

12V / 5V DC-DC converter Z51-GW20

Ordering data

Designation	Type	Item no.
12V / 5V DC-DC converter	Z51-GW20	150 501 03 AX



- **Supply of 5V consumers with 5V/2.5A (5V/1.6A at an input-side supply through a 12V power supply unit)**
- **Adjustable output voltage: 5.0V ... 5.5V**
- **Top-hat rail module**
- **Type of protection: I M2 Ex ib I**

Application

The 12V / 5V DC-DC converter of type Z51-GW20 is used to supply power to a Z51 automation station, which includes e.g. a central module of type Z51-ZM20 or Z51-ZM20-1.

On the input side, one or two intrinsically safe power supply units (NG3-12ib) feed the converter with a 12V nominal voltage. If only one 12V supply unit is used, a max. output current of approx. 1.6A can be tapped.

When using two 12V power supply units, the max. output current is 2.5A. The output short-circuit current is set to 2.7A.

The DC-DC converter generates a controlled 5V supply directly in the Z51 automation station near the consumer Z51-ZM20 and thus does not need extended supply lines, which avoids the associated voltage drops between 5V power supply unit and consumer.

A potentiometer on the Z51-GW20 allows the user adjustment of the output voltage in the range from 5.0V to 5.5V.

The existence of the input voltages and the output voltage is indicated through 3 LEDs.

The 12V / 5V DC-DC converter is installed in a robust sheet steel enclosure and suited for mounting on 35mm top-hat rails by means of a bracket.

Configuration

The 12V / 5V DC-DC converter of type Z51-GW20 consists of a robust sheet steel enclosure, and in its bottom section, a pcb is installed which is equipped with the electronic components. This pcb is embedded in sealing compound.

The LEDs for the indications, the input and output connecting terminals as well as a potentiometer for adjusting the output voltage protrude from this sealing compound.

The connecting terminals are marked with self-adhesive plastic labels which are fixed to the sealing compound surface.

The power transistors of the output current and voltage control are mounted on a holder which is made from aluminium and attached onto the pcb. The top side of the holder protrudes from the sealing compound. It carries a profile heat sink which dissipates the heat loss to the ambient air.

The marking of the 12V / 5V DC-DC converter is given on a nameplate made from self-adhesive plastic film on a side wall of the sheet steel enclosure.

Functioning

One (or two) intrinsically safe power supply circuit(s) (12V nominal voltage) are connected to terminal pairs

KL100/* and KL101/*. Series diodes protect the supply inputs against reverse polarity.

A downstream installed, internal filter stage ensures the suppression of interference voltages (EMV).

LED H100 (or H101 for the second input) indicates the existence of the input voltage.

An associated current limiting circuit at each of the inputs enables to adjust and limit the current consumption of the relevant input to 1.1 A.

This prevents that one power supply unit is operated in the short-circuit range, while the other one operates in the no-load or partial load range.

The power transistors of the current limiting stages are mounted on an internal cooling plate which dissipates the heat loss to the exterior via its close thermal coupling with the enclosure side wall.

In case of persistent overload conditions, the power supply is switched off (reversibly) by two thermal switches which are also mounted on the cooling plate.

In case of failure of the thermal switches, two integrated thermal links irreversibly switch off the power supply.

An integrated DC-DC converter (switching converter) converts the 12V supply voltage into an internal 6V voltage with minimal loss.

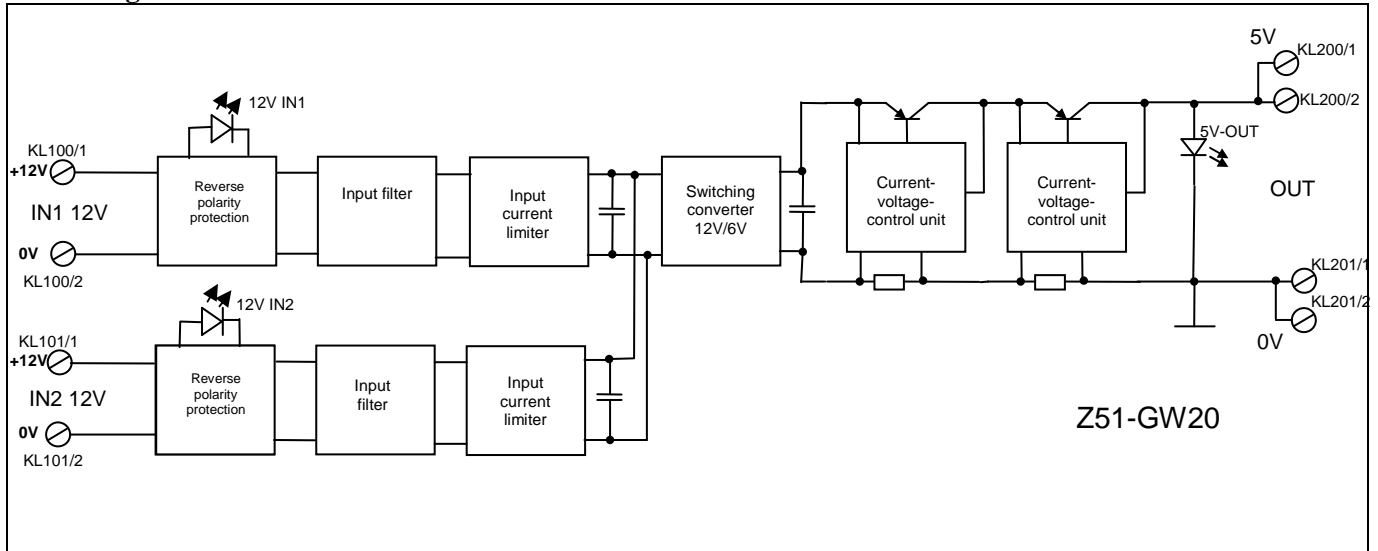
A voltage monitoring stage monitors this output voltage and will only switch it through to the 5V output (terminals KL200/* / KL201/*), if it has exceeded a value of 5.5V. The switching through is performed with a time delay. If the output voltage of the DC-DC converter falls short of the value of 5.4V, e.g. due to overload, the output voltage will be

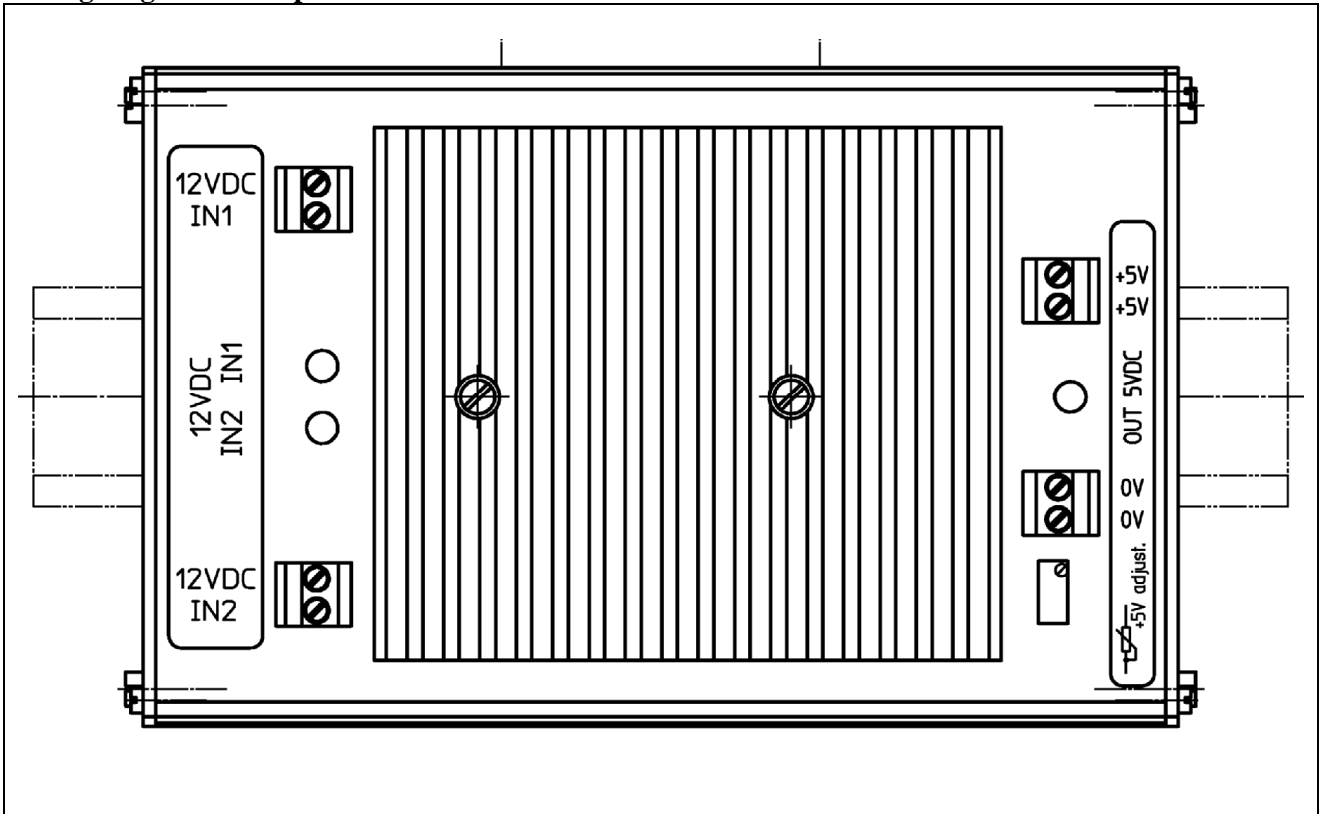
switched off with no delay. Downstream of the DC-DC converter output (6V) and the voltage monitoring stage, 2 current and voltage limiting stages (in-phase regulators) are connected which limit the output voltage to $U_0 = 5.5V$ and the output current to $I_0 = 2.7A$ (terminal pairs KL200/* / KL201/*). The limiting stages dissipate their heat loss to the exterior by means of profile heat sinks.

A potentiometer which is accessible from the exterior enables the downward adjustment of the output voltage from 5.5V to 5.0V. This potentiometer does not allow a voltage adjustment to values larger than 5.5V.

An LED (green) assigned to this output indicates the existence of the 5V output voltage.

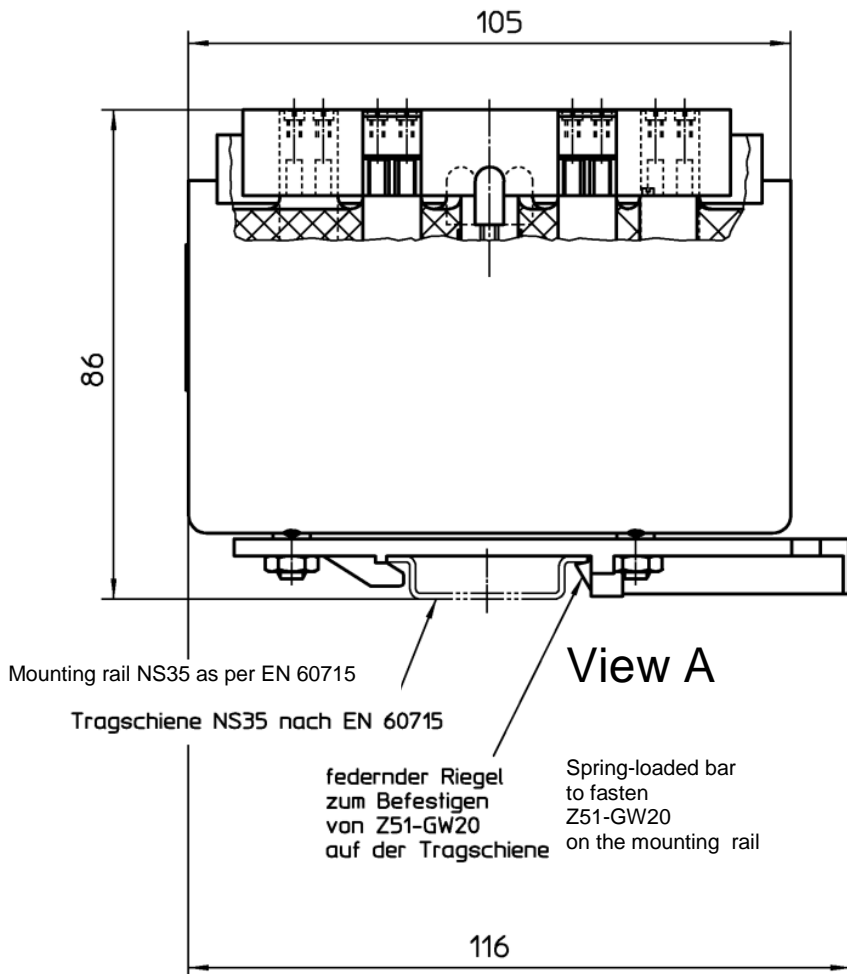
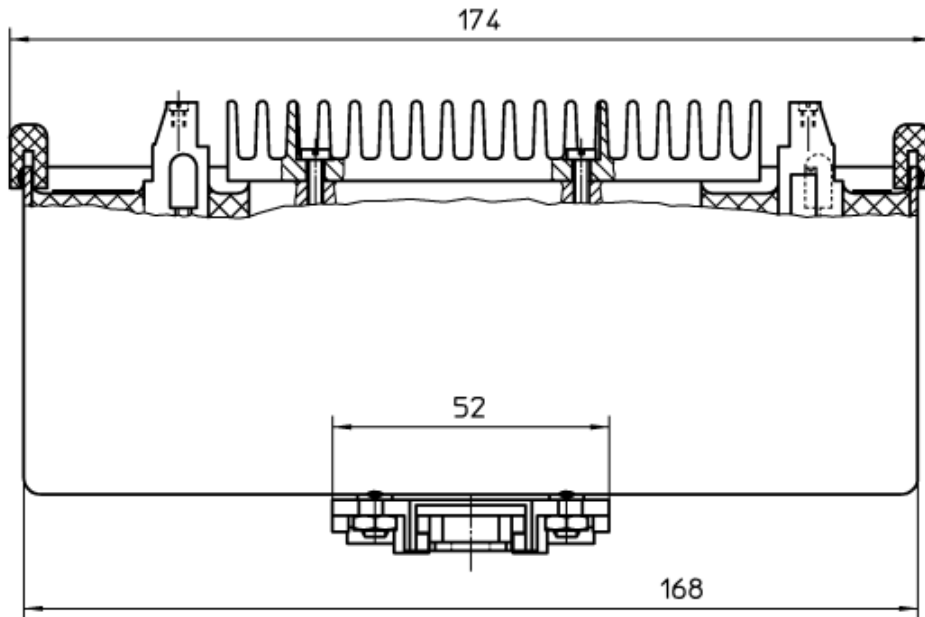
Block diagram



Wiring diagram and top view**Indications**

- LED "12V_{DC} IN1" (yellow) on, if 12V input voltage 1 exists
- LED "12V_{DC} IN2" (yellow) on, if 12V input voltage 2 exists
- LED "5V-Out" (green) on, if +5V output voltage exists

Dimensional drawing



Technical data

Designation	12V / 5V DC-DC converter
Type	Z51-GW20
Electrical parameters	
Intrinsically safe power supply circuit (supply)	
Terminals Kl. 100/* (power supply unit 1) and Kl. 101/* (power supply unit 2)	
Voltage U_i	13 V _{DC}
Effective internal capacitance C_i	negligible
Effective internal inductance L_i	negligible
Only approved and certified power supply units may be used for feeding the intrinsically safe input circuit! The interconnection must be checked and certified separately.	
Intrinsically safe output circuit	
Terminals KL200/*	
Voltage U_0	5.5 V _{DC}
Current I_0	2.7 A
Max. output current at $U_0 = 5.5$ V	2.5 A
Power P_0	13.75 W
Capacitance C_0	≤ 2300 μF
Inductance L_0	≤ 30 μH
Enclosure	Sheet steel enclosure
Enclosure protection degree	IP20 for installation in an enclosure of protection type of at least IP54 as per IEC60529
Optical status indications	
LED "12V _{DC} IN1" (yellow)	Input voltage 1 12 V _{DC} exists
LED "12V _{DC} IN2" (yellow)	Input voltage 2 12 V _{DC} exists
LED "5V-Out" (green)	5 V _{DC} output voltage exists
Dimensions	168 x 105 x 86 mm (W x H x D)
Weight:	2.2 kg
Operating mode	100 % ON-time (continuous operation)
Service position	at choice
Operating conditions	Use preferably inside areas susceptible to fire-damp
Temperature range	
- Operation	- 20 to + 45°C
- Storage	- 30 to + 70°C
- Transport	- 30 to + 70°C
Approval:	BVS 07 ATEX E 179 U
Type of protection:	I M2 Ex ib I
Marking	
The nameplate is marked as follows:	
Company	FHF Bergbautechnik 42551 Velbert Germany
Type	Z51-GW20 ⊕ I M2 Ex ib I BVS 07 ATEX E 179 U CE 0158 F. No.... Test....(short sign, month/year)

Installation / Mounting

The 12V / 5V DC-DC converter of type Z51-GW20 has to be installed in an enclosure which ensures at least an IP54 degree of protection conforming to EN 60529.

The internal wiring (in this enclosure) has to be configured as per section 6.3.11 and 7.6.e of EN 60079-11:2007. Connecting terminals or plug connectors for the intrinsically safe circuits have to be arranged as per section 6.2.1 and/or 6.2.2 of EN 60079-11:2007.

The component shall be connected conforming to the representation in the wiring diagram. The interconnection with other equipment must be certified separately.

Commissioning and settings

Prior to the commissioning, the fastening of the component, the correct installation and the related cables and connection shall be checked. The 5V output voltage is factory-set to 5.3V. The user can adjust the value of the 5V output voltage in a range between 5.5V and 5.0V by means of a potentiometer accessible right beside the output voltage terminals.

Maintenance

The 12V / 5V DC-DC converter of type Z51-GW20 is maintenance-free and does not contain any parts requiring maintenance.

Disposal

The disposal of the packaging material and of used parts must be realised in compliance with the regulations of the country in which the device is installed.

Warnings & Safety Advice

This equipment item is a component of explosion-proof design destined for operation inside an explosive atmosphere. It belongs to equipment group I M2.

Especially the following warnings and safety advice shall be observed:

The interconnection with other electrical equipment must be certified separately.

Connection and installation of the device has to be carried out by instructed qualified personnel in due consideration of the specified type of protection and in accordance with the applicable regulations for installation.

This component may only be connected and operated with the specified voltage. Ensure the correct polarity of the connections of the supply voltages.

For the operation of this component in industrial facilities the accident prevention regulations of the employer's liability insurance association for electrical installations and equipment have to be observed.

Make sure to avoid any damage to the housing. Components with damaged housing must not be operated and have to be put out of service immediately.

Attachment and installation of further parts is prohibited.

The component must only be operated under the indicated ambient conditions. Harsh ambient conditions can result in damage to the device and therefore lead to a possible risk for the life of the user. Harsh ambient conditions can be:

- moisture, dusts (pay attention to degree of protection)
- combustible gases, vapours, solvents which the type of protection does not cover.
- excessively high ambient temperatures (>+ 45°C)
- excessively low ambient temperatures (<- 20°C).

The ambient temperature range specified for the component must neither be exceeded nor fallen short of during operation (-20°C to +45°C).

Make sure to replace defective parts by corresponding original spare parts only.

Repairs must only be carried out by the manufacturer or a person committed by the manufacturer for this work in connection with a new routine test for this component.

In case of transport and storage as well as when not in use the devices and components have to be protected against damage and ingress of dirt.

Non-observance of the above mentioned points results in loss of the explosion protection. In this case the device will constitute a danger for the life of the operator and can cause an explosive atmosphere to ignite.

EG-KONFORMITÄTSERKLÄRUNG

EC DECLARATION OF CONFORMITY

Wir erklären in alleiniger Verantwortung, dass das Produkt auf das sich diese Erklärung bezieht mit der/den folgenden Norm(en) oder normativen Dokumenten übereinstimmt:

Herewith we declare bearing sole responsibility that the product referred in this declaration is in conformity with the following standards or normative documents and regulations of the directive:

Bezeichnung Erzeugnis / Komponente Name of product or component	Gleichspannungswandler DC Converter
Geräte- oder Typenbezeichnung Equipment type or mark of equipment	Z51-GW20
Bestimmung der Richtlinie Provisions of the directive	Nr. und Ausgabedatum der Norm(en) No. and date of issue of the standard(s)
94/9/EG: Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen 94/9/EC: Equipment and protective systems intended for use in potentially explosive atmospheres	EN 60079-0:2006 General requirements EN 60079-11:2007 Intrinsic safety „i“
EG-Baumusterprüfbescheinigung EC-Type-Examination Certificate	BVS 07 ATEX E 179 U
Benannte Stelle für die Bescheinigung Notified body of the certificate	DEKRA EXAM GmbH Fachstelle für Sicherheit elektrischer Betriebsmittel – BVS Postfach 10 27 048 D 44727 BOCHUM
Benannte Stelle für die Überwachung Notified body of inspection	0158
Kennnummer / Inspection number	
Hersteller / Anschrift Manufacturer / Factory address	FHF Bergbautechnik GmbH & Co. KG Eintrachtstr. 95 D – 42551 Velbert

Geschäftsführer:
Managing director:

Dr. Opitz, Hans-Peter

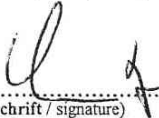
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