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Service manual for DC/DC converter



DCC24

version 1.2
9/15/2015

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1. DC/DC converter



1.1. Brief description

- The DCC 24 is a switched step-down converter, which converts DC voltage in the range 20 V to 60 V on the input side to 13.8 V / 2.5 A DC on the output side.
- The converter has high efficiency, typically better than 80 %.
- It is resistant to polarity reversal of the input voltage, undervoltage at the input, shorting at the output and connecting voltage to the output terminals. If the input voltage descends under 16.5 V (at $I_{out} = 2,5$ A) then the converter switched off to prevent the unstable conditions.
- Assembly on to DIN rail TS35.
- Minimum ground plan dimension: 35 × 75 mm.
- Maximum demand charge: 35 W.

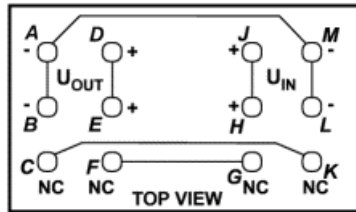
1.2. Application

- The DCC24 converter is suitable for DC voltage supply to electrical devices when it is necessary to convert DC voltages in the 20 V to 60 V range to 13.8 V DC and with a maximum output current of 2.5 A.
- It is typically used for supplying MORSE system devices (MR25 and MR400 radio modems) media where the backed up distribution is 24 V DC (or 48 V DC).
- Due to its high efficiency and small dimensions the DCC24 converter finds use in supplying electronic equipment located in mobile devices with a 24 V DC on-board network.
- The design and construction of this device allows for long-term loading and for this reason it is primarily determined for continuously running applications.

- DC/DC converter is designated for Assembly on to DIN rail TS35, ground plan dimension is 35 × 75 mm.

1.3. External circuitry

Connections of input and output wires to terminals of the converter are shown in the following diagram:



Terminals are of ENTRELEC type and enable connection of conductors with maximum cross section of 2,5 mm².

1.4. Technical parameters of the DCC 24

Rated input voltage (DC)	24 V
Rated input current	1.5 A
Recommended range of input voltages (DC)	19 V – 60 V
Maximum range of input voltages (DC)	16,88 V – 60 V
Output voltage	13.8 V
Max. output voltage deviation	max. ±3 % at 19–60 V, max. ±6,5 % at 16,8–19 V
Maximum output current	2.5 A
MTBF (mean time between failures)	> 100 000 hours
Operating range of temperature	-25 to +55 °C
Relative humidity	10–90 %
Dimensions: length × width × height	35 × 75 × 100 mm



Note

For converters manufactured before February 2008, is the input voltage in the range of 20–60 V.

1.5. Product Consistency

Railway Safety Appliance Standards Regulations

Electronic appliances in railway vehicles	CSN EN 50155 ed. 2 nd : 2002. art. 10.2.8.2 CSN EN 50121 art. 7: tab. 3 and 4
EMC (Electromagnetic Compatibility)	CSN EN 50121-3-2 art. 8
Vibrations and beats	CSN EN 61373


RACOM s. r. o. hereby declares that its GPRS modem MG100 complies of the European Union directives 89/336/EEC. This equipment therefore bears the CE marking.

2. Declarations

2.1. Declaration of Conformity

Fig. 2.1: Declaration of conformity

2.2. Country of Origin




Country of Origin Declaration

Producer: RACOM s.r.o.
Address: Mirova 1283, 592 31 Nove Mesto na Morave, Czech Republic
VAT No: CZ46343423

We, the manufacturer, hereby declare that Country of Origin of the RAY microwave links and its accessories is the Czech Republic, EU.

Part Number	Description
MS2000/12	230 V AC / 13.8 V DC, intelligent back-up
MS2000/24	230 V AC / 24 V DC, intelligent back-up
MSU120	Arbitrary solar panel / 14.7 V DC
DCC24	20-60 V DC / 13.8 V DC

Nove Mesto na Morave, 1 of March 2014
 Jiri Hruska, CEO



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Fig. 2.2: Country of Origin declaration for MS2000

3. DCC24 Installation Instructions

- The device is designed for industrial use for assembly into premises with limited access (electrical switchboards).
- Wiring up must be carried out by an individual with knowledge of the regulation No. 50/78 Coll. The source is designed for assembly into switchboards by attaching to a mounting plate on to a DIN rail. The mounting plate and DIN rail must be properly grounded in accordance with valid standards. The source must be located in such a way so as not to prevent air circulation necessary for cooling purposes.
- Conductors must be wired into labelled terminals in accordance with valid standards. Terminals are only designed for connecting copper conductors of max. diameter 2.5 mm^2 and do not serve for switching devices under voltage. If there is a larger distance from the converter to the solar panel or to the accumulator, where installation leads longer than 3 m would be required, we recommend wiring in conductors with a greater diameter from the shortest possible distance from the converter in order to limit power losses in the circuit when it is at maximum charging current.
- We do not recommend changing accumulator poles when wiring up.
- Colour coding of low voltage conductors must comply with the requirements of respective standards.

3.1. Assembly of the DCC24

The DCC24 converter is a special device requiring special assembly. RACOM's own employees assemble all supplied devices at the user's premises. For subsequent maintenance RACOM shall train the user's specialists who will have the *Operating regulations for radio data networks* and *MORSE Firmware - Documentation* available to help them.

4. Warranty and Servicing

The manufacturer assumes liability for defects for a period of 24 months. Only the manufacturer, RACOM s.r.o. Mírová 1283, 592 31 Nové Město na Moravě, Czech Republic, Tel.: +420 566 618 578, is entitled to repair any devices.

5. Conditions for DCC24

5.1. Important Warning

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Under no circumstances is the Racom or any other company or person responsible for incidental, accidental or related damage arising as a result of the use of this product. The manufacturer shall not provide the user with any form of guarantee containing assurance of the suitability and applicability for its application. RACOM products are not developed, designed or tested for use in equipment which directly affects the health and life functions of humans or animals and neither as part of other important equipment, and RACOM does not provide a guarantee if company products are used in such equipment.

5.2. Conditions of Liability for Defects and Instructions for Safe Operation of Equipment

Please read these safety instructions carefully before using the product:

- Liability for defects does not apply to any product that has been used in a manner which conflicts with the instructions contained in this operator manual, or if the case in which the converter is located has been opened, or if the equipment has been tampered with.
- Equipment mentioned in this operator manual may only be used in accordance with instructions contained in this manual. Error-free and safe operation of this equipment is only guaranteed if this equipment is transported, stored, operated and controlled in the proper manner. The same applies to equipment maintenance.
- In order to prevent damage to the converter and other terminal equipment the supply must always be disconnected upon connecting or disconnecting the cable to the radio modem data interface. It is necessary to ensure that connected equipment has been grounded to the same potential. Before connecting the supply cable the output source voltage should be disconnected.
- Only undermentioned manufacturer is entitled to repair any devices.

Tab. 5.1: RAY10 Radio parameters

RAY10		Channel spacing 7 MHz; limits for ACCP/CCDP					
Modulation	Raw Bit Rate	User Bit Rate	RSS / SNR for BER 10 ⁻⁶		Co-channel rejection*	Adjacent channel Selectivity*	Blocking
			RSS	SNR	1 dB	1 dB	± 17.5 MHz
					declared / limit	declared / limit	declared / limit
[-]	[Mbps]	[dBm]	[dB]	[dB]	[dB]	[dB]	
QPSK	12 /H	8,5	-96	7,5	-11 / -23	17 / 0	30 / 20
QPSK	12 /L	9,9	-93	8,5	-14 / -23	15 / 0	31 / 20
16 QAM	24 /H	17,3	-88	13,5	-17 / -30	14 / 3	24 / 20
16 QAM	24 /L	19,4	-87	14,5	-19 / -30	14 / 3	23 / 20
32 QAM	30 /H	22,3	-83	17,5	-22 / -33	12 / 2	22 / 20
32 QAM	30 /L	24,6	-82	18,5	-24 / -33	11 / 2	20 / 20
64 QAM	36 /H	28,3	-80	20,0	-24 / -33	11 / 2	20 / 20
64 QAM	36 /L	28,8	-79	20,5	-25 / -33	10 / 2	20 / 20

* Guaranteed values and according limits for specifications of disturbance attenuation are shown for lucidity in the same form as the parameter of Blocking. It is therefore a ratio of I / C (signal disturbance output / useful signal output), expressed in logarithmic units.

Tab. 5.2: RAY10 Radio parameters

RAY10		Channel spacing 7 MHz; limits for ACCP/CCDP					
Modulation	Raw Bit Rate	User Bit Rate	RSS / SNR for BER 10 ⁻⁶		Co-channel rejection*	Adjacent channel Selectivity*	Blocking
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					declared / limit	declared / limit	declared / limit
[-]	[Mbps]	[dBm]	[dB]	[dB]	[dB]	[dB]	
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QPSK	12 /L	9,9	-93	8,5	-14 / -23	15 / 0	31 / 20
16 QAM	24 /H	17,3	-88	13,5	-17 / -30	14 / 3	24 / 20
16 QAM	24 /L	19,4	-87	14,5	-19 / -30	14 / 3	23 / 20
32 QAM	30 /H	22,3	-83	17,5	-22 / -33	12 / 2	22 / 20
32 QAM	30 /L	24,6	-82	18,5	-24 / -33	11 / 2	20 / 20
64 QAM	36 /H	28,3	-80	20,0	-24 / -33	11 / 2	20 / 20
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