

# DVCH1503-400

## DC/DC converter

galvanically isolated



Abbildung ähnlich / device similar to figure



DVCH1503-400-derivate table

Type	Input voltage		Output voltage (configurable)		Output current	Cat. No.
	Nom.	Range	Nom.	Adj. range	Max.	
DVCH1503-400-24	400 VDC	200 - 470 VDC	24 VDC	2 - 30 VDC	56 A	105192/x/yyyy*
DVCH1503-400-12	400 VDC	200 - 470 VDC	12 VDC	2 - 15 VDC	112 A	105193/x/yyyy*

\*Order option:

.../x/...: Accessory variant

- .../0/...without accessory
- .../20/... with heatsink (cooling fins in longitudinal direction)
- .../21/... with heatsink (cooling fins in transverse direction)
- .../22/... with cold plate (liquid cooling system)
- More on request

.../yyy: Setting (Standard setting or customized)

- .../000 DC-Standard CAN 2.0A
- .../001 DC-Standard CAN J1939
- Customer-specific parameterization on request

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## 1 Input

Input voltage range	-	see DVCH1503-400-derivate table (valid for continuous operation)
Undervoltage range	0 - 200 VDC	Class C*
Lower restricted operation range	200 - 250 VDC	Continuous operation, class B*
Unrestricted operation range	250 - 450 VDC	Continuous operation, class A*
Upper restricted operation range	450 - 470 VDC	Continuous operation, class B*
Overvoltage range	470 - 500 VDC	≤ 10 s, class C*
Max. current consumption	≤ 8,5A	typ. 8 A @U <sub>IN</sub> = 200VDC, see fig. 9.1
Input capacity	< 8 μF	Attention: No inrush current limitation in the device. Provide a pre-charging section in the application, otherwise there is a risk of a overvoltage damage to the input of the DC/DC converter.
No-load current consumption	< 65 mA	-

### \* Evaluation criteria for the operation behavior

The following evaluation criteria describe the functional state of the DC/DC converter as a function of the operation input voltage.

<b>Class A</b>	Unrestricted operation range	The DC/DC converter operates as designed in compliance with the tolerances specified in the data sheet.
<b>Class B</b>	Lower and upper restricted operation range	One or more functions may go beyond the specified tolerance. After returning to the unrestricted operation range, the DC/DC converter operates again as designed.
<b>Class C</b>	Undervoltage and overvoltage range	One or more functions do not work as intended. After returning to the unrestricted operation range, the DC/DC converter operates again as designed.

## 2 Output

Output voltage $U_{nom}$	-	see DVCH1503-400-derivate table (valid for continuous operation)
Initial accuracy (0-20 Hz)	$\pm 1,0\% U_{nom}$	-
Ripple & Noise	$< 1,8\% U_{nom}$	measurement bandwidth 20 MHz
Max. continuous output current $I_{nom}$	56A 112A	DVC1503-400-24, see fig. 9.3 DVC1503-400-12, see fig. 9.4
Max. continuous output power $P_{nom}$	$\leq 1500W$	-
Current limiting	$1,1 \times I_{nom}$	above $1,0 \times I_{nom}$ $U_{out}$ may sink
Recovery time	$< 3ms$	Duration from leaving the tolerance band until the permanently return to the tolerance band after a load step.
Slew rate for setpoint change	30V/s	valid only for controllable version

## 3 Environment

Working temperature (environment)	$-40^{\circ}C \dots +70^{\circ}C$	-
Max. permissible temperature of the mounting surface	$< 50^{\circ}C$	-
Overtemperature protection	-	Linear derating between $70^{\circ}C^*$ and $90^{\circ}C^*$ . When $90^{\circ}C^*$ is reached, the device switches off.  * internal device temperature
Storage temperature	$-40^{\circ}C \dots +85^{\circ}C$	-
Humidity	100%	-
Dewing	allowed	-
Shock test acc. to DIN EN 60068-2-27	-	half sinusoidal (excitation) 250m/s <sup>2</sup> (peak acceleration) 6ms (duration) 1.000 shocks to each axis (quantity) $\pm X, \pm Y, \pm Z$ (axis)
Vibration test acc. to DIN EN 60068-2-6	-	sinusoidal (excitation) 30m/s <sup>2</sup> (acceleration) 5 - 100Hz (frequency, floating) 5g (acceleration) 10 - 500Hz (frequency, floating) 9h per axis (duration), 1 Oct/min X, Y, Z (axis)
Degree of protection acc. to EN 60529	IP65, IP67, IP6K9K	Using the appropriate mating connectors; except M12 screw connection points at the output

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## 4 General data

<b>Insulation strength</b>	500 VDC 4,25 kVDC 1 kVDC	Output / Enclosure Input / Output + Enclosure + CAN Output / CAN
<b>Insulation resistance</b>	≥ 30 MΩ at 500 VDC	Input / Output + Enclosure + CAN
<b>Max. Efficiency</b>	typ. 94% @U <sub>IN</sub> = 400VDC	see fig. 9.2
<b>Average efficiency</b>	typ. 93,2% @U <sub>IN</sub> = 400VDC	Averaging of the efficiency values at 25%, 50%, 75% und 100% of the nominal output power. see fig. 9.2
<b>Current consumption auxiliary and control circuit</b>	≤ 51 mA	Current consumption pin 3 (KL15) / pin 4 (KL30) without HV voltage applied to input with active communication via CAN see fig. 9.5
<b>Dimensions (LxWxH)</b>	approx. 295 x 233 x 68,5 mm	without connections, see fig. 8.1
<b>Enclosure</b>	Aluminium	-
<b>Weight</b>	approx. 5 kg	-

## 5 Standards

### EMC (Electromagnetic Compatibility)

Title	Standard	Data
<b>Emitted interference</b>	ECE R10.5 EN12895 EN 61204-3	- - acc. to 6.4.2, table H.3, for industrial environment (class A, cable length < 3 m)
<b>Immunity</b>	ECE R10.5 EN12895 EN 61204-3	- - acc. to 7.2.3, Noise immunity level for industrial environment (cable length < 3 m)

### Electrical safety

Title	Standard	Data
<b>Low-voltage switch mode power supplies - Safety requirements</b>	DIN EN 61204-7	-
<b>Safety of industrial trucks - Electrical requirements</b>	designed according to DIN EN 1175*	-
<b>Electrically powered road vehicles</b>	ISO 6469-3	-

\* The system integrator is responsible for compliance of all product-specific requirements in the end application.

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## 6 Installation and safety instructions

In addition to the general installation and safety instructions for DC/DC converters, the following values and supplements apply:

<b>Mounting points</b>	-	4x Mounting holes (Ø9 mm) see fig. 8.1
<b>Installation orientation</b>	-	any
<b>Connection input / output</b>	-	see chapter 7
<b>Interlock-function</b>	-	realized by HV-connector plugs. Guide via signal connection plug, see chapter 7. Attention: Max. ampacity of the HV interlock line ≤ 300 mA.
<b>Input fuse</b>	-	No integrated input fuse. A fuse must be provided externally by the customer application.
<b>Input discharge duration</b>	< 5s	Time from disconnecting the input voltage to $U_{in} < 60VDC$
<b>Reverse polarity protection input</b>	-	reverse polarity protection through connection plug
<b>Reverse polarity protection output</b>	< 30VDC	Note: DVCH1503 self-protection, does not protect the application from reverse polarity.

The general installation and safety instructions for DC/DC converters can be found at: [www.deutronic.com](http://www.deutronic.com)

## 7 Connections

### Input

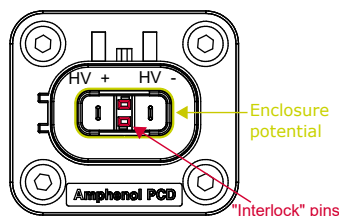


Figure 7.1: Connection input

AMPHENOL, Excel Mate Eco HVSL282 02 2 A:

- 2 pole HV connector with interlock contacts.
- Matching mating connector: AMPHENOL, Excel Mate Eco HVSL282 06 2 A 104
- Contacts for mating connector: AMPHENOL, Excel Mate Eco, socket contact, crimp connection: C310003612
- HV-cable: Huber+Suhner, FHLR91XC13X (4mm<sup>2</sup>, shielded single conductors)

### Output

threaded bolt:

- M12 [max. torque 35Nm]

### Enclosure potential

Thread:

- M8 (below the output connections, see fig. 8.1)

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## Signal (CAN)

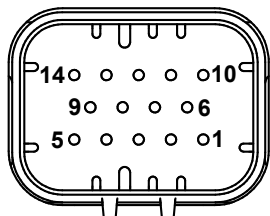


Figure 7.2: Connection CAN

### TE connectivity AMPSEAL, 14-pins:

- 14-pin automotive connector (TE-Nr.: 776267-1)
- Matching mating connector: TE-connectivity AMPSEAL 14-pin, socket housing (TE-Nr.: 776273-1)
- Contacts for mating connector: TE-connectivity AMPSEAL socket contact, crimp connection (TE-Nr.: 770854-1)

### PIN "1" / PIN "2": Interlock

- If the HV connector is properly connected to the input, PIN "1" and PIN "2" are connected via the HV connector.
- If the HV connector is disconnected from the device, the internal connection between PIN "1" and PIN "2" is also disconnected.

PIN "3": KL15 (10 - 30 VDC) switched plus of ignition starter switch

PIN "4": KL30 (10 - 30 VDC) continuous plus of the battery

PIN "5": Common GND

PIN "6": Digital Input

PIN "7": Digital Input: Inhibit-function\* (10 - 30 VDC)

- Control of DCDC converter (output On / Off) via digital input possible

PIN "8": Digital Output

PIN "9": Digital Output: Power-Good function\*

- Output of the current device status (output On / Off) possible via digital output
- At supply over KL30 the output voltage corresponds to the voltage on KL30
- If there is no supply via KL30 and high voltage is switched on, the voltage is 12V

PIN "10": n.C.

PIN "11": CAN<sub>Hi</sub> (CAN High)

PIN "12": CAN<sub>Lo</sub> (CAN Low)

PIN "13" / PIN "14": CAN<sub>R</sub>

- To terminate the CAN bus with a 120Ω resistor, the CAN<sub>R</sub> Pin "13" must be connected to the CAN<sub>R</sub> Pin "14".

**PIN "1" to PIN "14" are galvanically isolated from the input and output circuit.**

\* The Inhibit and Power-Good functions can be activated via setting, further information can be found in the DC-CAN documentation.

## 8 Dimensions

All dimensions are given in millimeters and have a general tolerance according to DIN ISO 2768 - m.

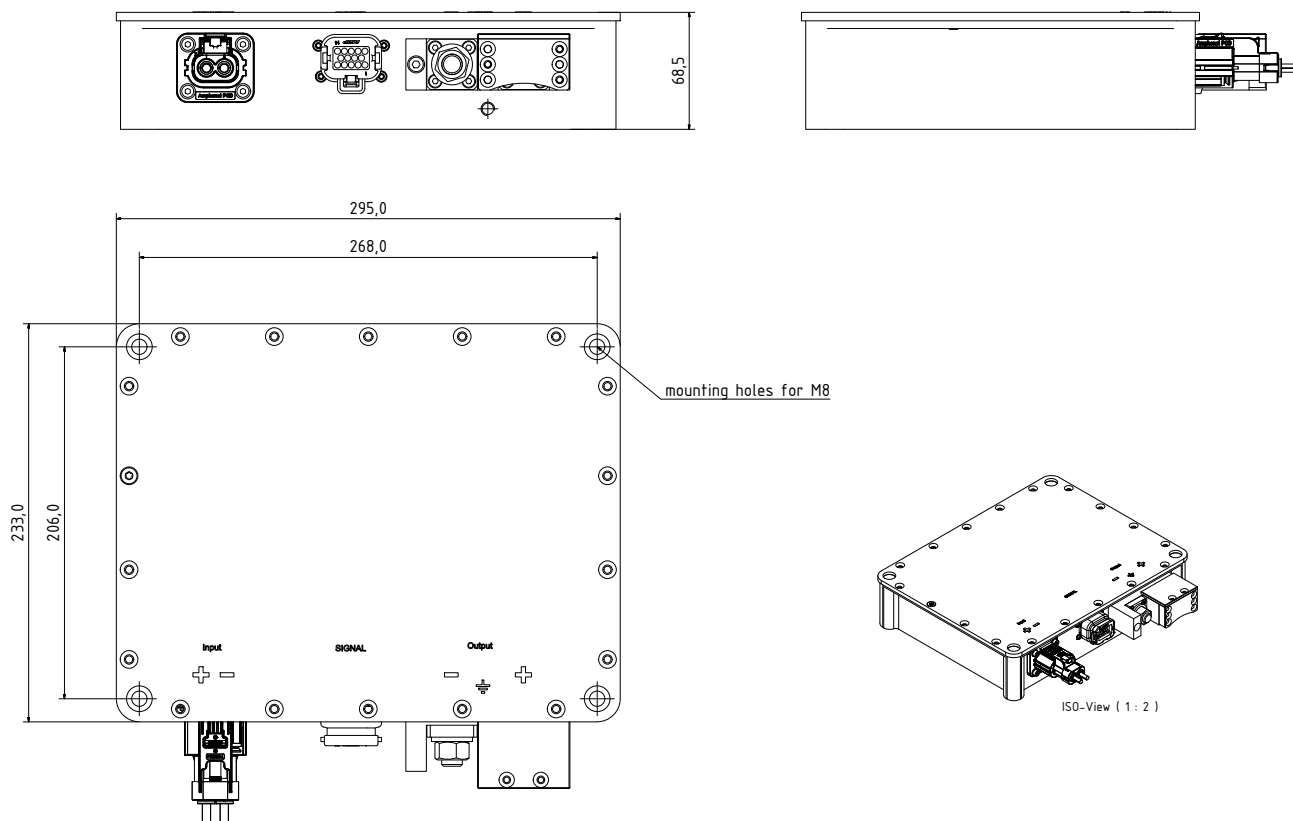


Figure 8.1: Dimensions

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## 9 Characteristics

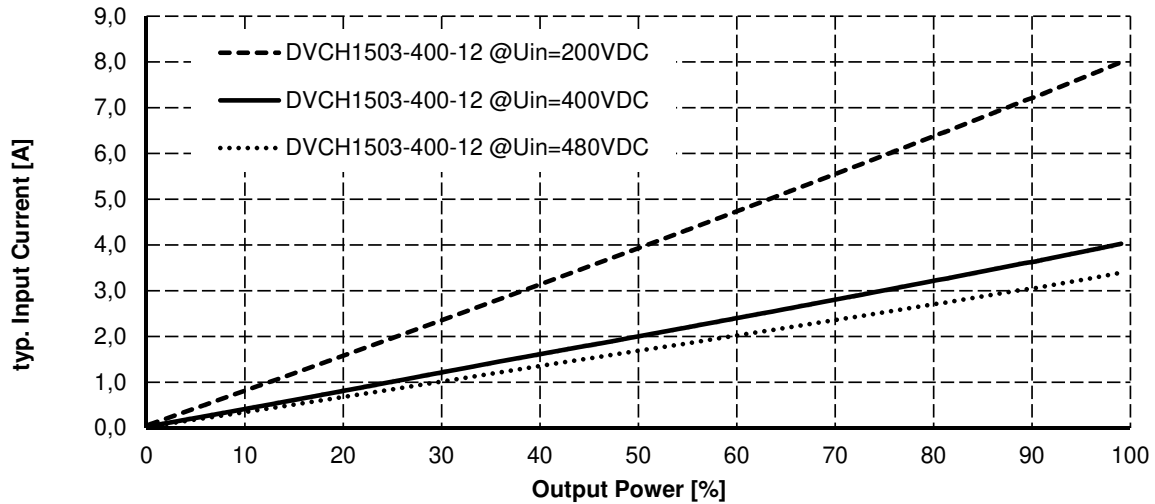


Figure 9.1: Current consumption depending on the output power

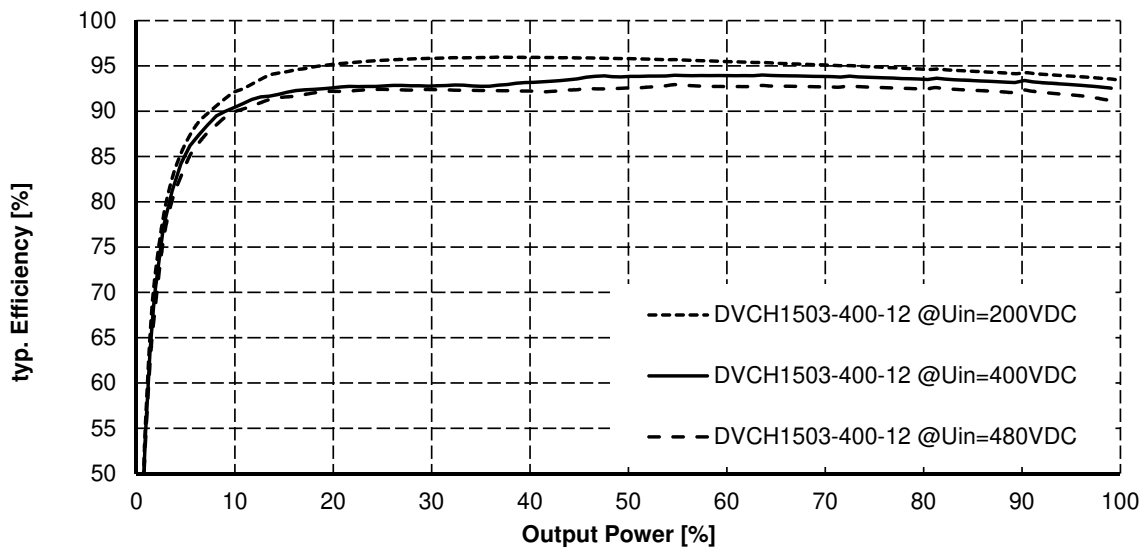


Figure 9.2: Efficiency as a function of output power



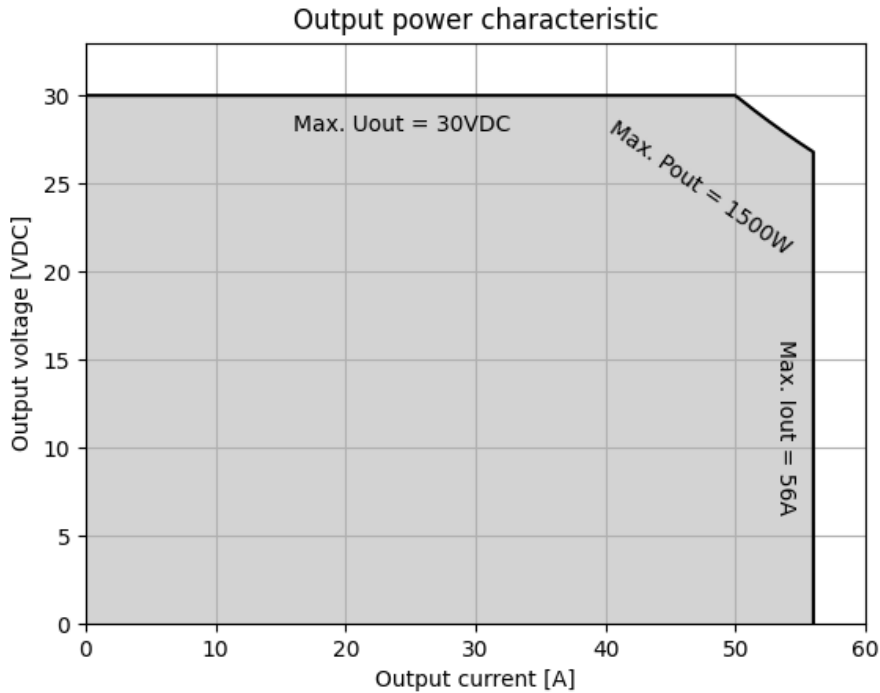


Figure 9.3: Output power DVCH1503-400-24

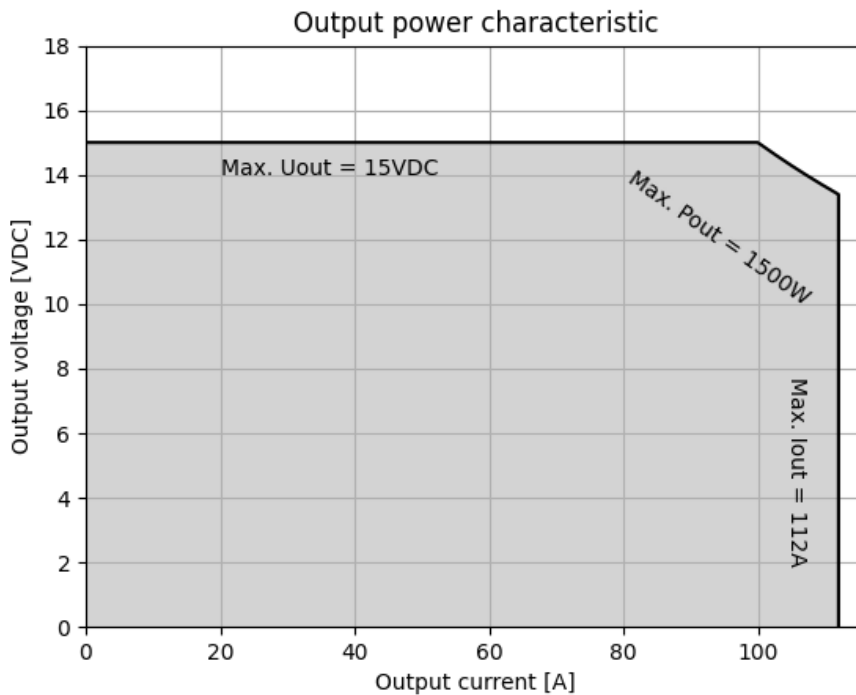


Figure 9.4: Output power DVCH1503-400-12

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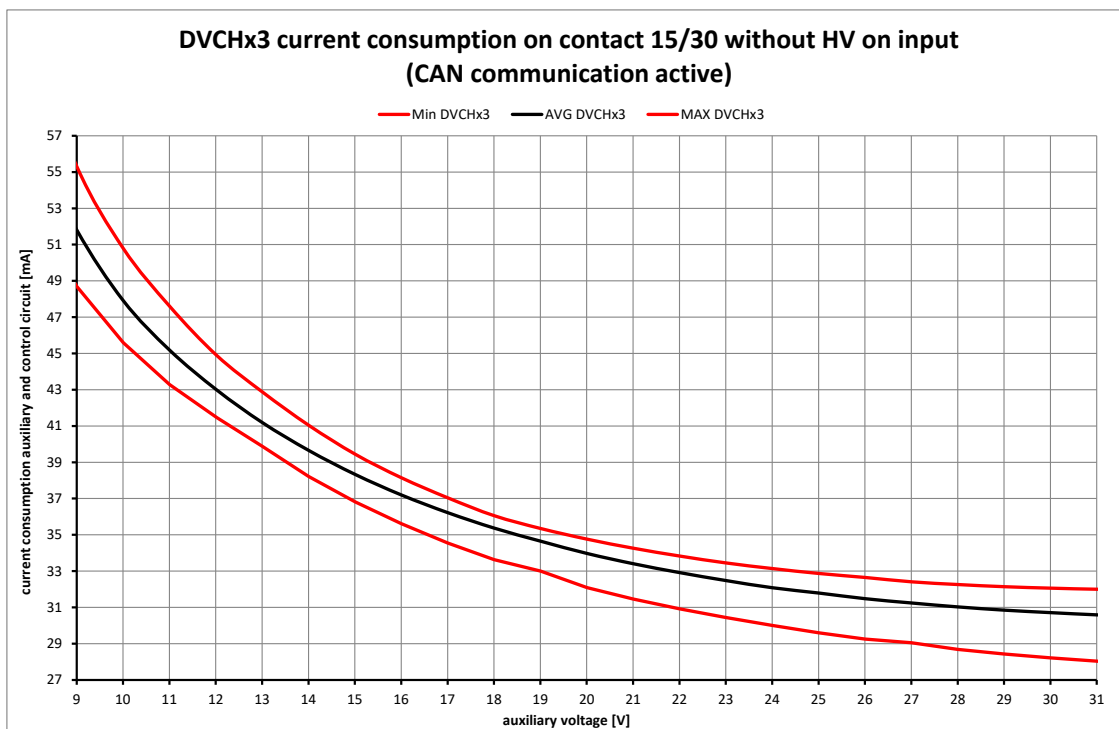


Figure 9.5: Current consumption auxiliary and control circuit

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