



Modular DC-DC Converter System Installation and Operation Manual



Models

DRS-24-48-7500

DRS-48-24-7500

24-48-DHS

48-24-DHS

M-DRS248-7500
As of 042117

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System Overview

1.1 System Specifications

This manual contains information and installation instructions for the Newmar model DRS-24-48-7500 shelf and DC/DC Converter System. The system consists of five (5) converter slots, one (1) 48V connection, and one (1) 24V connection, and alarm output relays. The table below contains the input and output power specifications for the power shelf. The power shelf is used with both 24V-to-48V and 48V-to-24V converters see section 1.2 for more information on converter modules.

Model	Output Voltage	Max. Output Amperages
DRS-24-48-7500 (Shelf)	48V DC	139A
DRS-48-24-7500 (Shelf)	24V DC	278A
24-48-DHS (Module)	48V DC	27.8A
48-24-DHS (Module)	24V DC	55.7A



Spec	Data
Electrical Requirements	
24V Input Voltage	21 - 29 VDC
DC Input Current	380A Max.
DC Output Voltage	54 VDC
DC Output Current	139A Max.
48V Input Voltage	42 - 58 VDC
DC Input Current	190A Max.
DC Output Voltage	27 VDC
DC Output Current	278A Max.
Environmental Requirements	
Operational Temperature	-40C - +65C
Storage Temperature	-40C - +80C
Relative Humidity	0 - 95%
Altitude	-100 - 10000 ft

1.2 Converter Specifications

The converters are rated for operation in a temperature range of -40°C to 65°C.

The airflow of the converters is horizontal, front-to-back.

Model Number	Nominal DC Input	Nominal DC Output	Rated Output of Converter
24-48-DHS	21 - 29 VDC	54.00V	27.8A
48-24-DHS	42 - 58 VDC	27.00V	55.7A



Note: Blank panels are available to cover un-used converter bays in the shelf.
Model: 451-0001-0

2 Safety Instructions

2.1 About legal and safety information

Please read all safety and legal information given here before working with any Newmar products. Ignoring these instructions may result in damage to the equipment, health hazards, or loss of life.

These safety instructions are an extension of any national laws governing health and safety at work and the applicable standards, as well as any regulations of the statutory authorities.

Installation shall only be performed by trained persons familiar with the local installation regulations. The local installation regulations must always be followed (covering installation in the building and main AC distribution panels). It is also necessary to follow the instructions provided in the system user manual for installation, commissioning, operation, and maintenance.

2.2 Legal statements

2.2.1 Statement of compliance

Please see the relevant product fact sheet for information.

2.2.2 Limitations

The equipment is mainly intended for telecommunications purposes only. The equipment is not intended for use in applications in which the failure of the equipment could lead to death, person injury, or severe physical or environmental damage.

Newmar is not responsible for any danger or damage resulting from incorrect installation, maintenance, operation or usage of the equipment, use beyond its intended purpose, failure to observe state instructions, and/or failure to observe the applicable safety regulations.

Newmar is only responsible for components and services provided by Newmar. Third party components and/or services, such as batteries, repair and/or maintenance used in and/or conducted for the equipment, are not the responsibility of Newmar. Furthermore, Newmar is not responsible for any malfunction or danger of, and/or damage to/resulted from the equipment caused by such third party components and/or services.

Unauthorized modifications to the equipment may result in incorrect operation and/or performance. The operator is responsible for the consequences of any modification in the hardware configuration that are made without an agreement with the manufacturer or authorized representative.

Installation, operation and maintenance of the equipment should only be performed by suitably qualified personnel with appropriate training. The operator is responsible for

ensuring that personnel working with the equipment are provided with appropriate operation and safety training.

The operator is responsible for ensuring that location of the system is treated as an electrical equipment room. These rooms must have appropriate air-conditioning and restricted access. The operator is also responsible for ensuring that the system rack doors are securely locked and not accessible to unauthorized persons.

If the power supply to the system is not fitted with a disconnecting switch or equivalent device, the operator is responsible for fitting an appropriate disconnection switch conforming to the relevant regulations.

2.2.3 Third party devices

Newmar is not responsible for devices, such as batteries that are not supplied by Newmar.

Newmar is not responsible for any danger or damage resulting from devices not supplied by Newmar.

2.3 Safety instructions

Warnings, cautions, and notes are used to identify important information. They are classified as follows:



Warning! A warning means that injury or death is possible if the information or instructions are not obeyed.



Caution! A caution means that damage to equipment is possible if the information or instructions are not obeyed



Note! Notes are additional information which may be useful to the operator.

2.3.1 General instructions



Warning! Hazardous voltages are present within the equipment when a source of electrical power is applied.

There is the risk of electrical shock from the main power supply and/or batteries

When working on equipment with power applied, supervision of personnel is required. The supervisor must be capable of providing first aid in the event of electrical shock. Provision of an emergency switch or disconnection strap is not sufficient protection.

There is increased risk of accidents and electrical hazards when working on compact equipment due to the close proximity of components. Operation of compact equipment requires extra attention to safety.



Warning! Protective shields and other safety devices provided with the equipment must be in place when the equipment is operated.

The power system may have dual energy supply. Hazardous voltages may be present at the main power connector and within the equipment for up to 10 seconds after disconnecting the power supply. The operator is responsible for securing the proper precautions for maintenance or service purposes.

During installation and maintenance, protective shields may be temporarily removed. Use suitable insulated tools and appropriate clothing. Handle fuses only with tools provided for this purpose, for example, load-break switch handles.

Adequate insulation from ground potential (earth) must be provided when working on the equipment.



Warning! High temperatures present.

Localized areas of high temperature (<70 °C) may occur within the rectifier/converter/distribution rack. Take precautions against accidental burns.



Warning! Moving parts

Devices, such as rectifiers and converters contain fans. These may also continue to rotate for some time after the power has been removed.



Warning! Heavy equipment

The weight of the equipment requires suitable safety considerations. Additional personnel or lifting equipment may be needed. Where required, the weight of equipment is stated on the front of the unit.



Warning! Sharp edges

Equipment may have sharp edges. We recommend you wear gloves.



Caution! Do not restrict air flow. Fit blank panels for empty converter slots to ensure correct air circulation inside cabinet.



Caution! Use only suitable measuring devices. Calibrate measuring devices regularly.

2.3.2 Specific instructions

Please observe all warning labels and notification on the equipment.

Additional warnings, cautions, and notes specific to certain equipment and/or conditions are described in the context of relevant instructions

Please read all documentation relevant to the given task.

Where devices, such as batteries, that are not supplied by Newmar are used, please read and observe all safety notices and instructions supplied by the appropriate manufacturer or supplier.

3

Installation Checklist

The following procedure provides an overview of the steps to install and power-up the system. See section 4 for details on each step.

Step 1 Unpack the power system (section 4.2)

Step 2 Install the power system into a rack (section 4.3)

Step 3 Connect input cables from input breaker to input connections (section 4.4.1)



Note! Do not activate the input breaker(s)

Step 4 Connect output cables from customer equipment (section 4.4.2)

Step 5 Plug converters into open slots

Step 6 Activate input breaker(s)



Note! Within a few seconds, the converter OK LED should turn green.

Step 7 See section 5 to troubleshoot any remaining alarms

4 System Installation

This section will discuss the necessary detail to install the system. The system comes fully assembled and all the connections (other than input and output DC connections) are made at the factory. There is no internal or module wiring required.

4.1 Tools Required

The following tools are recommended:

- 10mm Socket Wrench
- Wire cutter
- Lug crimper (up to 350 MCM)

4.2 Unpack System

Prior to removing the system from the box, note any damage to the packaging. Remove the system from the box and inspect the system for any dents or damage. If any damage is noted, contact the carrier immediately.



Caution! Ensure a clean, dust-free environment during the installation of the system. Excessive dust can reduce the lifespan of electronics in the system. Leave converters in packaging until the system is ready to power-up. See Section 3 for power-up procedure.

4.3 System Mounting

Airflow moves from the front of the system to the rear of the system; therefore a minimum of 1" is required in front of the system for proper airflow. Install the system into a standard 19" wide telecom relay rack.



Caution! System is suitable for mounting on concrete or other noncombustible surfaces only.



Caution! Do not install the system with the converters installed.

- Step 1 One person should hold the system in place
- Step 2 A second person can then secure the shelf to the rack
- Step 3 Torque rack screws to recommendations in section 4.2. Newmar recommends two (2) screws per side

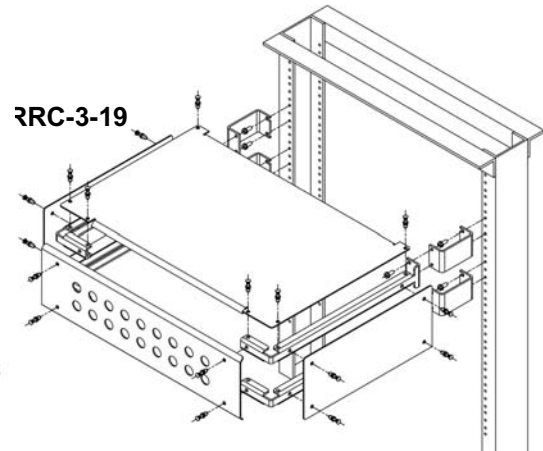
4.4 DC Connections

Use the supplied 6mm hex head bolts to attach the input and output cables to the shelf and tighten to 65 in-lbs. If using two hole lugs they should be 90° with 1" hole center to center. Lugs with 1/4" holes will accommodate 6mm hardware. Use the provided flat washers and lock washers to sandwich the lug between the flat washers with split lock washers underneath the head of the hex bolt.

4.4.1 Input Connections

Installing External breaker(s) to protect the input wires is recommended, see breaker ratings matrix below.

If there is no rear panel protection on the rack, it is recommended an insulating cover be installed. Model RRC-3-19 is available from Newmar.



The recommended input circuit breaker value(s) depend(s) on several factors including the model number of the converter and the number of converters installed per input.

The following is an example of the requirements for determining the appropriate breaker size, using the table below.

Numbers of Converters Installed	Model Number	Nominal Input Voltage	Input Current	Recommended Input Breaker
1	DRS-24-48-7500	21 - 29 VDC	76A	100A
	DRS-48-24-7500	42 - 58 VDC	38A	50A
2	DRS-24-48-7500	21 - 29 VDC	152A	200A
	DRS-48-24-7500	42 - 58 VDC	76A	100A
3	DRS-24-48-7500	21 - 29 VDC	228A	300A
	DRS-48-24-7500	42 - 58 VDC	114A	150A
4	DRS-24-48-7500	21 - 29 VDC	304A	350A
	DRS-48-24-7500	42 - 58 VDC	152A	200A
5	DRS-24-48-7500	21 - 29 VDC	380A	450A
	DRS-48-24-7500	42 - 58 VDC	190A	250A

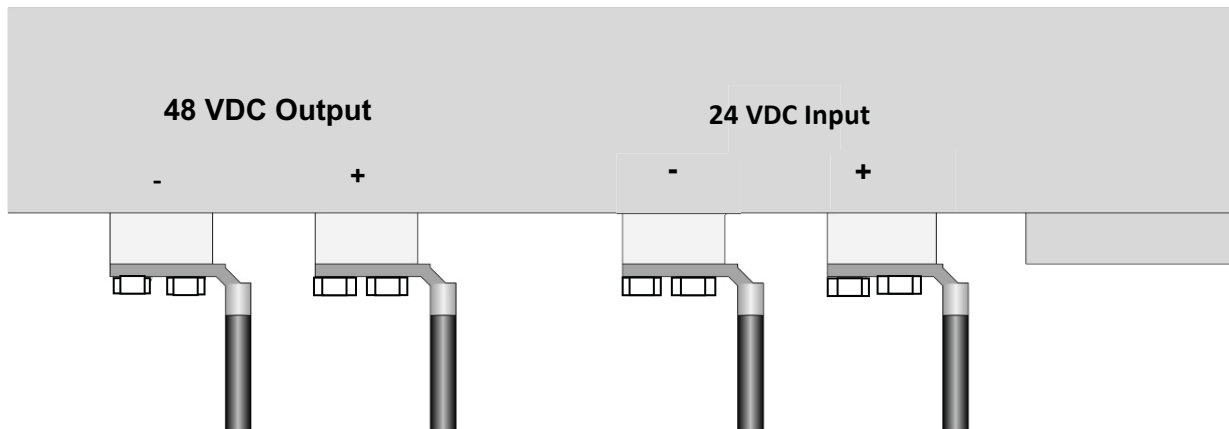
The National Fire Protection Association (NFPA) produces the National Electrical Code (NEC) which contains the standard for ampacity of wire. Wire sizes shall be based on the breaker rating plus any correction factors for ambient temperatures above 30°C. Newmar recommends consulting NEC table 310.16 to determine the required American wire gauge (AWG) for the provided breaker values in the following table. Wire runs of greater than 50 feet will require larger gauge wire than required by ampacity.



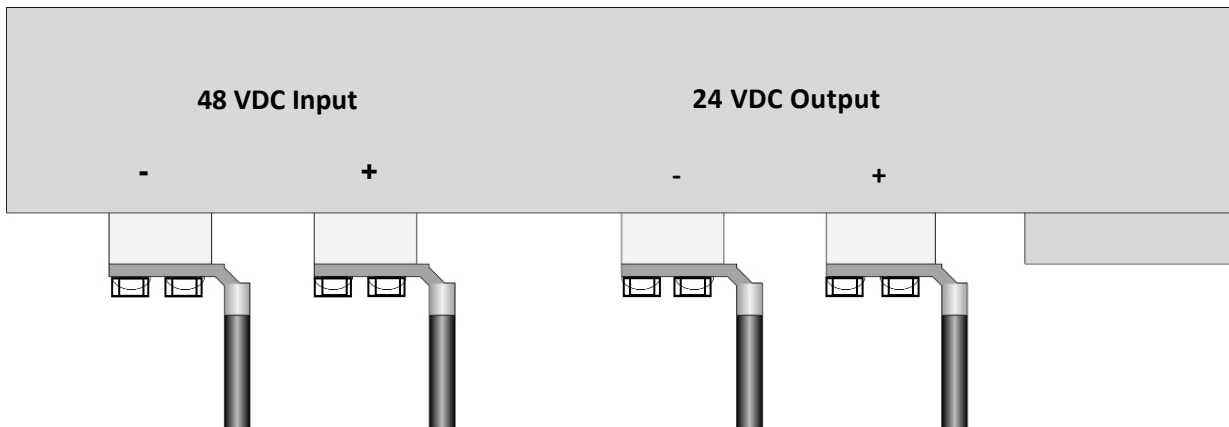
Note! Confirm the operating voltage before proceeding.

- Step 4 Determine input breaker size per table above
- Step 5 Size wires based on NEC table 310.16.
- Step 6 Determine required 90° lug sizes
- Step 7 Route input wires from the breaker to the power shelf
- Step 8 Connect lugged wires to input connections
- Step 9 Secure lug to the connection using the supplied hardware and torque to requirements in section 4.4

Shelf DRS-24-48-7500: 24V to 48V



Shelf DRS-48-24-7500: 48V to 24V



- Step 10 Do not activate the input breaker before following the Power-up Procedure located in section 3



Model DRS-24-48-7500 Shown

The recommended output wires shall be sized for the total installed converter capacity per output. The following is an example of the requirements for determining the appropriate output capacity based on converter model number and the number of converters per output. A system with four (4) 24-48-DHS converters (four converters to one output) requires a wire size capable of carrying 111.2A.

Converters per Output	Model Number	Output Voltage	Output Current
1	24-48-DHS	54.00V	27.8A
	48-24-DHS	27.00V	55.7A
2	24-48-DHS	54.00V	55.6A
	48-24-DHS	27.00V	111.3A
3	24-48-DHS	54.00V	83.4A
	48-24-DHS	27.00V	167.0A
4	24-48-DHS	54.00V	111.2A
5	24-48-DHS	54.00V	139.0A

Step 17 Follow the Power-up Procedure located in section 3

4.5 Alarm Cable Connection

The alarm module provides two (2) form-C relays for output alarms. The relays are potential-free; single-pole-single-throw relays capable sinking 0.5A at 60Vdc. The connector is a compression style connection capable of accepting stripped wire sizes between 26 AWG and 16 AWG.



Alarm connection right from rear shelf location

The relay configuration is shown in the table below.

Pin Number	Pin Name	Alarm Description
1	Minor Common	Single converter failure or alarm card failure
2	Minor NC	
3	Minor NO	Multiple converter failure or alarm card failure
4	Major Common	
5	Major NC	
6	Major NO	

Step 18 Insert wire(s) into desired position on the alarm block

Step 19 Connect the wire(s) to the customer's cross-connect

Step 20 Repeat for all desired relays

5 Troubleshooting

Troubleshooting information can be gathered from output alarm relays and the converter LED status.

5.1 Relay Alarms

See section 4.5 for more information

5.2 Converter Status LEDs



- **OK LED is solid green**
 - The converter is operating normally
- **OK LED is blinking green**
 - The converter is in standby mode because of a user command from the controller
- **OK LED is solid red**
 - The converter is not operating due to input being out of the operating range (under-voltage or over-voltage)
 - The converter is not operating due to over-temperature protection (OTP)
 - The converter is not operating due to a fan failure
 - The converter is not operating due to a DC overvoltage protection (OVP)
 - The converter is not operating due to improper installation
- **OK LED is off**
 - The converter is not working due a loss of input power
 - The converter is not working due to a converter failure
- **COM LED is solid green**
 - The converter is communicating with the controller
- **COM LED is off**
 - The converter is not communicating with the controller
- **STA LED is solid red**
 - The converter is shut down permanently (latched protection) due to an over-temperature or a DC over-voltage
- **LD LED is solid yellow**
 - The converter is operating at less than 5% load
- **LD LED is blinking yellow**
 - The converter is operating in current limit mode
 - The DC output of the converter is short circuited