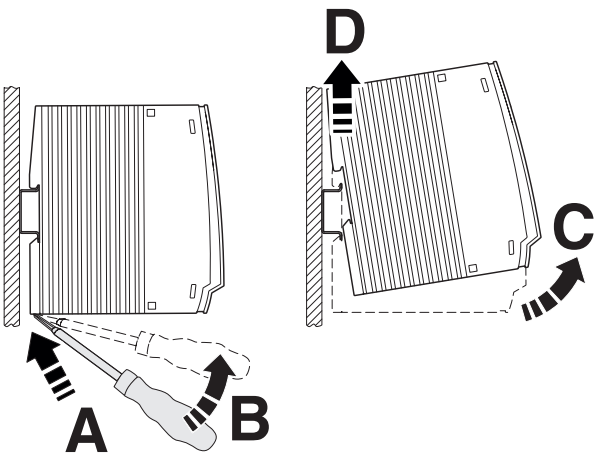
Figure 10 Mounting on standard DIN rail



12.2 Removal

Pull the snap lever open with the aid of a screwdriver and slide the module out at the lower edge of the DIN rail.

Figure 11 Removing the DIN rail



13 Device connection terminal blocks

This power supply is a specialist product. Only qualified specialist personnel with electrotechnical expertise may install, start up, and operate this power supply.

WARNING: Observe the national safety regulations for working on electrical systems

In Germany, this work may only be carried out by electrically skilled persons with additional training.

Furthermore, the five basic safety rules apply:

- Disconnect safely
- Ensure power cannot be switched on again
- Verify safe isolation from the supply for all positions
- Ground and short circuit
- Cover or safeguard adjacent live parts

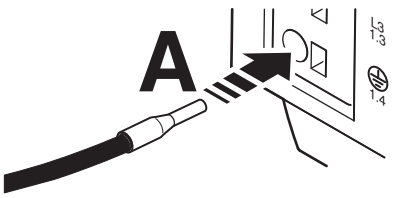
13.1 Push-in connection technology

All connection terminal blocks on the power supply have push-in connection technology on the front. The power supply is wired by simply plugging in the connecting cables, no tools are required. For the necessary connection parameters for the terminal blocks, please refer to the technical data.

13.1.1 Plug in connecting cable

The wiring is carried out by simply plugging the connecting cable into the contact opening provided. Insert the connecting cable as far as it will go.

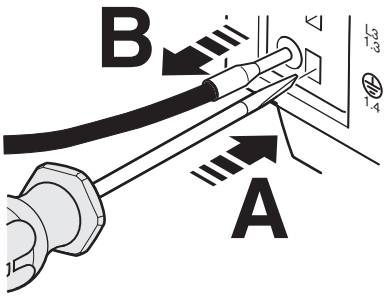
Figure 12 Insert connecting cable (push-in connection technology)



13.1.2 Loosen the connecting cable

To disconnect the wiring, take a suitable screwdriver and insert it into the opening for release. Then carefully pull the connecting cable out of the contact opening.

Figure 13 Release connecting cable (push-in connection technology)



14 Input

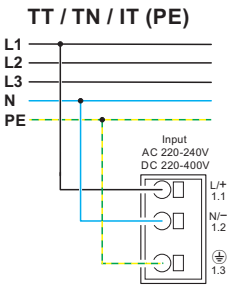
The power supply is designed to be operated on 1-phase AC power grids (star network). Here, the star network supports various supply system configurations, for example, TT, TN, and IT systems.

As an alternative, operation on a DC power grid is supported. The connection is made via the connection terminal blocks INPUT L1/+, N/-, ⏚.

NOTE: Damage possible at impermissibly high voltage levels

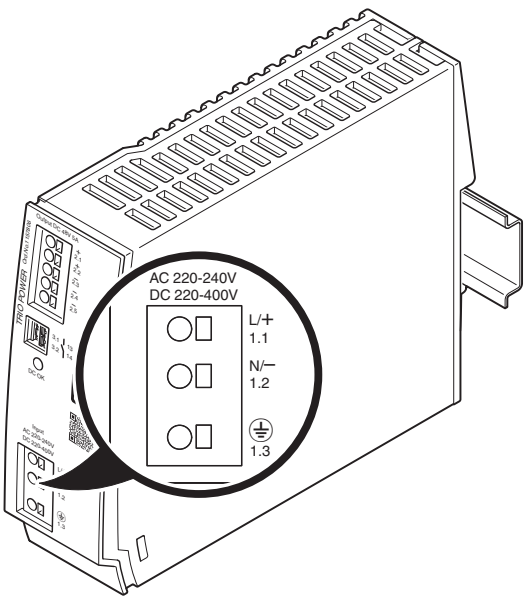
The power supply is approved for connection to TN, TT, and IT power grids with a maximum phase-to-phase voltage of 240 V AC. Operation on a DC power grid is approved up to a maximum of 400 V DC.

Figure 14 Network types



14.1 Position of input terminals

Figure 15 Position of input terminals



14.2 Protection of the primary side

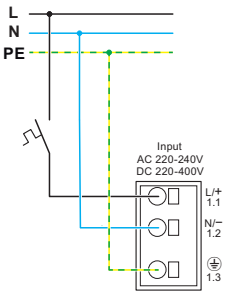
Installation of the device must correspond to EN 61010-1 regulations. It must be possible to switch the device off using a suitable disconnection device outside the power supply. For example, the primary-side line protection is suitable for this (see technical data).

An internal AC/DC fuse is provided for device protection.

If the internal fuse is triggered, there is a device defect. In this case, the power supply must be examined by the manufacturer. Opening it and repairing it yourself is not permitted.

14.2.1 1AC supply network

Figure 16 Schematic diagram, switching the input terminals



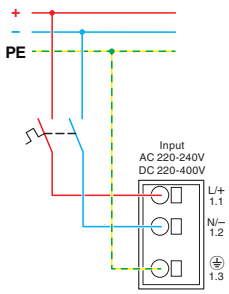
14.2.2 DC supply network

NOTE: Damage possible if an incorrect fuse is used

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

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

Figure 17 Schematic diagram, two-phase fuse protection

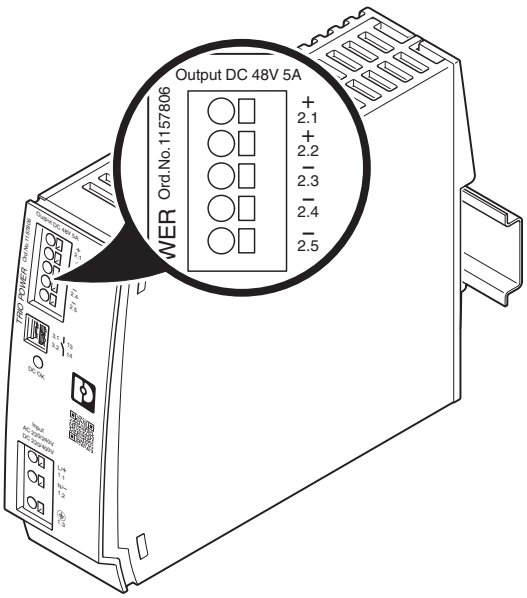


15 Output

The power supply provides a 48 V DC voltage for supplying loads. The DC output voltage is set to the fixed value by default and cannot be changed. The load is connected via the OUTPUT +/- connection terminal blocks.

15.1 Position of output terminals

Figure 18 Position of output terminals

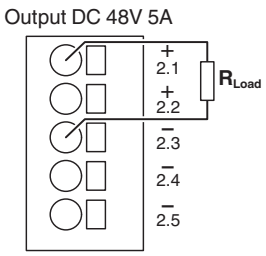


15.2 Protection of the secondary side

The power supply is electronically short-circuit-proof and idling-proof. In the event of an error, the output voltage is limited. It must be ensured that all output cables are dimensioned accordingly for the maximum output current or have separate protection.

The connecting cables on the secondary side should have large cross sections to keep the voltage drops in the cables as low as possible.

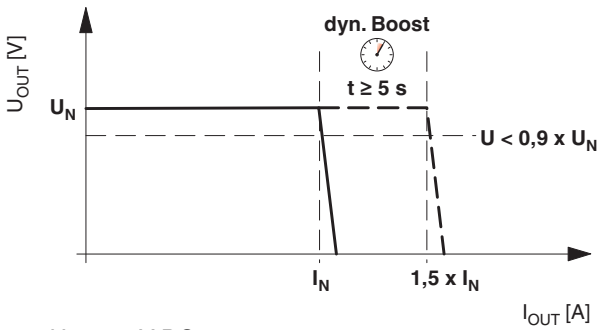
Figure 19 Schematic diagram, switching the output terminals



15.3 Output characteristic curve

The power supply works with a dynamic power reserve, the dynamic boost, as shown in the U/I characteristic curve in the figure. In the event of a secondary-side short circuit or overload, the output current is limited to max. 1.5 x I_N for 5 seconds. The secondary voltage is reduced beyond this time period until the short circuit is eliminated. The U/I characteristic curve with the dynamic power reserve enables high inrush currents of capacitive loads or inductive loads to be supplied reliably.

Figure 20 U/I characteristic curve with dynamic load reserve



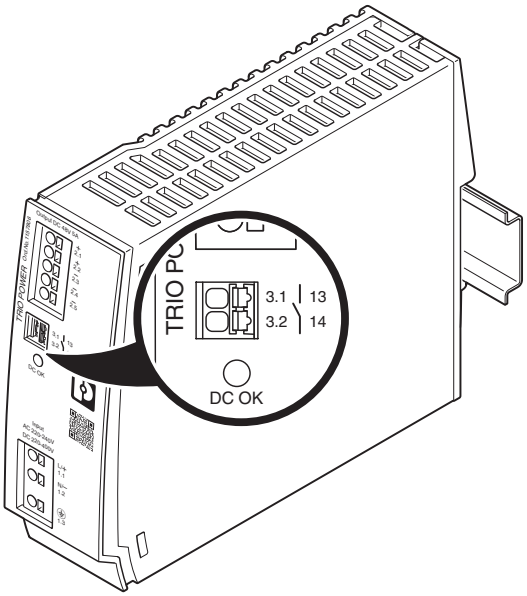
- U_N = 48 V DC
- I_N = 5 A
- I_{Dyn} = 7,5 A (5 s)
- P_N = 240 W
- $P_{Dyn.}$ = 360 W

16 Signaling

16.1 DC OK-LED

The DC OK-LED is available for function monitoring. The LED is continuously illuminated when the output voltage is > 70 % of the nominal output voltage U_{OUT} (48 V DC).

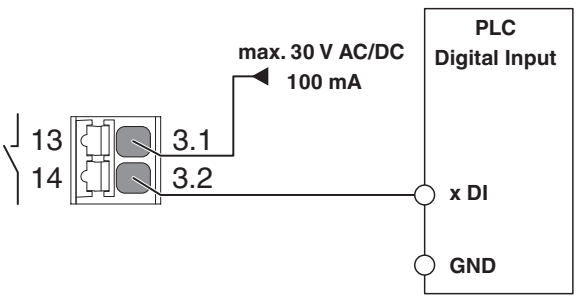
Figure 21 Location of the elements



16.2 Floating signal contact

A floating diagnostics contact can be used to forward data to a higher-level control system. When opened, the diagnostics contact indicates an underrange of more than 70% for the nominal output voltage U_{OUT}.

Figure 22 Wiring principle

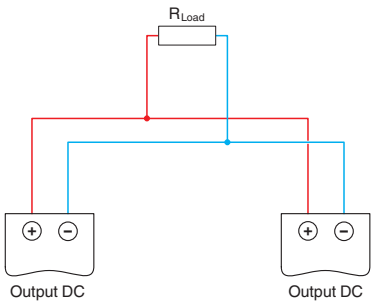


17 Connection versions

Depending on how you intend to use your power supply, connect the DC output side in parallel operation for the following applications:

– Power increase
– Redundancy operation

Figure 23 Schematic diagram, power increase in parallel operation or redundant operation



17.1 Increasing power

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

17.2 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, two power supplies of the same type and performance class with identical configurations must be used.

In the event of an error, it must be ensured that one of the 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 power supplies connected in parallel on the output side. In normal operation, each of the two power supplies will be utilized by up to 50%.

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

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

DC output voltage: On each of the power supplies, set the DC voltage in idle mode such that the voltage values are identical. Take any voltage drops occurring due to long cable lengths into consideration.

The DC output voltage on this power supply is set to a fixed value by default and cannot be changed.

Cable lengths: To ensure the symmetrical utilization of he 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 power supplies.

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

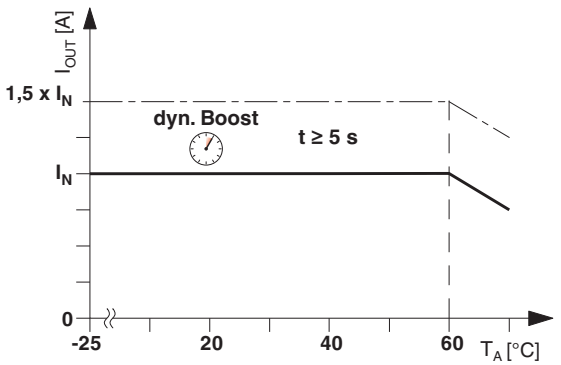
If more than two power supplies are connected in parallel for the required power increase, fusing the DC outputs separately is recommended. Use appropriate miniature circuit breakers (MCBs) for this.

18 Derating

18.1 Temperature-dependent derating

At an ambient temperature of up to +60°C, the device provides both the nominal output current $I_{N.}$ and the dynamic output current ($I_{Dyn. Boost}$). At ambient temperatures above +60°C, the output power must be reduced by 1.6%/K temperature increase. At ambient temperatures above +70°C or in the event of a thermal overload, the device does not switch off. The output power will be reduced enough to ensure that device protection is provided. After the device has cooled down, the output power will be increased again.

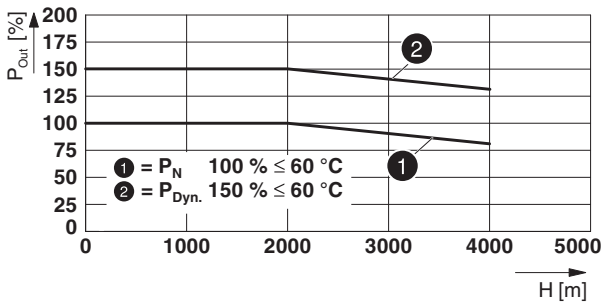
Figure 24 Temperature derating in normal mounting position



18.2 Installation height

The power supply can be operated at an installation height 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 (see technical data section). The data provided is based on the results of pressure chamber testing performed by an accredited test laboratory.

Figure 25 Output power depending on the installation height



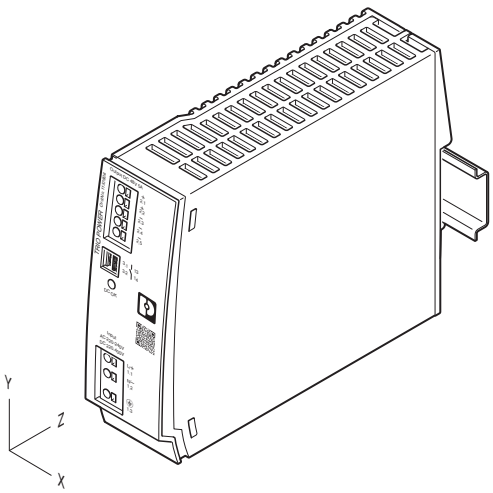
18.3 Position-dependent derating

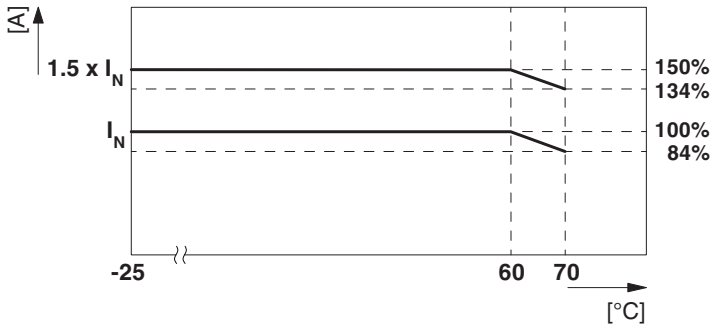
The power supply can be installed onto all 35 mm DIN rails according to EN 60715. The normal mounting position of the power supply is horizontal.

When installing in a different mounting position, derating should be adhered to.

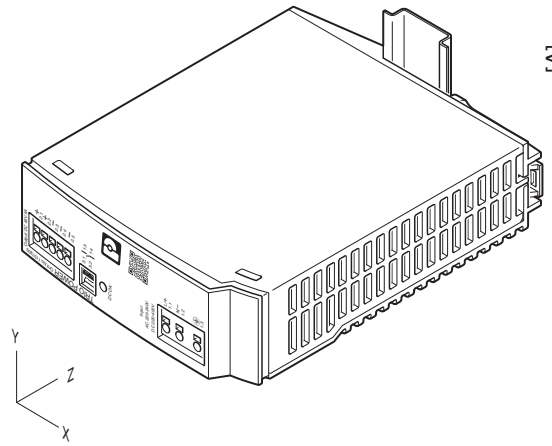
The characteristic curve can be used to determine the maximal output power to be drawn for each ambient temperature for different mounting positions.

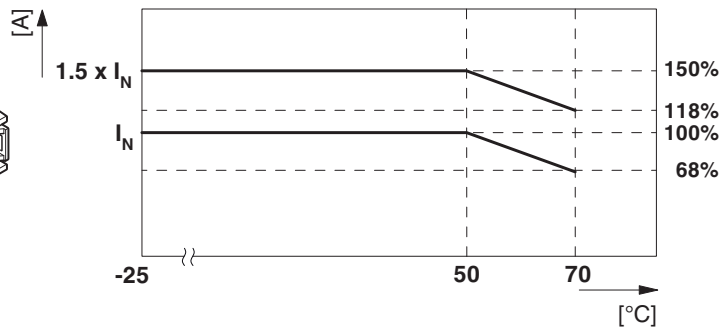
Normal mounting position



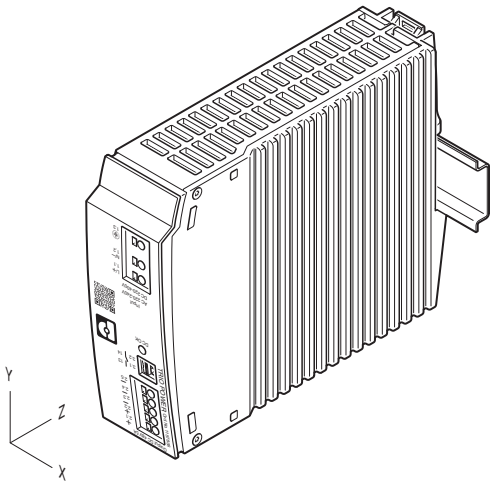


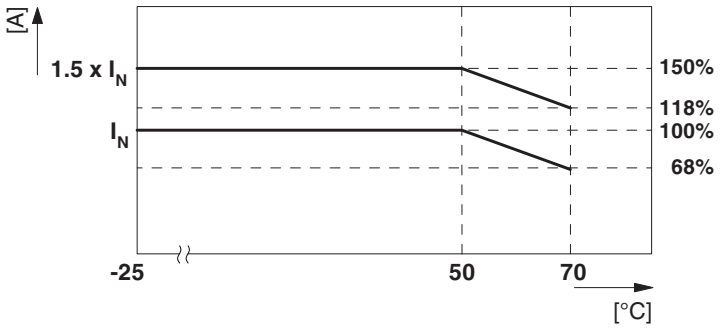
Rotated mounting position 90° Z-axis



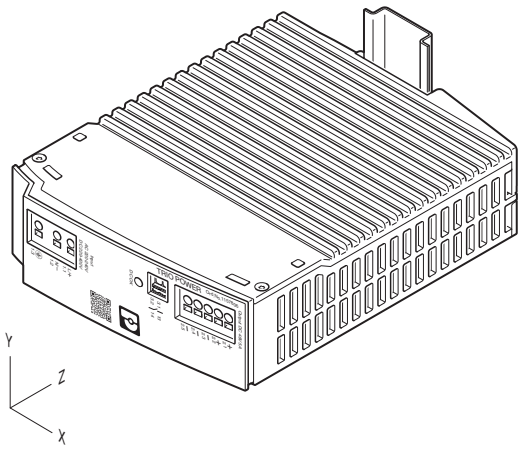


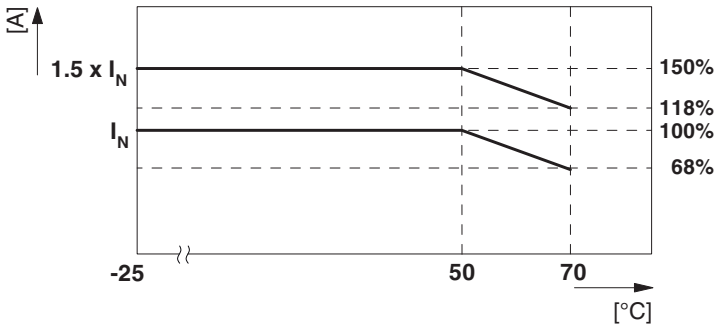
Rotated mounting position 180° Z-axis



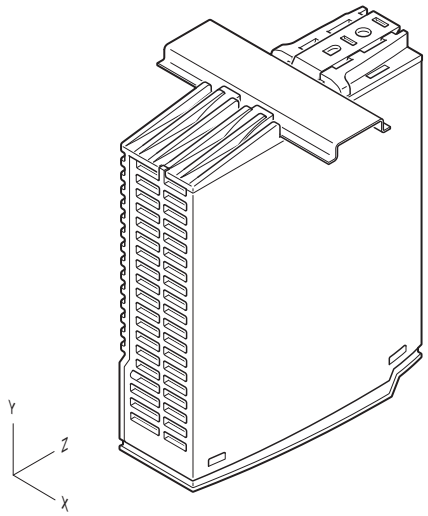


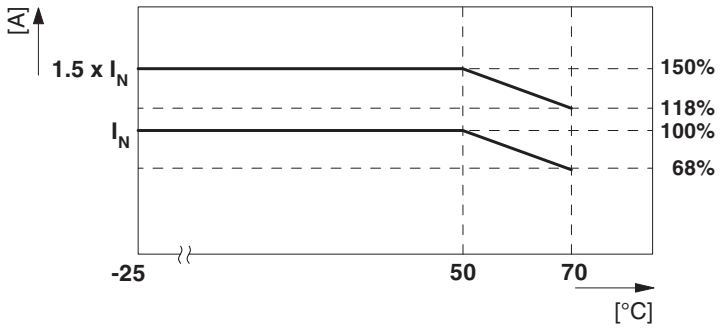
Rotated mounting position 270° Z-axis



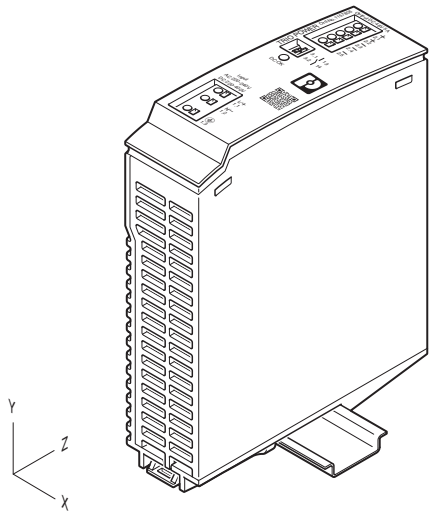


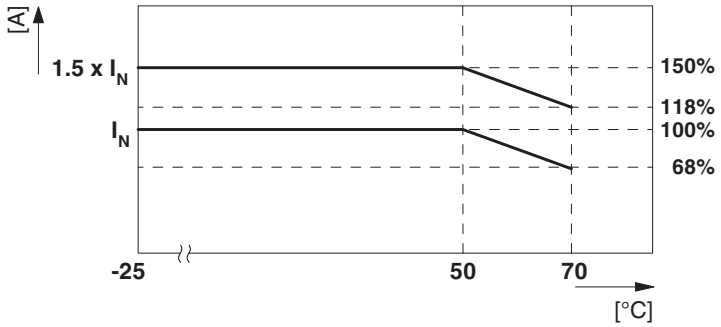
Rotated mounting position 90° X-axis





Rotated mounting position 270° X-axis





19 Disposal and recycling

Ensure the correct disposal of electronic components

Do not dispose of the 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.