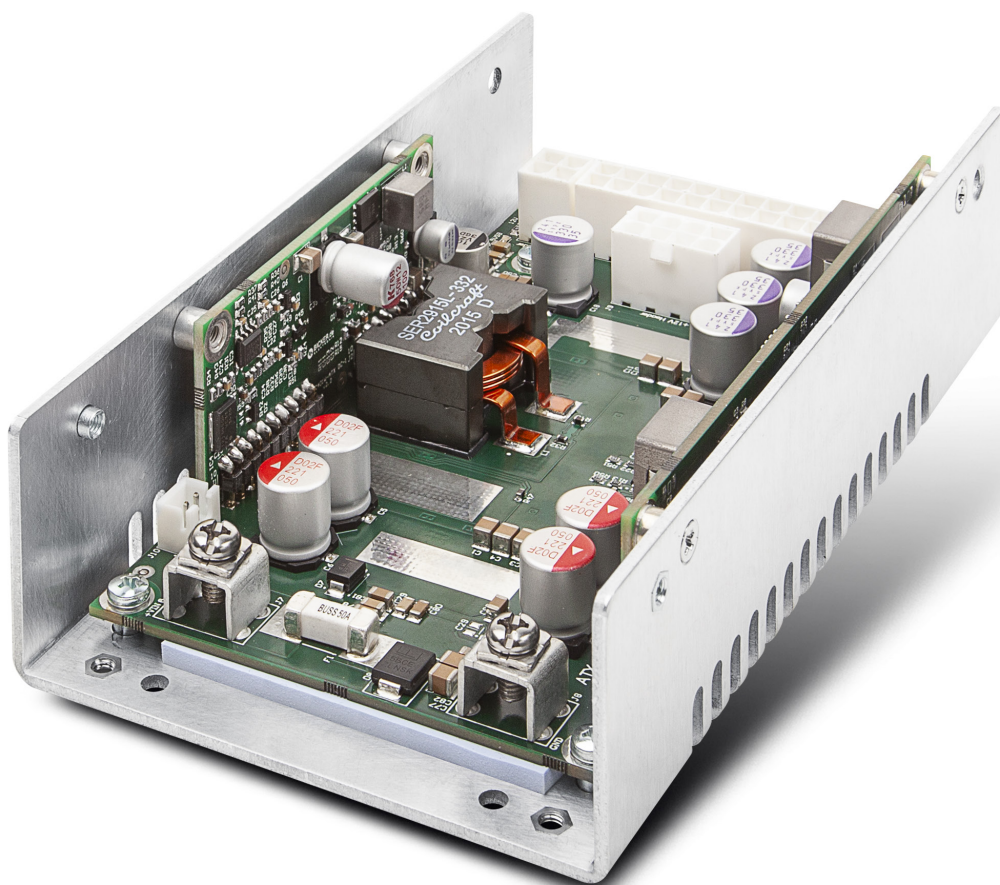


DC401W

DC/DC 400W POWER SUPPLY



Legend of used symbols

Symbol	Description
	Attention! Important hazard warning.
	Do not dispose of in the domestic waste.
	Warning of electrical voltage.

Revision Directory

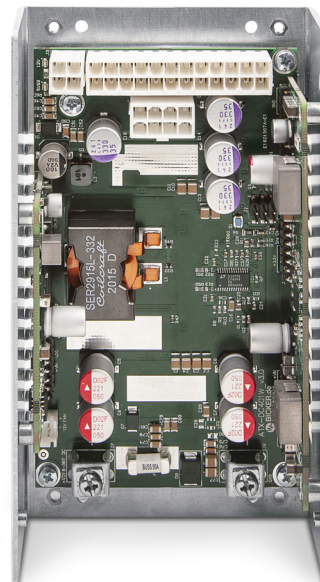
Date	Change
18.04.2024 Revision 0-1	Initial version
09.05.2025 Revision 1-0	Release version

A Brief specification

DC401W

400 Watt DC/DC converter

- ✓ **Ultra wide input range 6...36 VDC**
- ✓ **ATX output voltage**
+12 V/27 A, +5 V/7 A, +3.3 V/7 A,
-12 V/0.3 A und 5 V_{sb} /3 A
- ✓ **Very compact design**
- ✓ **Temperature range -20...+70°C**
- ✓ **High efficiency up to 94%**
- ✓ **More than 10 years capacitor lifetime**
- ✓ **Temperature controlled fan connection**



Technical Data	
Input voltage	6...36 V
Input current	<40 A
Output voltages and currents	ATX version 3.0 Multi Rail (Intel® PSU Design Guide v3.0) 12V/27 A, 5V/7 A, 3.3V/7 A, -12V/0.3 A, +5V _{sb} /3 A
Max. total output power	385 W (ATX) +15 W (5V _{sb})
Capacitive load	3300 µF / 330 µF (-12V) according to ATX Version 3.0 Multi Rail
Protection	Overtemperature protection <u>Input:</u> Active reverse polarity protection, UVLO (undervoltage lockout), OVP (overvoltage lockout) <u>Output:</u> OVLO (overvoltage lockout) via supervisor, UVLO (undervoltage lockout) via supervisor, OCP (active overcurrent and short circuit protection)
Fan	Temperature controlled fan, 12V-PWM controlled
Derating	See chapter D2
Ambient temperature	Operating Storage/Transport -20...+70°C -20...+70°C
Operating altitude	≤5000 m
Max. permitted humidity	≤95 % (at +25°C, no dew)
Dimensions W / H / D	149 x 39 x 86.5 mm
Weight	350 g

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B Introduction and description

Read carefully before initial operation!

This manual shall help the user to get familiar with the product and its components and features. It shall provide information as accurately and completely as possible.

The manual as well as all documents has to be read and followed strictly before installation. Otherwise warranty and guarantee can be cancelled partly or completely. Any liability on the part of Bicker Elektronik is excluded for possible existing errors as well as non-compliance with the instructions for use and installation.

B1 Description of the product and its functions

The DC401W is a high-performance, multi-channel DC-ATX converter according to ATX specification version 3.0 (Intel® Power Supply Design Guide version 3.0) with a total output power of up to 400W and a wide input voltage range of 6–36 V. From an input voltage of 12V, the full power can be drawn without any de-rating in power over the ambient temperature range of –20 to +50°C. A green status LED for 12V and a yellow status LED for 5V_{sb} indicate that the 12V and 5V_{sb} converters are ready for operation.

When the input voltage is applied, the 5V_{sb} supply starts, which is visualized by the corresponding LED. By activating the PS-ON signal, the device starts the full ATX output according to the Intel® ATX Design Guide-Lines 3.0.

The DC401W has several protective circuits to protect the device from failures and defects. These include input-side reverse polarity protection, input undervoltage lock, input overvoltage protection, overtemperature protection and output-side undervoltage, overvoltage and short-circuit protection via supervisor for the ATX voltages 12 V, 5 V, 3.3 V. In addition, overvoltage protection is integrated for the 5V_{sb} supply. The –12V supply has hardware undervoltage protection and overvoltage protection via supervisor.

If the 12V, 5V and 3.3V outputs are operated in the event of an undervoltage or overvoltage failure, the supervisor switches off all ATX voltages. A switching cycle of the PS-ON signal restarts the ATX output. In addition, the –12V output is monitored for undervoltage, which means that the ATX output is switched off in the event of a failure. Overvoltage protection for the –12V output is implemented in the hardware. This case has no consequences for the other ATX voltages.

If there is an undervoltage or overvoltage at the device input or if a critical temperature is reached, all ATX voltages as well as the 5V_{sb} supply are switched off. Once the fault has been removed, the device can be restarted.

In the event of a short circuit or overcurrent fault on an ATX output (12V, 5V, 3.3V or –12V), the ATX voltages are switched off by the supervisor, while the 5V_{sb} output remains available. Once the fault has been removed, the device can be restarted using the PS-ON functionality. In the event of a short circuit or overcurrent situation on the 5V_{sb} output, it operates in „Hiccup Mode“ – the ATX outputs operate with their normal functionality.

B2 Intended use

During installation, it is recommended to thermally connect the DC401W to the housing of the application to ensure good heat transfer.

The ambient temperature specified in the technical details is the air temperature directly at the components and must not be undercut (minimum value) or exceeded (maximum value).

The power supply is designed for professional use in areas such as industrial control, communications, multi-media and instrumentation. It must not be used in equipment or systems where a malfunction could cause serious injury or endanger human life.

The DC401W is not suitable for charging energy storage devices such as batteries, EDLC or lithium batteries. Using it as a charger may cause fire or endanger life and limb!

The device must be protected from contact during operation as, depending on the power, high temperatures can occur and cause burns.

C Safety instructions



WARNING!

Disregarding of following issues can result in electric shock, fire, serious injury or death.

1. Care must be taken to ensure proper and professional wiring.
2. The device pack must not be exposed to fire and temperatures outside the specification.
3. The device must not be immersed in water or exposed to splash water.
4. The device must not be operated in a humid environment or in an environment where dew and condensation are to be expected.
5. The device must not be opened, overheated or otherwise soldered/welded.
6. Changes or attempts to repair the device are to be omitted.
7. Effects of foreign objects on the device must be avoided (e.g. metal parts).
8. Do not put obviously damaged devices into operation (e.g. dents, burn marks, rough contamination).
9. Keep ventilation openings clear.
10. Device must not be dropped.
11. All parts of the device and accessories must not be eaten or swallowed.
12. A current limited source is to be used.
13. During operation, the circuit board, the housing and any exposed connections must not be touched. Touching the circuit board, the housing or the connection terminals can cause burns, especially at very high power levels.
14. The device is not suitable for direct charging of energy storage devices



ATTENTION!

1. Improper use as well as opening and disassembling of the device will void the warranty.
2. The device may only be used as intended.
3. The national accident prevention and safety regulations must be observed.
4. The assembly of the device and the electrical installation have to be state of the art.
5. The electrical, thermal and mechanical limit values have to be observed.
6. The DC401W wiring specifications - as described in this manual - have to be followed.

D Technical Data

D1 General Technical Data

INPUT DATA	
Unless otherwise stated, all specifications apply to +25°C ambient temperature, 6–36 V DC input voltage and nominal output current (I_N).	
Input voltage	DC
Input voltage range	6–36 VDC
Electric strength max.	39V
Approximate current consumption @ 400W output power (ATX+5V _{sb})	
U _{IN} = 12V	~37.2 A
U _{IN} = 19V	~23 A
U _{IN} = 24V	~18.2 A
U _{IN} = 36V	~12.2 A
Efficiency	up to 94 %
Internal input fuse	50 A (SMD)
Standby consumption	≤2.1 W
Switch-on time (5V _{sb})	≤350 ms
Protection	under voltage: 5.5V over voltage: 38.5 V active reverse polarity
Insulation voltage	No separation between input and output

OUTPUT DATA

Unless otherwise stated, all specifications apply to +25 °C ambient temperature, 6–36 V DC input voltage and nominal output current (I_N).

Output voltage	12V, 5V, 3.3V, –12V, 5V _{sb}
Output voltage tolerance	12V / –7 %, +5 %, 5V / ±5 %, 3.3V / ±5 %, –12V / ±10 %, 5V _{sb} / ±5 %
Capacitive load	3300 µF / 330 µF (–12V) according to ATX Version 3.0 Multi Rail
Maximum output current	ATX-Version 3.0 Multi Rail (Intel® PSU Design Guide V3.0)
U _{OUT} = 12V	27 A
U _{OUT} = 5V	7 A
U _{OUT} = 3.3V	7 A
U _{OUT} = –12V	0.3 A
U _{OUT} = 5V _{sb}	3 A
Ripple & Noise	+12V: <120 mV +5V: <50 mV 3.3V: <50 mV –12V: <120 mV +5V _{sb} : <50 mV
Output power	400W
Protection	Short circuit: 12V / overcurrent >42 A 3.3V / overcurrent >12 A 5V / overcurrent >12 A 5V _{sb} / overcurrent >4.5 A –12V overcurrent > 500 mA
Derating	See chapter D2

CONNECTION DATA INPUT (J7, J8)

Connection method	Screwterminal M4
Conductor cross-section solid	not provided
Conductor cross-section flexible	10 ... 14 AWG / 6...2.5 mm ² (depending on input voltage and power) Ring or fork cable lug
Conductor cross-section with ferrule	not provided
Stripping length	n.a.
Tightening torque	1.1 Nm

CONNECTION DATA OUTPUT (J1, J3, J9)

! Valid for J1, J3, J9 !

Max. voltage / max. current per contact: 300V / 7 A

Connection method (J1)	Lockable plug connector
Part number (J1)	Molex 0460152402 (or equivalent)
Connection method (J3)	Lockable plug connector
Part number (J3)	Molex 0460150402 (or equivalent)
Connection method (J9)	Lockable plug connector
Part number (J9)	Molex 0460150802 (or equivalent)

GENERAL DATA

Flammability class according to UL 94 (housing / terminal blocks)	Yes
Weight	350 g
UPS connection in parallel	No
UPS connection in series	No

HOUSING

Degree of protection	n.a.
Protection class	n.a.
Mounting type	Intended mounting types see chapter F2
Housing version	U-Case
Dimension W / H / D	149 x 39 x 86.5 mm

ENVIRONMENTAL CONDITIONS

Ambient temperature (operation)	–20... +70 °C
Ambient temperature (start up without load)	–20 °C
Ambient temperature (storage / transport)	–20... +70 °C
Max. permitted humidity	Operating: 10...90 % RH, non-condensing Storage: 10...95 % RH, non-condensing
Operating altitude	≤5000 m
Climate class	3k3 (EN 60721)
Degree of pollution	2
Overvoltage category EN 62368-1	I
Indoor / Outdoor use	Yes / No

STANDARDS

Safety extra-low voltage	IEC 62368-1 (SELV)
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APPROVALS

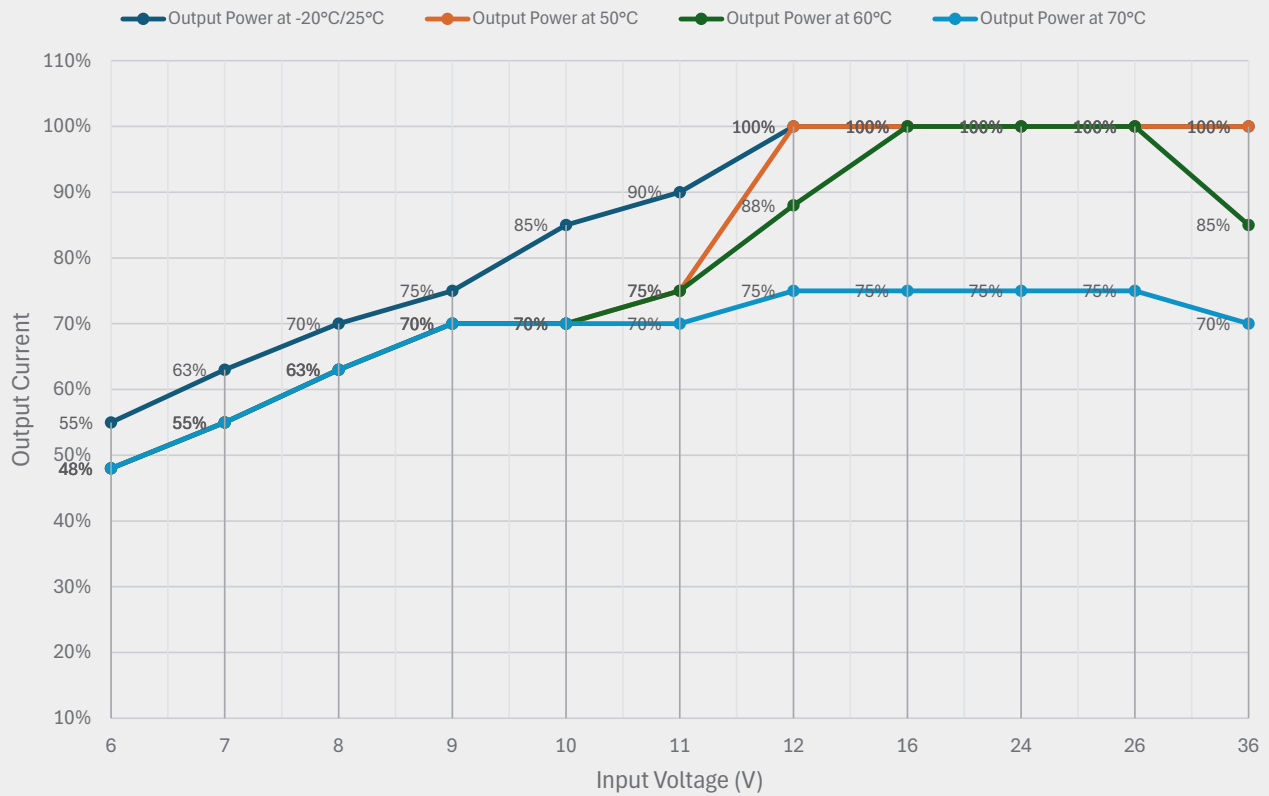
UL	n.a.
CSA	n.a.
CB Scheme	n.a.

INTERFERENCE IMMUNITY ACCORDING TO EN 61000 (INDUSTRY)	
Basic standard CE	Fulfilled requirements according to EN 61000 (CE) (Interference immunity of industrial environment)
Electrostatic discharge EN 61000-4-2 Contact discharge Air discharge Comment	4 kV 8 kV Criterion A
Fast transients (Burst) EN 61000-4-4 Test voltage Comment	2 kV Criterion A
Surge voltage load (Surge) EN 61000-4-5 Test voltage L–N Test voltage L–PE, N–PE Comment	2 kV 4 kV Criterion A

EMISSION ACCORDING TO EN 55016-2-3 (DOMESTIC)	
Basic standard CE	Fulfilled requirements according to EN 55016-2-3 (CE) (Domestic)
Conducted emission from the power port EN 55016-2-3 Frequency range Comment	The power supply has no built-in filter components. It is the user's responsibility to take appropriate measures and to eliminate interference in their entire system in order to comply with the legally specified limit values.
Electric field radiated emission EN 55016-2-3 Frequency range Comment	The power supply has no built-in filter components. It is the user's responsibility to take appropriate measures and to eliminate interference in their entire system in order to comply with the legally specified limit values.

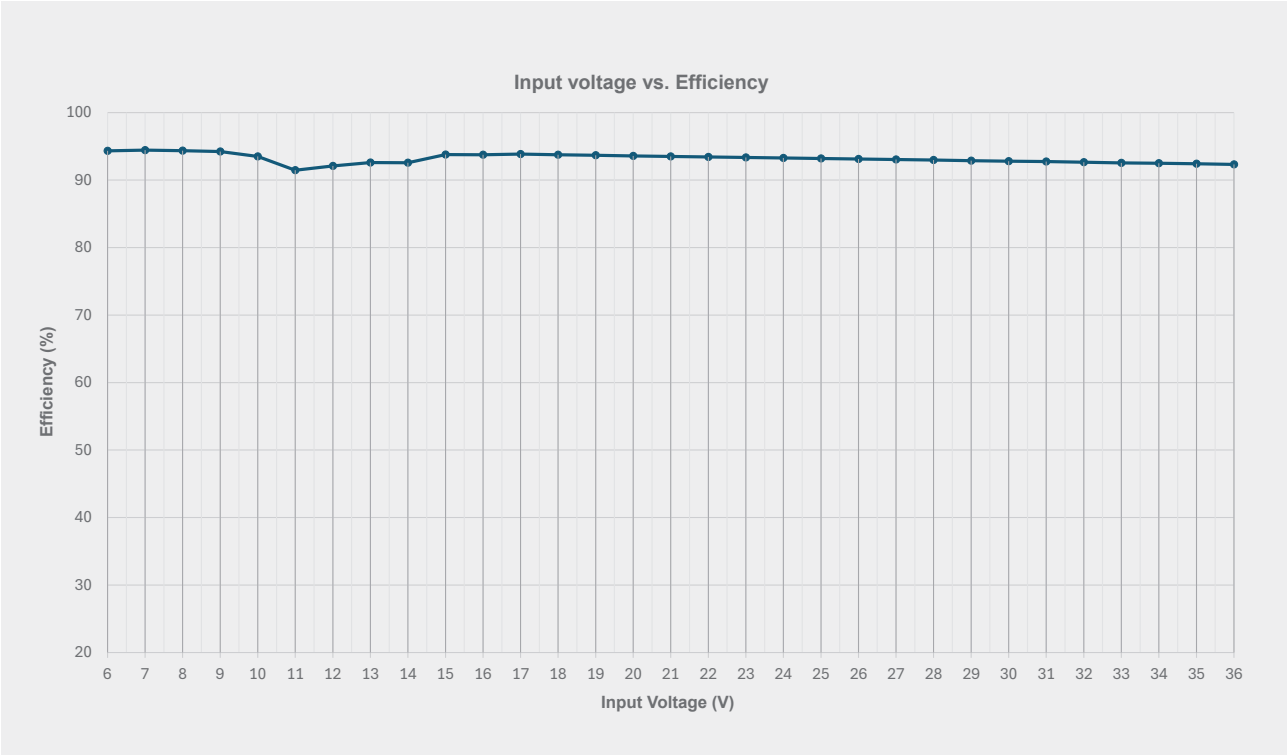
LEGEND	
Criterion A	Normal operating behaviour within the defined limits.
Criterion B	Temporary impairment of the operating behaviour, that is corrected by the device itself.

D2 Derating



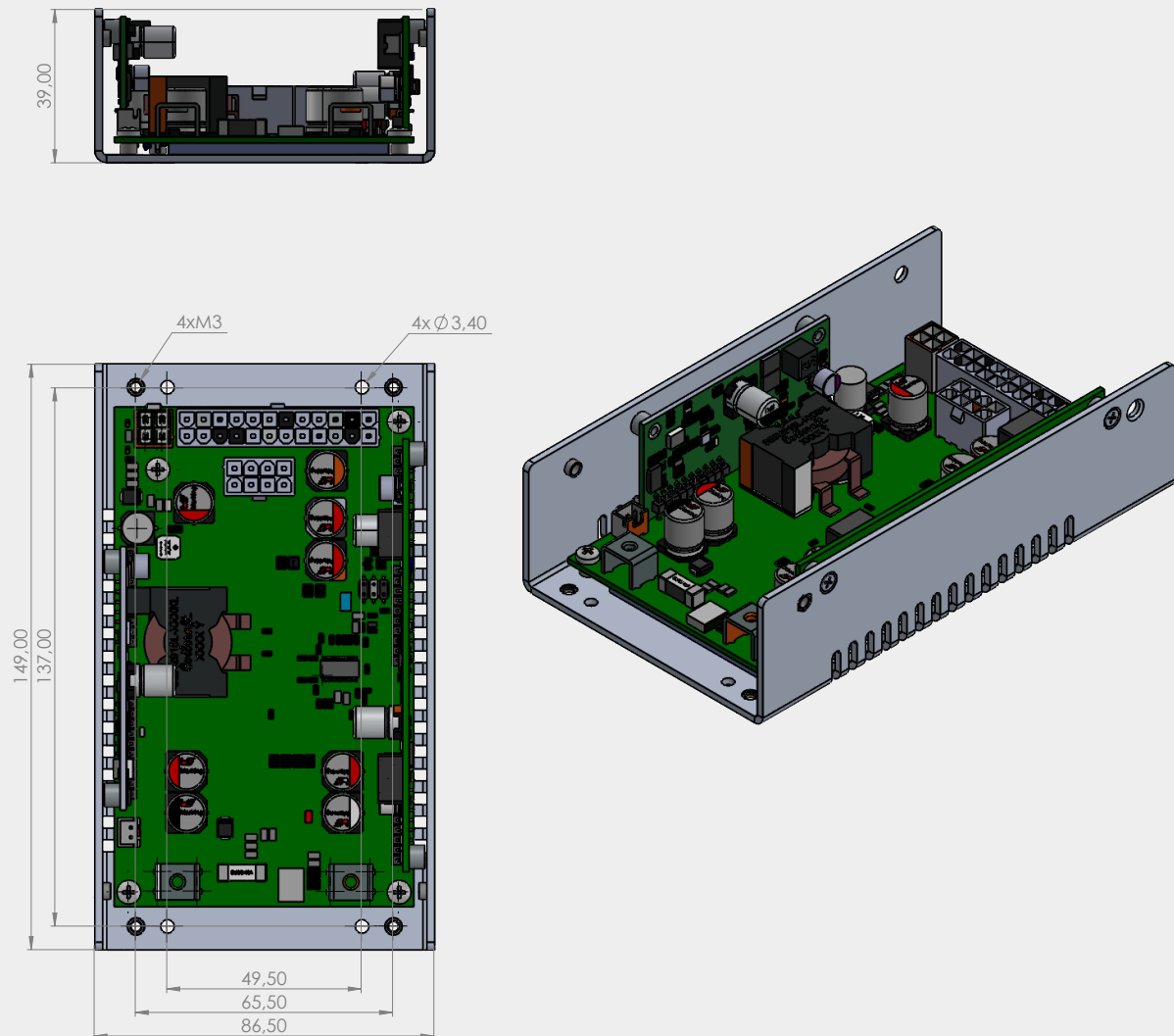
The line graphs show that the % of current drawn from each output voltage
i.e. 5V_{sb}, 5V, 3.3V, 12V and -12V.

D3 Efficiency



D4 Drawing

Unless otherwise stated,
Tolerance according to:
DIN ISO 2768 T1 - m
DIN ISO 2768 T2 - K



E Name / Address / Support E-Mail / Phone number of the manufacturer

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F General Data

F1 Assembly and installation advice

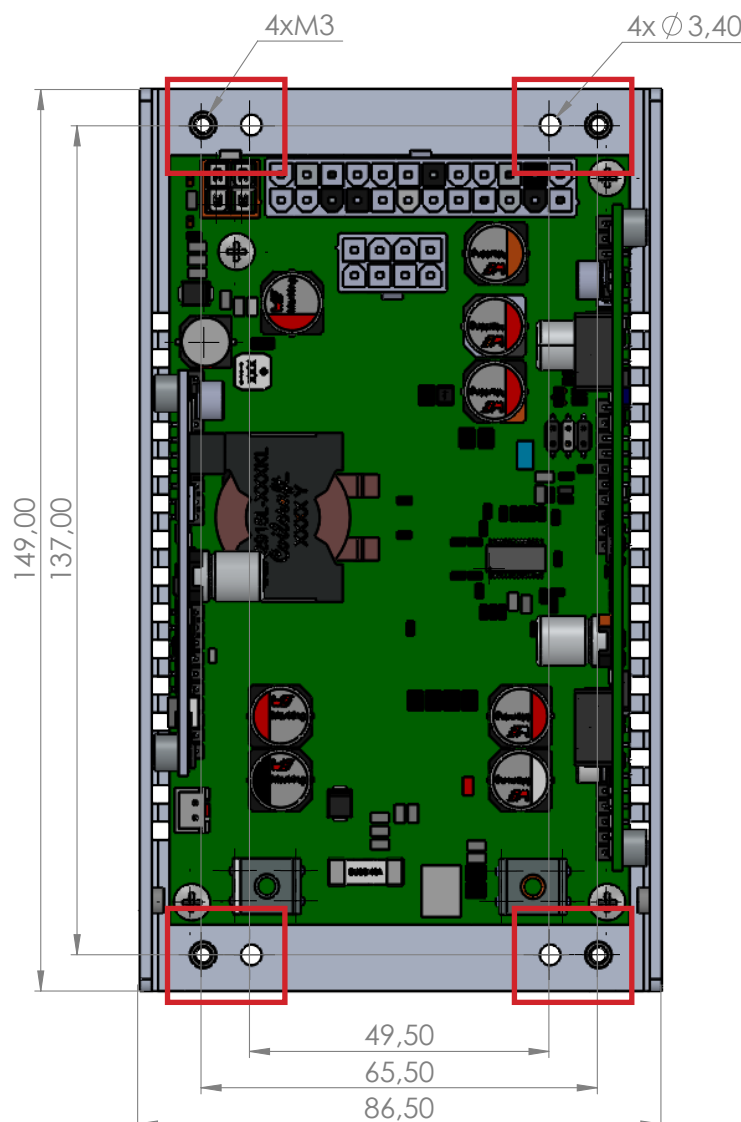


Installation and operation of this device is only allowed to be executed by a qualified electrician! The application has to be separated from any power during the mounting process. Wires have to be connected safely and must not have contact with sharp edges. Pay attention to correct polarity! Before commissioning, check all the connections for correctness!

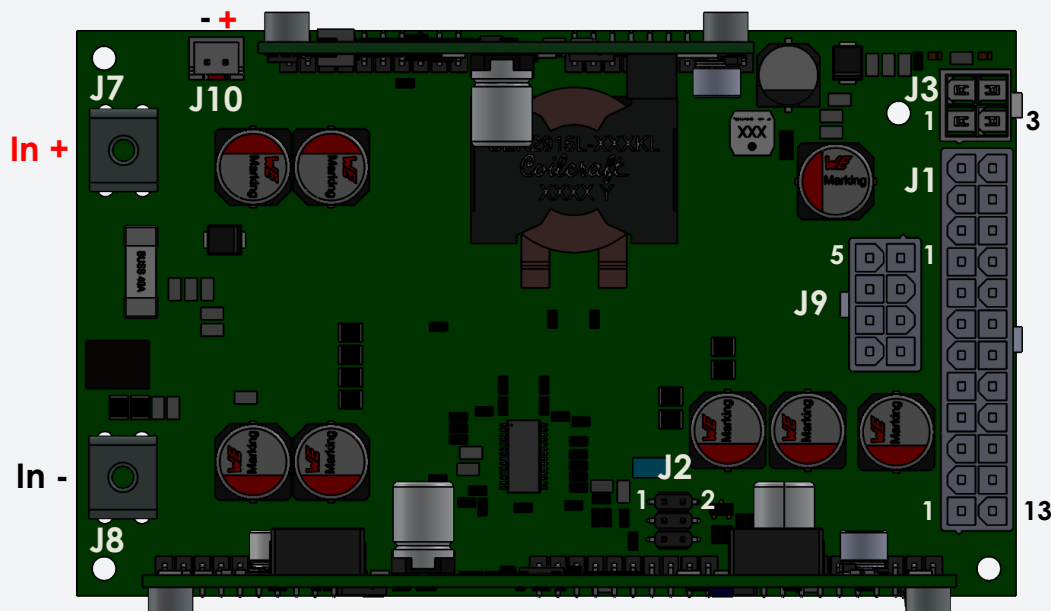
F2 Installation and cooling

The DC401W is designed to operate without additional cooling when operated within specification.

The power supply must be attached to the housing using the mounting holes provided.



F3 Description of connectors



TYPE	FUNCTION
J1	Output 24 pole (not ATX compliant) -> see drawing F4
J3	Output 4 pole
J7	VDC input Plus (+)
J8	VDC input Minus (-)
J9	Output 8 pole
J10	Fan connection

DC OUTPUT J1

1 = 5VDC	7 = PS-ON	13 = 3.3VDC	19 = GND
2 = 5VDC	8 = Power OK	14 = 5VDC	20 = GND
3 = 5VDC	9 = 5 V _{sb}	15 = 5VDC	21 = GND
4 = 3.3VDC	10 = 12VDC	16 = -12VDC	22 = GND
5 = 3.3VDC	11 = 12VDC	17 = GND	23 = GND
6 = 3.3VDC	12 = 12VDC	18 = GND	24 = GND

DC OUTPUT J3

1 = 12VDC	
2 = 12VDC	
3 = GND	
4 = GND	

DC OUTPUT J9

1 = GND	5 = 12VDC
2 = GND	6 = 12VDC
3 = GND	7 = 12VDC
4 = GND	8 = 12VDC

The pin assignment of the output connectors is not ATX compliant.
Failure to observe the pin assignment may result in damage to the application or the power supply!

F4 Initial operation

The correct installation of the power supply has to be ensured. All cables at the connectors have to be checked for proper contact, seating and polarity.

After that, start takes place by applying the supply voltage: From a voltage of 6 V at the input terminals, the power supply provides the set output voltage.

It is important to ensure that the source supplies enough current to guarantee the required power at the output. The formula

$$P_{IN} = P_{OUT_{MAX}} \times 1.25$$

can be used as a guideline for dimensioning an input voltage supply.

F5 Scope of delivery

SCOPE OF DELIVERY	
QUANTITY	DESCRIPTION
1x device	DC401W

F6 Accessory

PSZ-1114: Cover Set DC401W

MBZ-1024: ATX output cable

F7 Reverse polarity / Overcurrent / Short circuit

Reverse polarity:

The device has active reverse polarity protection at the input if the input terminal is connected with reverse polarity while the device is still switched off (e.g. during commissioning).

Overcurrent:

If the load current at the output is too high, the device switches it off. For maximally allowed current values and peak current values refer to chapter D „Technical Data“. A hard-reset is required with PS-ON. If the power supply is in this state, the green LED (12V) switches off.

Short circuit:

A short circuit on 12V, 5V and 3.3V will turn the device OFF except 5V_{sb}. A reset is required for normal operation. When 5V_{sb} is short circuited, only 5V_{sb} enters Hiccup Mode while the other voltages remain available.

F8 Maintenance

The DC401W contains no serviceable parts. In case of a malfunction the upstream power source has to be disconnected and cables have to be removed. Use a dry cloth for cleaning!

F9 Disposal

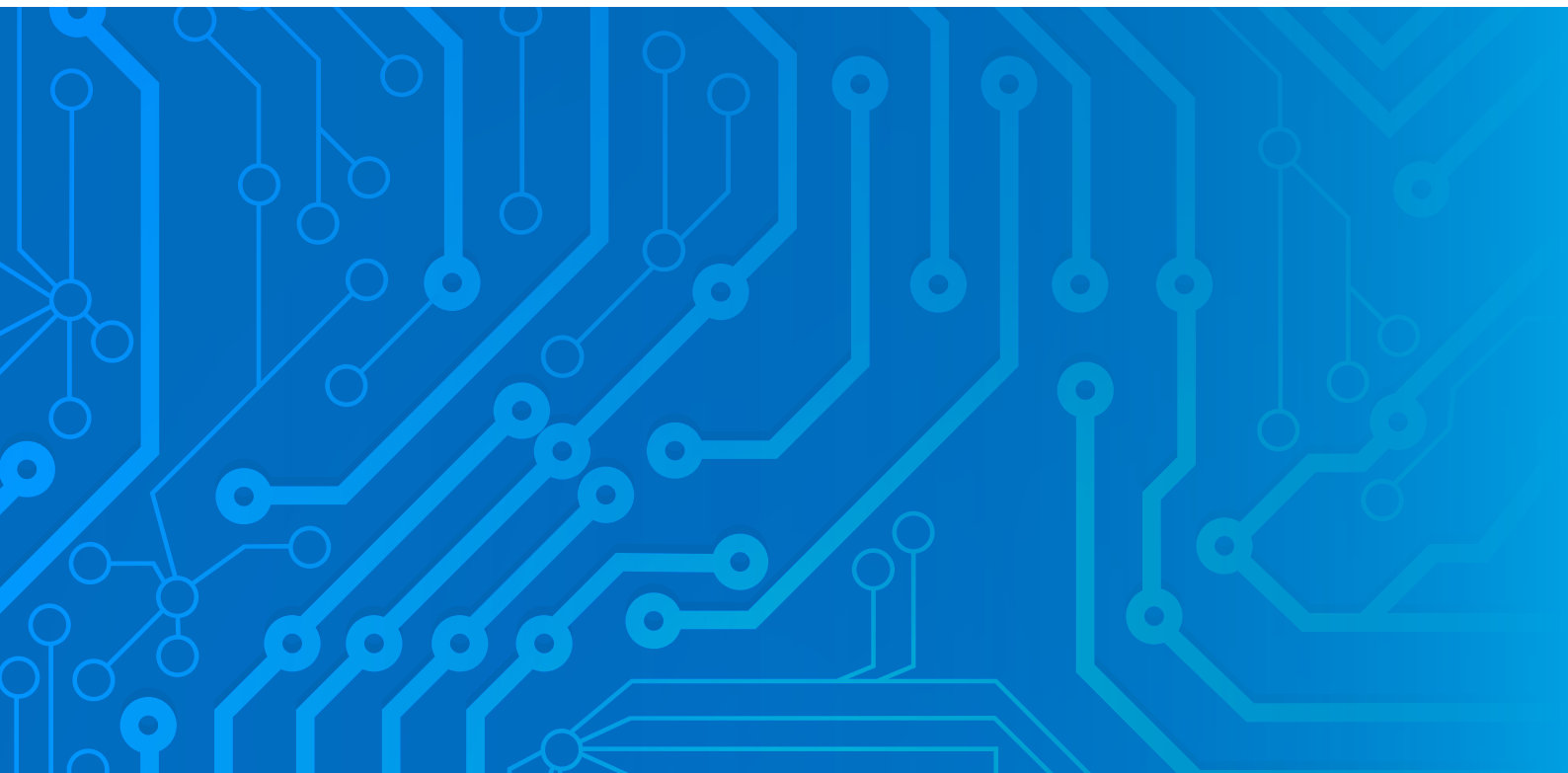
Electric and electronic devices must not be disposed with domestic waste!
Please consider to each country's own regulation about recycling and disposal of used batteries at the end of their lifetime or resending to any recycling organization.



F10 Disclaimer

We, the Bicker Elektronik GmbH, have checked the contents of this document for compliance with the hardware and software described. Nevertheless, deviations can not be ruled out, so we assume no liability for the complete agreement. The information in this publication is checked regularly, necessary corrections are included in the updated versions.

Suggestions for improvement as well as tips and criticism are always welcome.



Note: Subject to errors and technical modifications!
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