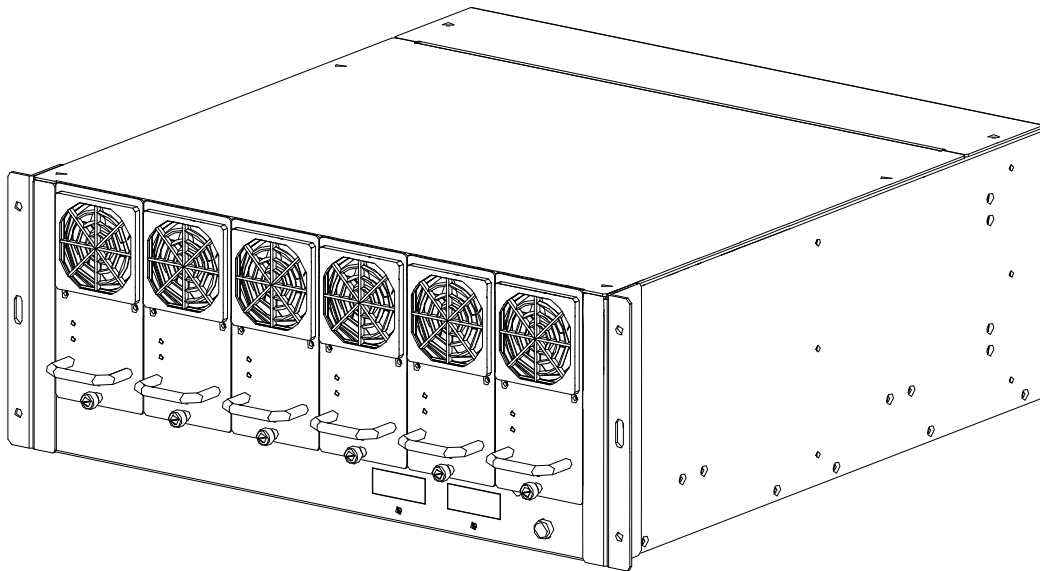




Modular DC Power Supply 43000 Series Operation Manual



Version A3
October 2009
P/N 151003

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Material Contents Declaration

A regulatory requirement of The United States of America defined by specification SJ/T 11364-2006 mandates that manufacturers provide a material contents declaration of electronic products. QuadTech's materials are listed below.

Part Name	Hazardous Substances					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Polybrominated Biphenyls	Polybromodiphenyl Ethers
	Pb	Hg	Cd	Cr ⁶⁺	PBB	PBDE
PCBA	×	○	○	○	○	○
CHASSIS	×	○	○	○	○	○
ACCESSORY	×	○	○	○	○	○
PACKAGE	○	○	○	○	○	○

“○” indicates that the level of the specified chemical substance is less than the threshold level specified in the standards.

“×” indicates that the level of the specified chemical substance exceeds the threshold level specified in the standards.

1. QuadTech, Inc. is not fully transitioned to lead-free solder assembly at this moment; however, most of the components used are RoHS compliant.
2. The environment-friendly usage period of the product is assumed under the operating environment specified in each product's specification.

Disposal

Do not dispose of electrical appliances as unsorted municipal waste. Please use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being. When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliances for disposal free of charge.



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Declaration of Conformity

For the following equipment :

DC Power Supply

(Product Name/ Trade Name)

43000 - xx-xx (Can be 15-90, 30-50, 60-26, 80-18 or 150-10)

(Model Designation)

QuadTech, Inc.

(Manufacturer Name)

Is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility (89/336/EEC), and the Amendment Directive (92/31/EEC), Low-voltage Directive (73/23/EEC) and the Amendment Directive (93/68/EEC). For the evaluation regarding the Directives, the following standards were applied :

IEC 61010-1:2001

EN 61326:1997+A1:1998+A2:2001 Class A

EN 61326:1997+A1:1998+A2:2001 (industrial locations)

IEC 61000-4-2:1995+A1:1998+A2:2000;

IEC 61000-4-3:1995+A1:1998+A2:2000; IEC 61000-4-4:2004; IEC 61000-4-5:1995+A1:2000;

IEC 61000-4-6:1996+A1:2000; IEC 61000-4-8:1993+A1:2000 ; IEC 61000-4-11:2004

The following importer/manufacturer or authorized representative established within the EUT is responsible for this declaration :

QuadTech, Inc.

(Company Name)

Person responsible for this declaration:

Robert M. Brown

(Name, Surname)

V.P. Technical Operations

(Position/Title)

U.S.A, Maynard, MA 1-08-09

(Place)

(Date)

(Legal Signature)

Safety Summary

The following general safety precautions must be observed during all phases of operation, service and repair of this instrument. Failure to comply with these precautions or specific WARNINGS given elsewhere in this manual will violate safety standards of the design, manufacturing, and intended use of the instrument. *QuadTech, Inc.* assumes no liability for the customer's failure to comply with these requirements.

BEFORE APPLYING POWER

Verify that the power is set to match the rated input of this power supply.

PROTECTIVE GROUNDING

Make sure to connect the protective grounding to prevent an electric shock before turning on the power.

NECESSITY OF PROTECTIVE GROUNDING

Never cut off the internal or external protective grounding wire, or disconnect the wiring of the protective grounding terminal. Cutting the protective ground could cause a potential shock hazard that may bring injury to a person.

FUSES

Only fuses with the required rated current, voltage and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuse holders. Using the wrong fuse could cause a shock or fire hazard.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate this instrument in the presence of flammable gases or fumes.

DO NOT REMOVE THE COVER OF THE INSTRUMENT

Operating personnel must not remove the cover of this instrument. Component replacements and internal adjustments can be done only by qualified service personnel.






DO NOT OPERATE UNDER HUMID CONDITIONS

DO NOT TOUCH THE EXPOSED CIRCUIT BOARD

⚡ WARNING

1. Hazardous voltage outputs for 15V, 30V, 60V, 80V & 150V.
 2. When the power is on, touching the connected circuit or output terminal on the front or rear panel may result in death.
-

Safety Symbols

	<p>DANGER – High voltage.</p>
	<p>Explanation: To avoid injury, death of personnel or damage to the instrument, the operator must refer to an explanation in the instruction manual.</p>
	<p>Protective Grounding Terminal: Protects against electrical shock in case of a fault. This symbol indicates the terminal must be connected to the ground wire before operating the equipment.</p>
<p> WARNING</p>	<p>The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or followed, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.</p>
<p> CAUTION</p>	<p>The CAUTION sign denotes a hazard. It may result in personal injury or death if not proceeded upon with caution. It calls attention to procedures, practices and conditions.</p>

Revision History

The following lists the additions, deletions and modifications in this manual at each revision.

Date	Version	Revised Sections
January 2009	A1	Release of Manual
Feb. 2009	A2	Update of Figures 1-1, 1-2, 3-3
Oct. 2009	A3	Move Update

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1. Overview

1.1 Introduction to System

The QuadTech, Inc. 43000 Series DC Power Supply is a modular power system specially designed for burn-in use. It has five kinds of power output modules: 43000-15-90 (15V/90A/1350W), 43000-30-50 (30V/50A/1500W), 43000-60-25 (60V/25A/1500W), 43000-80-18 (80V/18A/1440W) and 43000-150-10 (150V/10A/1500W) to output 15V, 30V, 60V, 80V and 150V DC power, based on the module integrated. A system is able to install up to six power modules and can be paralleled to output power within a Mainframe.

1.2 System Function

1.2.1 Operating Mode

- (1) Manual Control: It is operated by the output ON/OFF button and VR on the front panel.
- (2) Remote Control: It is operated via CAN bus for remote control.

1.2.2 Protection

The 43000 Series has the protection of input voltage over and under, over current and current limit, over temperature and cooling fan fail, etc.

1.3 Specification

Key Features:

1. Power System Ideal for Burn-in Applications
2. Higher Density (464mW/cm³)
3. HOTSWAP CAPABLE
4. Cost-Effective for Burn-in Utility
5. Remote Sense, 3V Line Loss Compensation
6. Graphic Soft Panel Control and Monitor
7. Remote ON/OFF Signal
8. Remote CAN bus Interface Control
9. DC OK Signal Output

The specifications of 43000 Series DC Power Supplies are shown in the table below. (Test condition: 25 ± 5°C and under resistance load.)

SPECIFICATIONS					
Model	43000-15-90	43000-30-50	43000-60-25	43000-80-18	43000-150-10
Electrical Specifications					
Output Ratings					
Output Power	1350W	1500W	1500W	1440W	1500W
Output Voltage	1~15V	1~30V	1~60V	1~80V	1~150V
Output Current	1~90A	1~50A	1~25A	1~18A	1~10A
Line Regulation	0.1% FS				
Load Regulation	1% FS				
Programming Accuracy	1% FS				
Measurement Accuracy	1% FS				
Output Noise (20MHz)					
Voltage Noise (P-P)	100mV	100mV	200mV	200mV	400mV
Voltage Ripple (rms)	30mV	30mV	50mV	50mV	100mV
Current Ripple (rms)	0.9A	0.5A	0.25A	0.18A	0.1A
Efficiency	> 87% @ full load	> 88% @ full load (typical)			
Turn on over shoot voltage₂	5% of nominal output				
Transient Response Time₃	< 5 ms				
AC Input Voltage					
Six Position Mainframe	187 ~ 250Vac (3 Phase 4 Wire, Δ Connection) or 323 ~ 437Vac (3 Phase 5 Wire, Y Connection)/45 ~ 65 Hz				
Three Position Mainframe	187 to 250Vac (single phase) / 45 ~ 65 Hz				
Input Power Factor	> 0.98@ full load				
Protection Function					
OVP	Automatically shuts down at 115% of set value				
Adjustment Range	1 ~ 16V	1 ~ 31V	1 ~ 65V	1 ~ 83V	1 ~ 155V
OCP	Current limit (0~100%) / OCP Shutdown at 115% of FS				
OTP	Automatically shuts down if internal limit is reached				
I/O Signal					
Remote ON/OFF (I/P)	Dry contact (closed = enabled), vice versa.				
AUX Voltage	4 ~ 24V/0.5A at mainframe(by trimmer adjust voltage)				
DC OK Signal Type (O/P)	Dry contact (closed = enabled) (Error : OVP/OCP/OTP/AC Fault)				
Programming Response Time₄ (Typical)					
Rise Time (Full Load)	For a programmed 5% to 95% step in output voltage : 100ms				
Rise Time (No Load)	For a programmed 5% to 95% step in output voltage : 100ms				
Fall Time (Full Load)	For a programmed 95% to 5% step in output voltage : 40ms				
Fall Time (No Load)	For a programmed 95% to 5% step in output voltage : 5s				
Vout Setting	CAN Bus send command to DC module receiver : 1s				
Measurement V & I	Under CAN command using fetch : 100ms				
Delay Time	For output ON/OFF enable and disable (under CAN command) : 5s(Single Mainframe)				
General Specifications					
Remote Sensing	3V max. line loss compensation				
Parallel Operation	Current Sharing (+/-5%)				
Operating Temperature	0~50°C				
Humidity Range	0~90% RH. Non-condensing				
Remote Interface	CAN Bus (optional)				
Safety & EMC	CE				
Dimensions (WxHxD)	Mainframe : 443 x 175 x 531 mm or 17.5 x 6.88 x 21 inches (43000-6)Mainframe : 239.9 x 175 x 531 mm or 9.47 x 6.88 x 21 inches (43000-3)				
	Module : 67.5 x 138.5 x 376.3 mm or 2.65 x 5.45 x 14.81 inches				
Weight	Mainframe : 14 Kg or 30.8 lbs (43000-6)Mainframe : 8 Kg or 17.6 lbs (43000-3)				
	Module : 4 Kg or 8.8 lbs				

Voltage to recover within 1% of its rated for a load changed of 25% **Note 4**: Six Position Mainframe through CAN

SPECIFICATIONS	
A620007 Control & Supervisor Unit	
Setting Item	Output voltage setting (V set + Rotary)
	Output current limit setting (I set + Rotary)
	Over voltage protection setting (OVP_SET) (Default : 115% Vmax.)
	Output ON/OFF
	OCP selection : CC mode or Shutdown (By Dip switch selection at rear panel)
	Max. output current setting (I max)
Measurement Display Item	Output voltage display (7 segment LED)
	Output current display (7 segment LED)
	Operating mode indicator : CV or CC
	Output ON/OFF indicator
	Max. output current display (I max button)
Alarm Indicator Item	CSU : Over voltage protection
	CSU : Over temperature protection
	AC fault alarm
	Power module fault alarm
Remote Control Interface	
CAN Bus	Standard
Ethernet	Optional
Analog Programming Interface(Standard)	Setting voltage (A/I) : 0-10Vdc or 0-1 mA of FS (Resolution : 12 bits, Accuracy : 1% FS)Setting current (A/I) : 0-10Vdc or 0-1 mA of FS (Resolution : 12 bits, Accuracy : 1% FS)Monitor voltage (A/O) : 0-10V of FS (Resolution : 12 bits, Accuracy : 1% FS)Monitor current (A/O) : 0-10V of FS (Resolution : 12 bits, Accuracy : 1% FS)
Remote Output ON/OFF	Dry contact
Output ON/OFF Indicator	Active High
CV or CC mode Indicator	TTL Level High=CV mode ; TTL Level Low=CC mode
OTP Indicator	Active High
System Fault Indicator	Active High
I/O Control Interface	I/O : I/P=10 , O/P=10
I/P Definition	
Pin 1 & 2	Temperature sensor for bulk power system rack A (Active : open / default : short)
Pin 3 & 4	Temperature sensor for bulk power system rack B (Active : open / default : short)
Pin 5 & 6	Emergency stop for bulk power system
Pin 7~20	Reserved
O/P Definition	
Pin 1 & 2	OVP
Pin 3~20	Reserved
AC Input Voltage	Single phase 187-253VAC
Dimension	High(2U) x width(19")

All specifications are subject to change without notice.

43000-3: Three Position 43000 Mainframe

43000-6: Six Position 43000 Mainframe

43000-15-90: DC Power Supply Module, 15V/90A/1350W

43000-30-50: DC Power Supply Module, 30V/50A/1500W

43000-60-25: DC Power Supply Module, 60V/25A/1500W

43000-80-18: DC Power Supply Module, 80V/18A/1440W

43000-150-10: DC Power Supply Module, 150V/10A/1500W

A620007: Control & Supervisor Unit

A620008: CAN bus Interface for Mainframe

A620010: Rack Mounting Kit for mainframe

A620011: Ethernet Interface for CSU

A620012: AD-Link PCI 7841 CAN bus Card

A620013: 19" rack (23U) of Model 43000 series

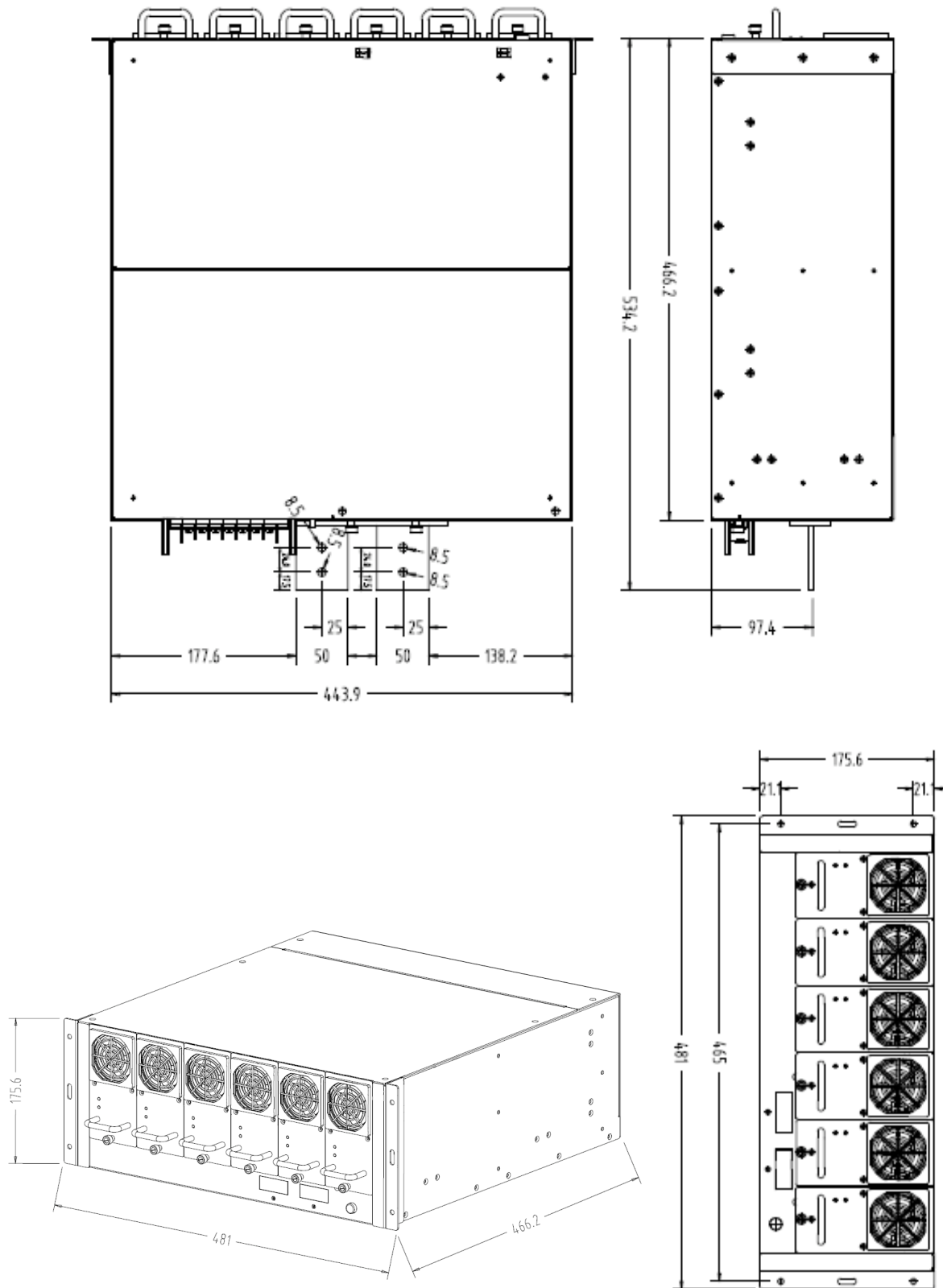
A620016: Rack Mounting Kit for CSU

A620017: Softpanel for 43000 Series

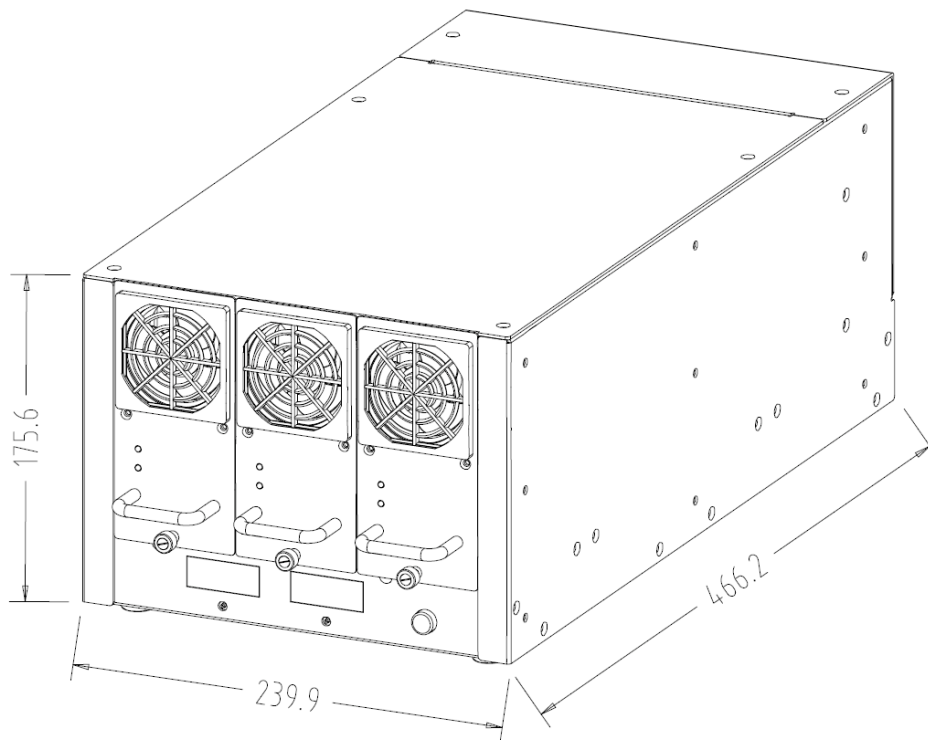
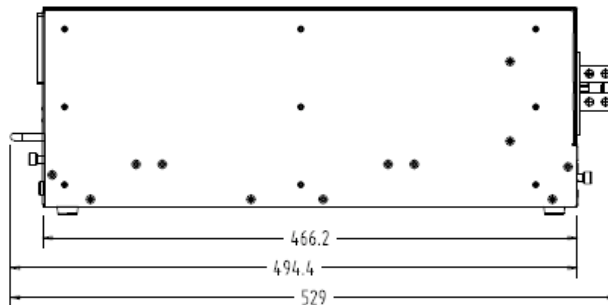
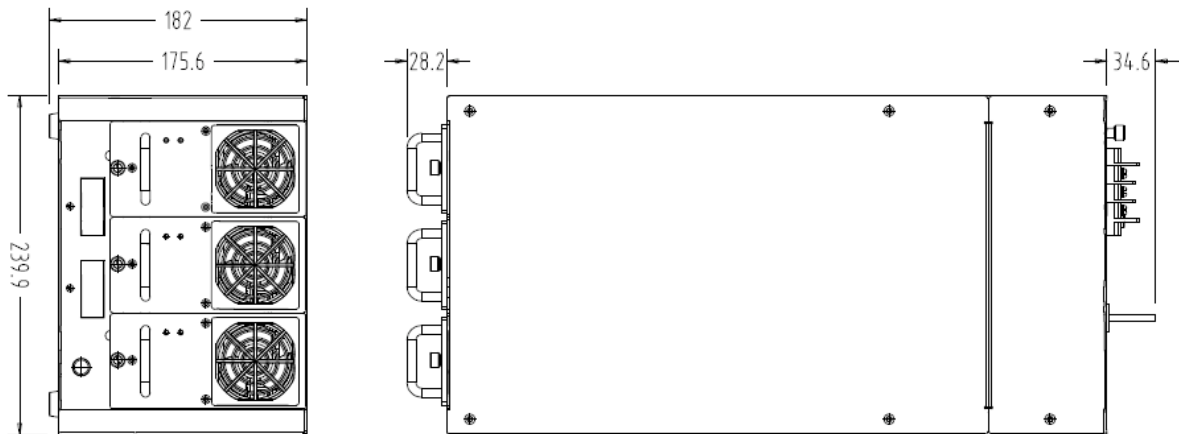
A620018: NI USB-8473 high-speed USB to CAN interface

1.3.1 Dimension Layout

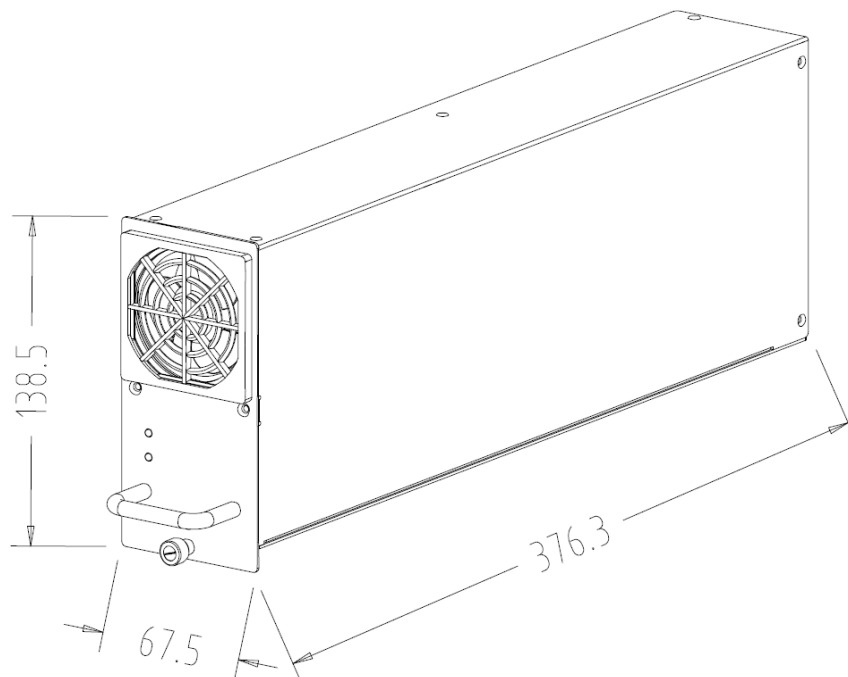
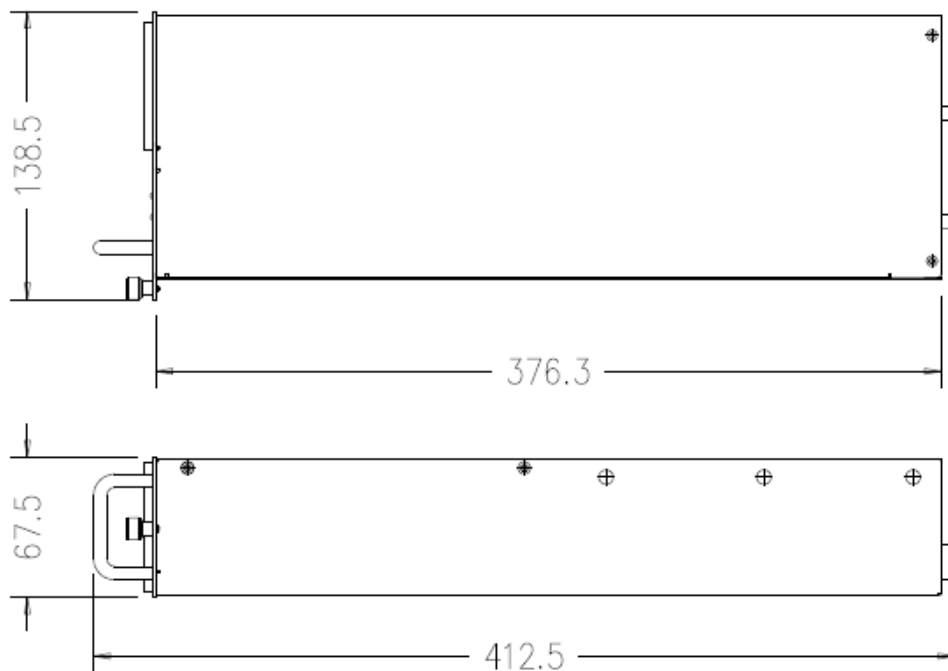
Mainframe: 43000-6 (Weight: 14Kg or 30.8 lbs)



Mainframe: 43000-3 (Weight: 8Kg or 17.6 lbs)



Module: 62015B (Weight: 4Kg or 8.8 lbs)



1.4 Function Keys

1.4.1 Front Panel

Front

Panel

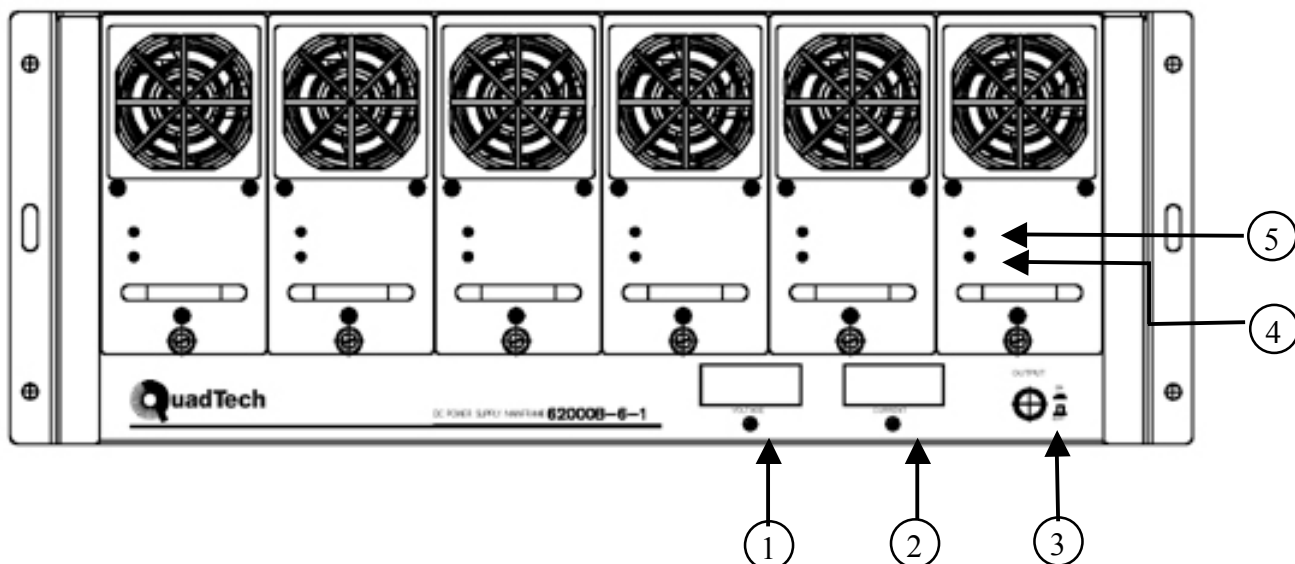


Figure 1-1 Front Panel of 43000-6

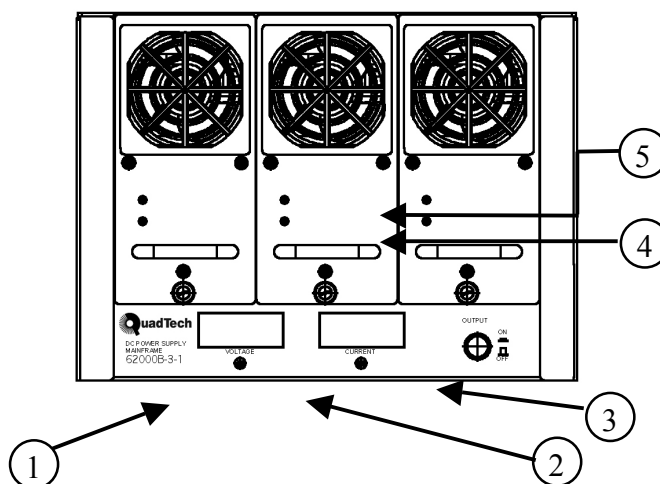


Figure 1-2 Front Panel of 43000-3

Item	Name	Description
1	Voltage V_SET	Adjusts the output to set voltage (The setting is completed after the LED blinked 3 times during adjustment.)
2	Current I_SET	Adjusts the output to current limit (The setting is completed after the LED blinked 3 times during adjustment.)
3	DC ON/OFF	Sets DC Output ON/OFF.
4	Fault	Appears when the voltage of the Mainframe is abnormal or the DC Module is in protection mode (the red LED is always on.)
5	Output	Indicates the device is running normally (the green LED is always on.)

Table 1-1 Description of Front Panel (items 1 – 5 are the same for 43000-6 & 43000-3)

1.4.2 Rear Panel

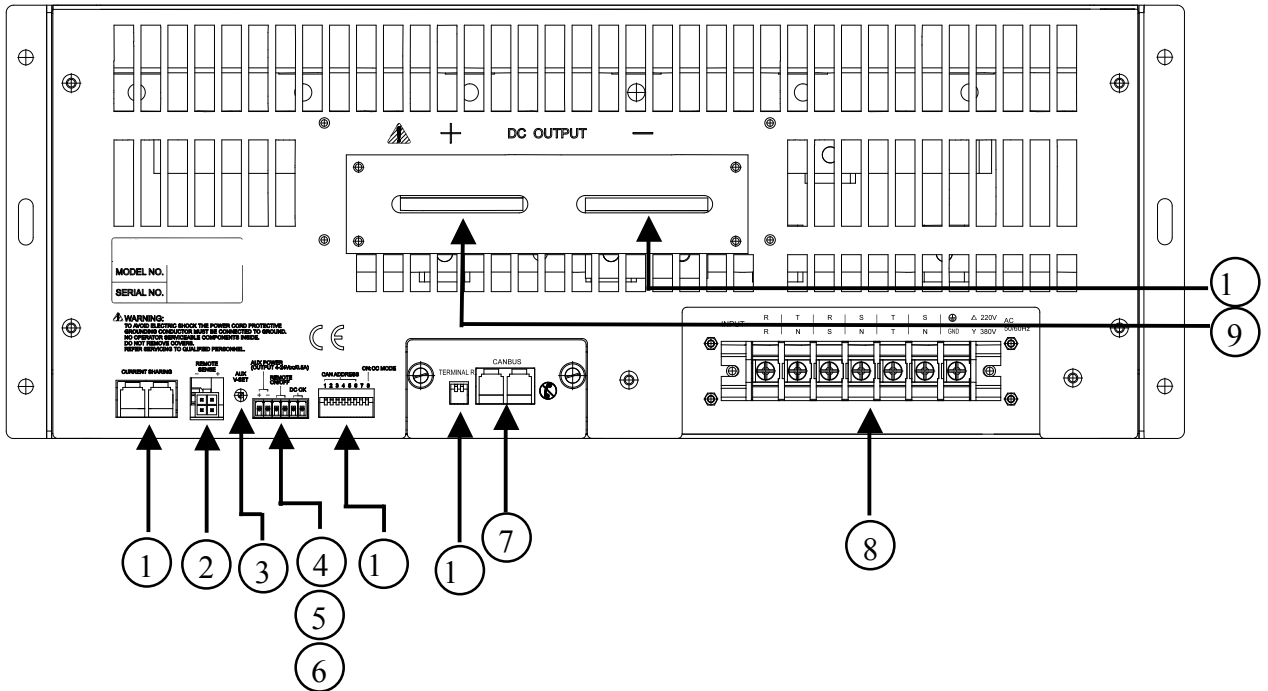


Figure 1-3 Rear Panel of 43000-6

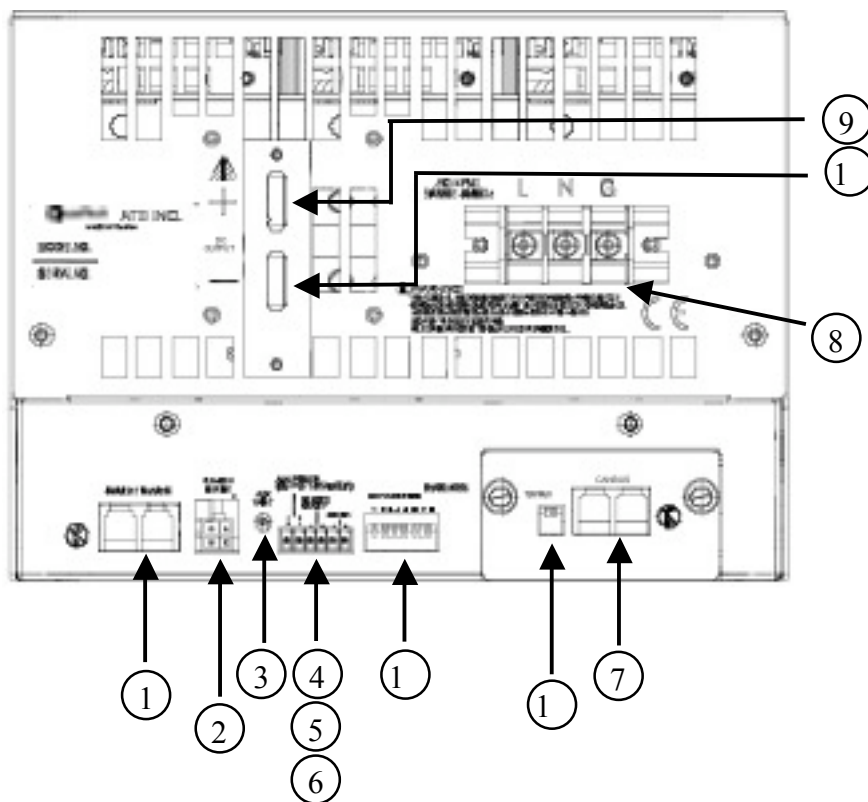


Figure 1-4 Rear Panel of 43000-3

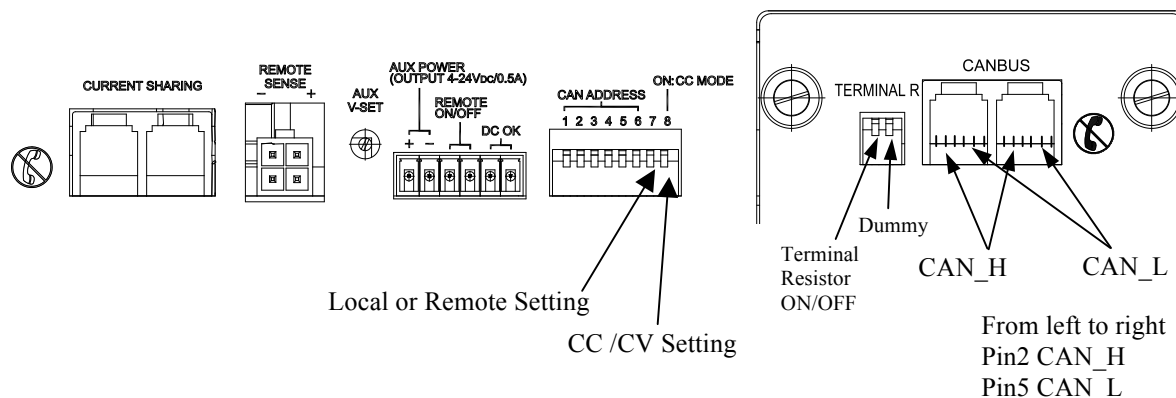


Figure 1-5 Communication Contacts on the Rear Panel

Item	Name	Description
1.	Current Sharing	The connection of Current Sharing in between Main Frames
2.	Remote Sense	Connects to the compensated voltage of load
3.	AUX V-SET	Adjusts the AUX Power Output voltage clockwise from low to high 4~24V (MAX 0.5A)
4.	AUX Power (Output 4~24V VDC)	The AUX Power voltage output contact
5.	Remote ON/OFF	The external trigger connector on the Main Frame rear panel that connects to the normal switch
6.	DC OK	The DC MODULE normal output, dry contact (24Vdc or 120Vac 1A)
7.	CAN bus	The CAN bus remote interface connected to a PC. The power on or off is controlled by the PC.
8.	AC INPUT	The input connector of AC power cable
9.	Positive DC Out	The positive output terminal
10.	Negative DC Out	The negative output terminal
11.	CAN ADDRESS & CC/CV Mode Local or Remote Setting	Sets the Mainframe communication address in binary. Sets CC/CV mode to on (see Figure 1-5 for CC Limit) OFF : Local Setting ON : Remote setting
12.	TERMINAL R	CAN bus Terminal Resistor is only required for the devices with the longest distance at the end of CAN bus. Set it to ON if there is one 43000 Mainframe terminal resistor. If there are two or more 43000 Mainframes, set the terminal resistor of the farthest 43000 to ON. The rest of the 43000 Mainframe terminal resistors are set to OFF as Figure 1-5 shows.

Table 1-2 Description of Rear Panel (items 1 –12 are the same for 43000-6 & 43000-3)

NOTE:

Do not insert or remove the **CAN bus Remote Interface** into or from the rear panel when the power module is working normally. It may cause an error on the power module. (It is necessary to turn the AC power source off before inserting or removing the interface.)

2. Installation

2.1 Checking the Package

- (1) Check if there is any damage or missing accessories after unpacking.
- (2) Should any damage be found, contact QuadTech, Inc. immediately to request return shipment.

The machine package is shown as below.

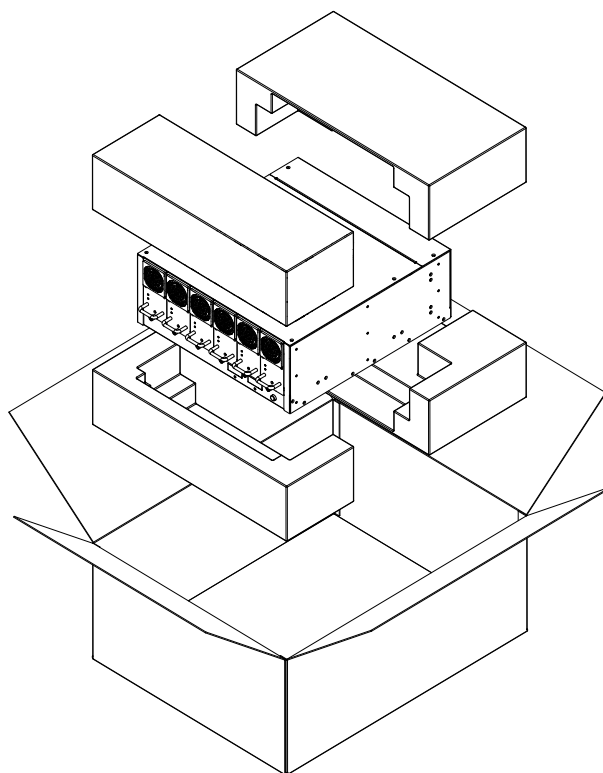


Figure 2-1

① NOTICE

1. Please keep all of the packing materials in case the device has to be returned for repair.
 2. Do not return the instrument to the factory without obtaining prior RMA acceptance from QuadTech, Inc.
-

2.1.1 Maintenance & Cleaning

Remove all the connected wires and cables on the instrument before cleaning. The fan filter on the power supply module has to be cleaned every **three months**. Use a brush to clean the dust. If there are stains on the chassis that cannot be removed by a brush, wipe it with a volatile liquid (such as Cleaning Naphtha). Do not use any corrosive liquid to avoid damaging the chassis. Use a damp cloth with soapy water or a soft detergent to clean the LCD front panel.

For internal cleaning, use a low-pressure air gun to dust the inside or send it back to our agent for cleaning.

2.2 Preparation for Use

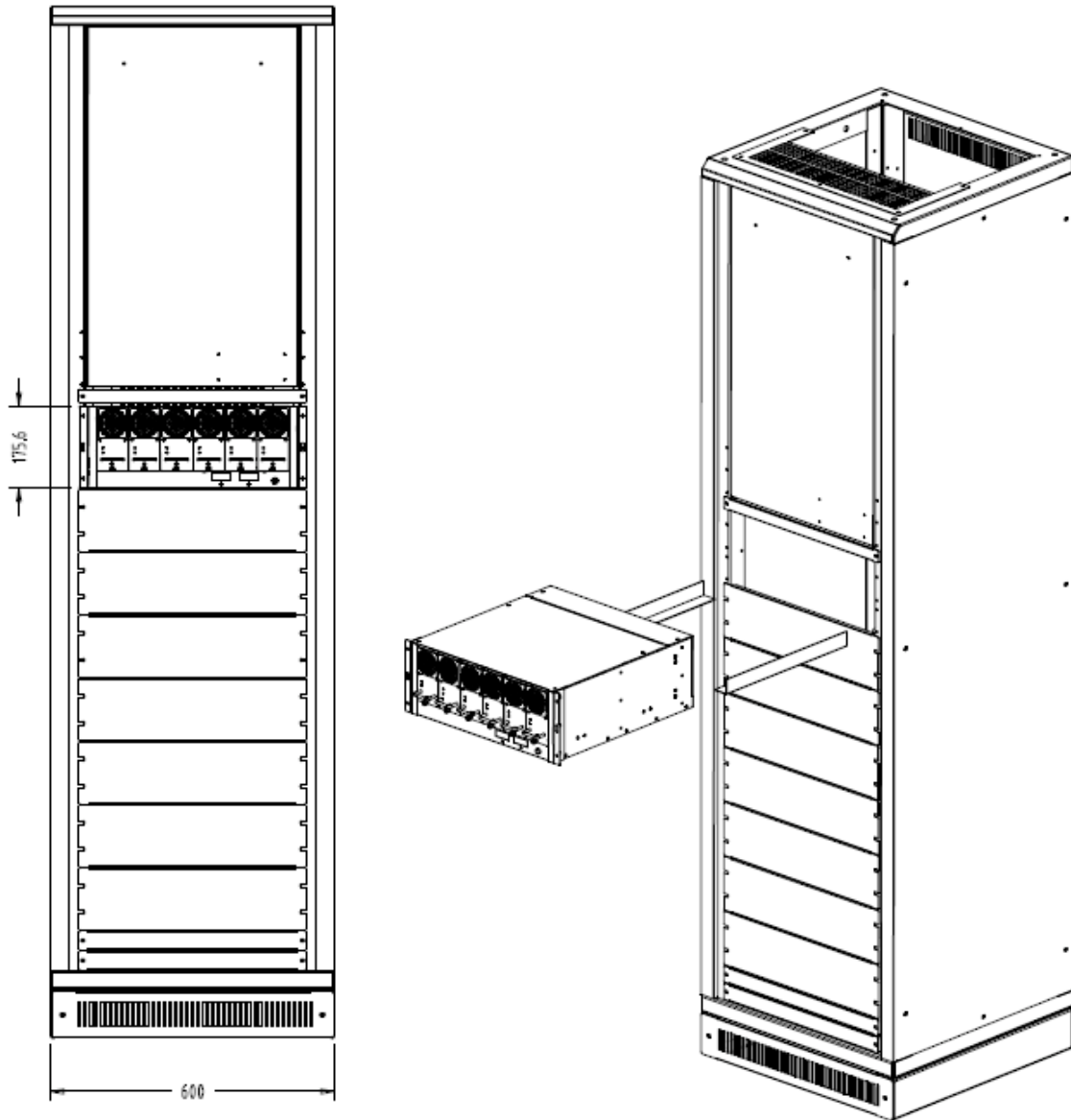
- (1) Be sure the Power Supply is connected to the AC line input and meets the specifications.
- (2) The instrument must be installed in an air-circulated area to avoid the internal temperature getting too high.
- (3) The ambient temperature does not exceed 50°C.

2.2.1 Common Environment Conditions

- (1) Indoor use.
- (2) Altitude up to 2000m.
- (3) Temperature 0°C to 50°C.
- (4) Maximum relative humidity 90% for temperature up to 40°C, decreasing linearity relative humidity to 50% at 50°C.
- (5) Input AC supply voltage fluctuations can vary up to +-15% of the rated voltage.
- (6) Transient over voltage is impulse withstand CAT II.
- (7) Pollution degree II.

2.3 Installation in Rack

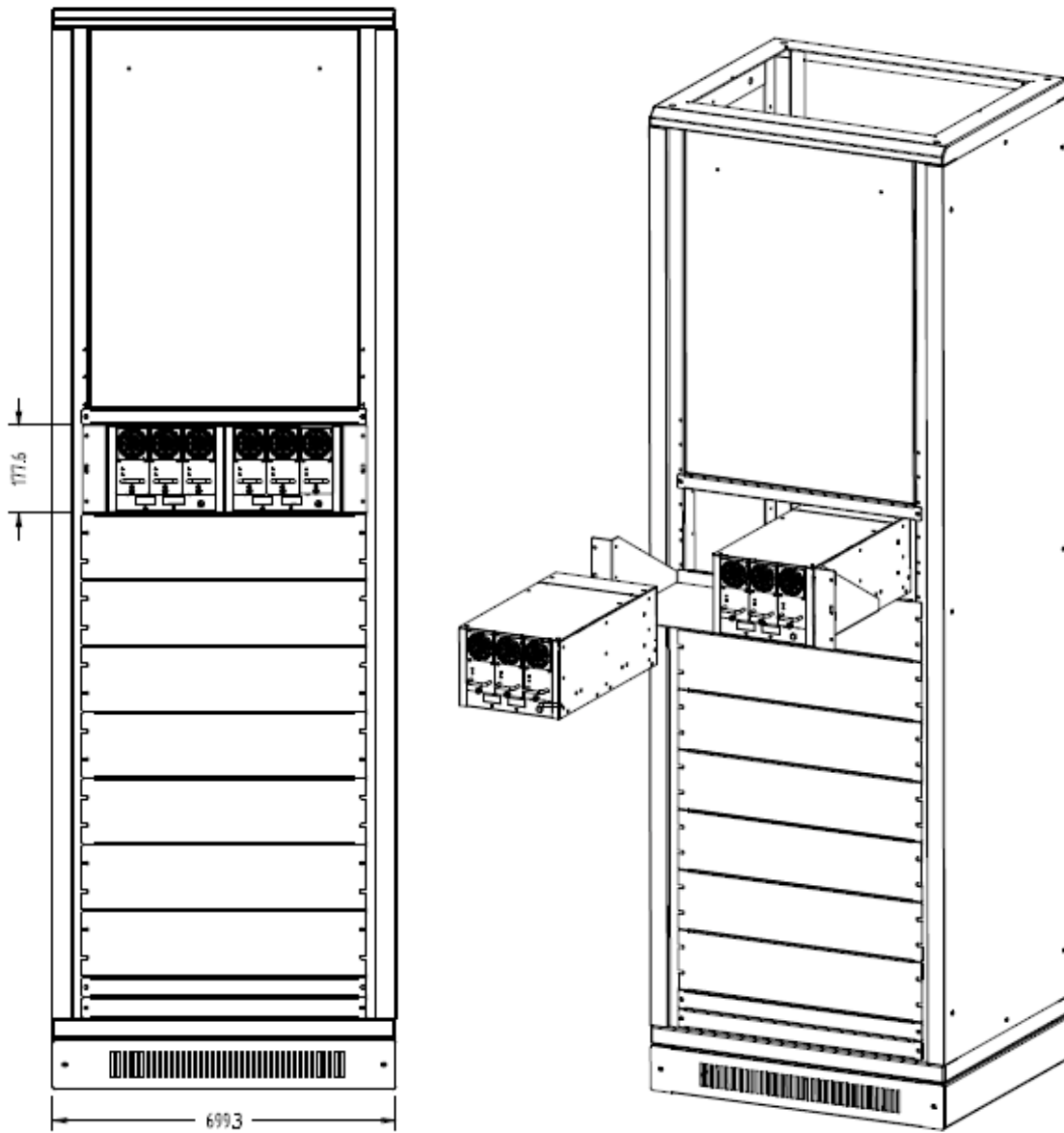
2.3.1 43000-6



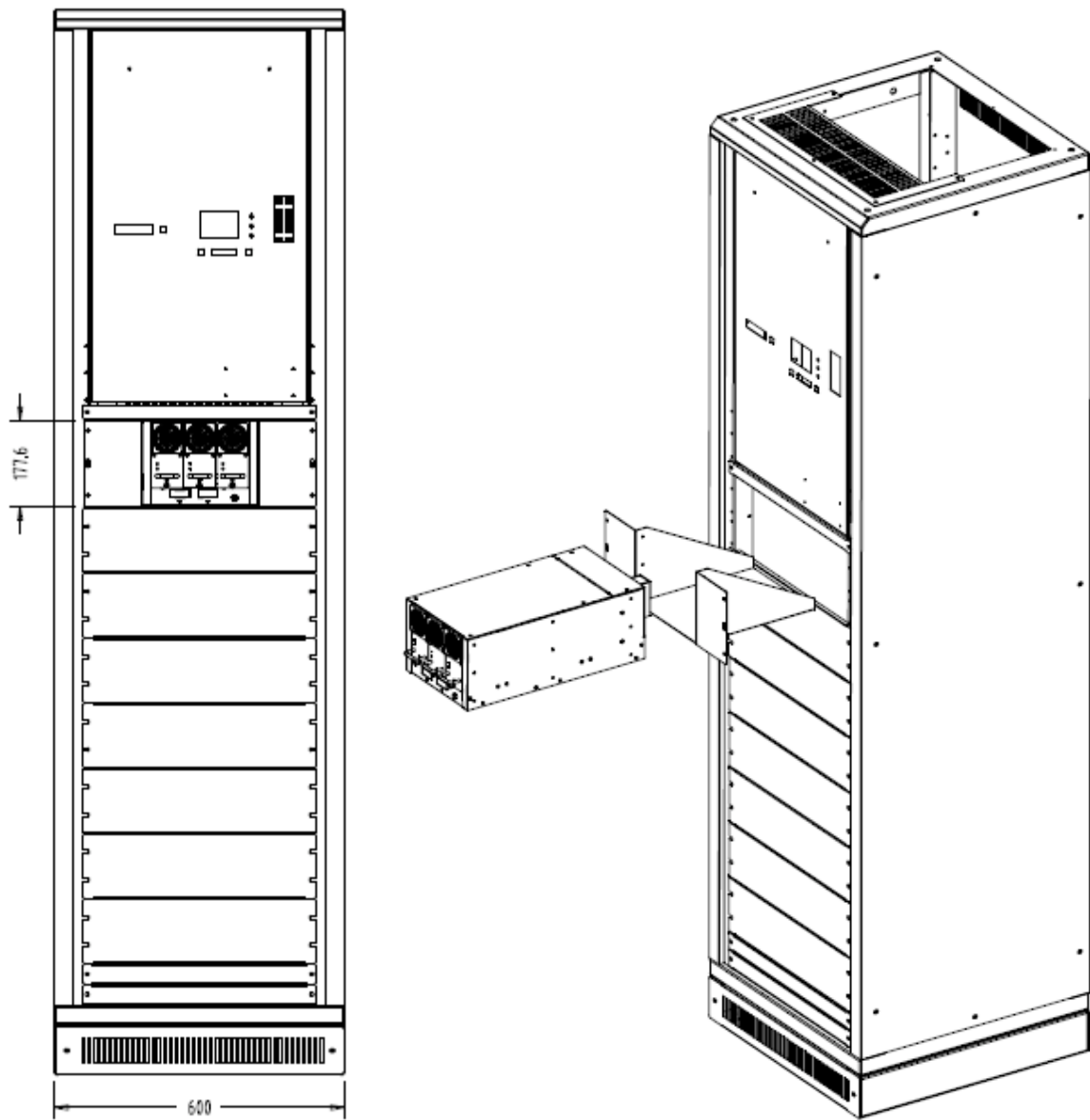
For 19" rack each 4U can hold one 43000-6

PS: It is suggested to use the support angle of 1.6 mm (SPCC/SECC) for rack mount of 4UH.
SECC: Steel - ElectroGalvanized - ColdRolled - Coil
SPCC: Steel Plate Cold rolled Commercial

2.3.2 43000-3



For 23" rack, each 4U can hold 2 sets of 43000-3



For 19" rack, each 4U can hold one 43000-3

3. System Operation & Usage

3.1 Connecting the Input

- (1) The input connector is located at the right side of the rear panel.
- (2) The power cord must be at least 85°C rated.
- (3) The rating of power cord must be between 12AWG to 10AWG.
- (4) See Figure 3-1 and follow the steps below for the assembly:
 - a. Remove the safety cover of input terminal from the DC Power Supply rear panel.
 - b. Remove the cable sleeve on the tip 1cm and tin it.
 - c. Plug in the power terminal and secure it with a Phillips Screwdriver.
 - d. Lock the safety cover to avoid electrical shock.
 - e. Tighten the latch on the safety cover to prevent the power cord from falling or exposing the charged terminal.

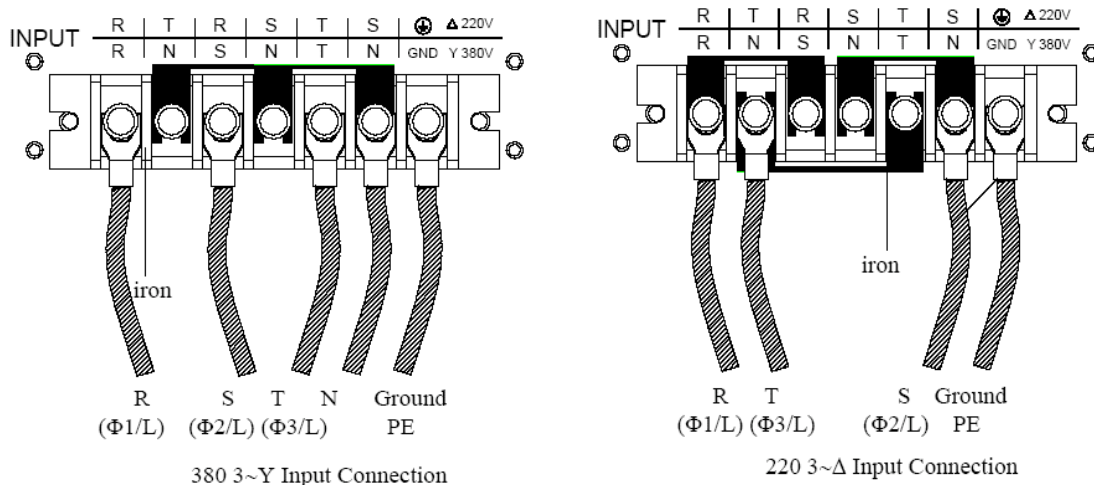


Figure 3-1 Connecting AC INPUT Wires for 43000-6

NOTE: There is no Breaker or Switch for the system input; therefore it activates when power is input. As to output, it is determined by front panel switch.

To cope with the various requirements from customers, the 43000 Series Power Supply has three kinds of on/off operating modes based upon the interface used. All of them can operate the system using 1. Manual on/off, 2. External trigger on/off or 3. Remote on/off. Customers can choose to use one of them with the following precautions in mind.

1. In initial state, the DC power output is determined by the ON/OFF Switch on the MAINFRAME front panel.
2. If the ON/OFF Switch on the Mainframe front panel is ON, but the DC Output is OFF, it is necessary to turn the Mainframe ON/OFF Switch to OFF. Turn ON again to switch the DC Output to ON.

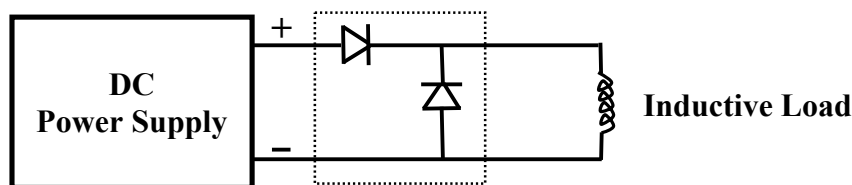
3.2 Notices When Connecting Output

- (1) It is necessary that the withstand current of output cable is larger than the maximum current of the LOAD.
- (2) To prevent the output cable from damage or over-shoot generated by cable inductance, the following method can be applied:

Use a large diameter cable with shortened length and tightly twisted positive/negative wires.

3.2.1 Notices When Connecting Inductive Load

An inductive load may generate a surge voltage and cause the DC Power Supply to be damaged. QuadTech, Inc. recommends adding a protection diode, as the figure shows below, when an inductive load is in use. (The specification of diode voltage in the following figure must be larger than the voltage/current specification of counter-electromotive force and the maximum output current of the DC Power Supply.)



3.2.2 Setting for Mainframe and Power Module

- The voltage range for 43000-15-90 is 1V~15V and the current range is 1A~546A.
- The voltage range for 43000-30-50 is 1V~30V and the current range is 1A~306A.
- The voltage range for 43000-60-25 is 1V~60V and the current range is 1A~156A.
- The voltage range for 43000-80-18 is 1V~80V and the current range is 1A~114A.
- The voltage range for 43000-150-10 is 1V~150V and the current range is 1A~66A.

3.3 Manual Power On/Off Procedure & Setting

Voltage/Current

This procedure is to use the MainFrame front panel switch directly to control the ON or OFF power.

1. Power-On Procedure:
 - a. Input the AC 3-phase 380V/220V.
 - b. Turn the MAINFRAME ON/OFF switch to ON.
 - c. Ensure the module's power output voltage is correct.

2. Setting Voltage (CV MODE):
Use a small flat screwdriver to turn the Voltage V_{SET} . The seven-segment display shows the adjusted voltage. The setting is done after it blinks three times.
3. Setting Current (CC MODE):
Use a small flat screwdriver to turn the Current I_{SET} . The seven-segment display shows the adjusted current. The setting is done after it blinks three times.
4. Power-Off Procedure:
 - a. Turn the MAINFRAME ON/OFF switch to OFF.
 - b. Set the AC Input to OFF.

3.3.1 Setting Over Voltage Protection

Module	Description
43000-15-90	1 ~ MAX SET VALUE 115% OF SET VALUE
	MAX OVP POINT 15V
43000-30-50	1 ~ MAX SET VALUE 115% OF SET VALUE
	MAX OVP POINT 30V
43000-60-25	5 ~ MAX SET VALUE 115% OF SET VALUE (1~5 V set voltage + 0.75V)
	MAX OVP POINT 60V
43000-80-18	5 ~ MAX SET VALUE 115% OF SET VALUE (1~5 V set voltage + 0.75V)
	MAX OVP POINT 80V
43000-150-10	5 ~ MAX SET VALUE 115% OF SET VALUE (1~5 V set voltage + 0.75V)
	MAX OVP POINT 150V

Note: The hardware protection MAX OVP POINT is prior to the software OVP point that is 115% of set value.

3.4 External Trigger Power On/Off Procedure

This procedure is to connect the external trigger connector on the Mainframe rear panel to a common switch, using the external switch to control the ON or OFF power. It is applicable for remote operation.

1. Power-On Procedure:
 - a. Input the AC3-phase 380V/220V.
 - b. Turn the external switch to ON. (Use Open/ Short SW to activate Remote ON/OFF as Figure 3-2 shows.)
 - c. Ensure the module's power output voltage is correct.
2. Power-Off Procedure:
 - a. Turn the external switch to OFF (see Figure 3-2)
 - b. Set the AC Input to OFF.

3.5 Remote Sensing

3.5.1 Correct Usage

1. Correctly connecting the remote sensing wire will ensure the output voltage is the set voltage. The DC Module can compensate the line voltage drop up to 3V under the condition—not exceeding the maximum system output voltage plus 1V.
2. Figure 3-2 shows the connection of the Remote Sensing. Using two cables, connect the load positive/negative connector and the Remote Sensing Connector on the rear panel. The cable diameter has to be larger than 30AWG and the withstand voltage should be within specifications.
3. Though the Remote sensing function is able to compensate a 3V voltage drop, the maximum output power of this series DC power supply is the rated power. (The sum of voltage multiplied by the current on the output terminal) The power that goes beyond the what the DC Module can supply will not be compensated with a line voltage drop up to 3V.

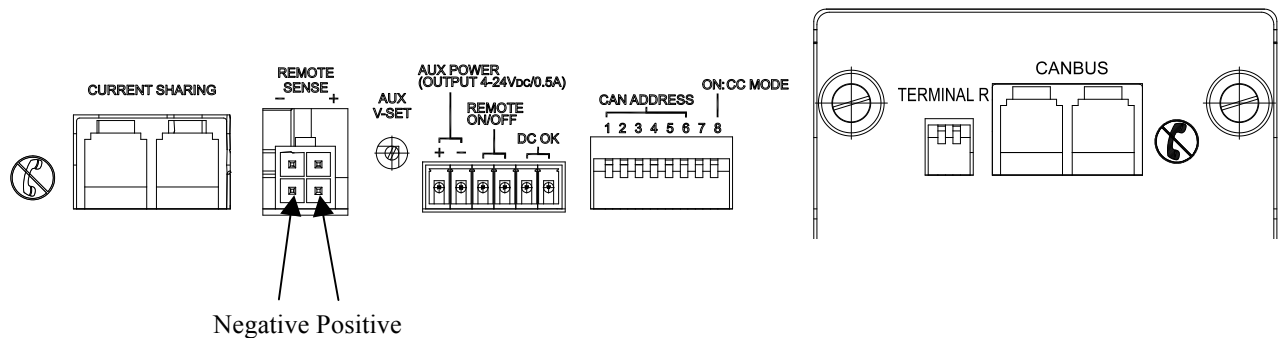


Figure 3-2

3.5.2 Connecting Remote Sensing Wire Polarity Reversely

As Figure 3-2 shows the polarity of the Remote Sensing Wire must be connected correctly, that is the “+” terminal should connect to the “+” of output terminal or its extended cable. Same goes for “-” terminal.

If the polarity is connected in reverse, the DC Module still works normally but is unable to provide the function of voltage compensation.

3.6 Mainframe Parallel Connection

When doing parallel connection, please be aware of the following as Figure 3-3 shows:

- The Current Sharing & Vense Connectors should be connected. The V-Sense should also connect to LOAD via cable for voltage compensation and current sharing.
- CAN bus Communication: It uses a CAN bus Wire to connect to the PC and requires setting the CAN ADDRESS to various positions (see Figure and Table 1-2.)

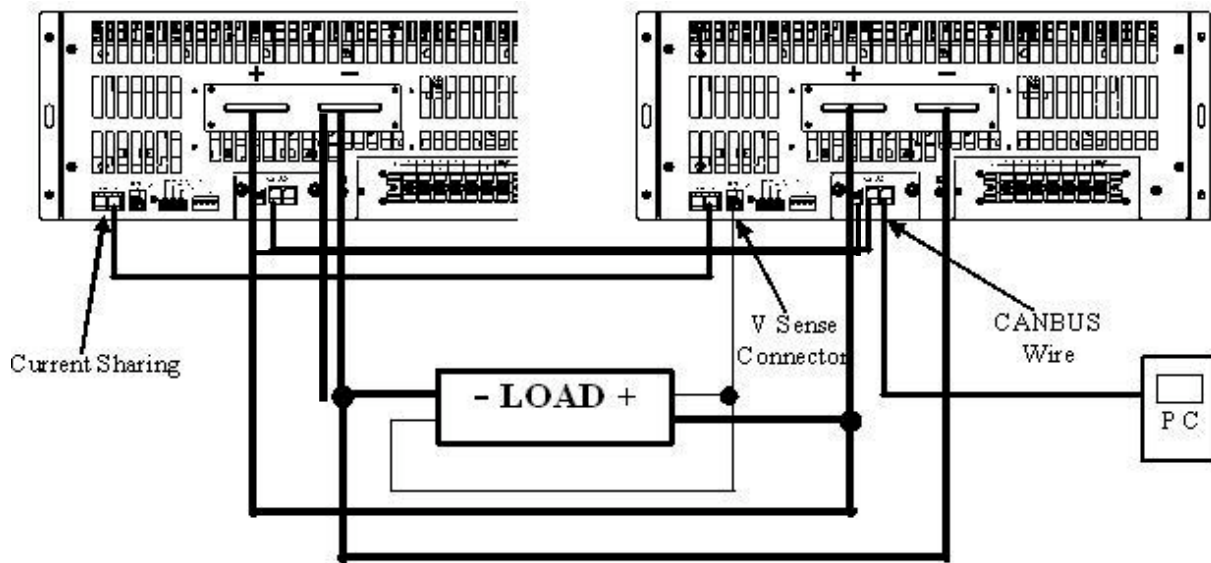


Figure 3-3

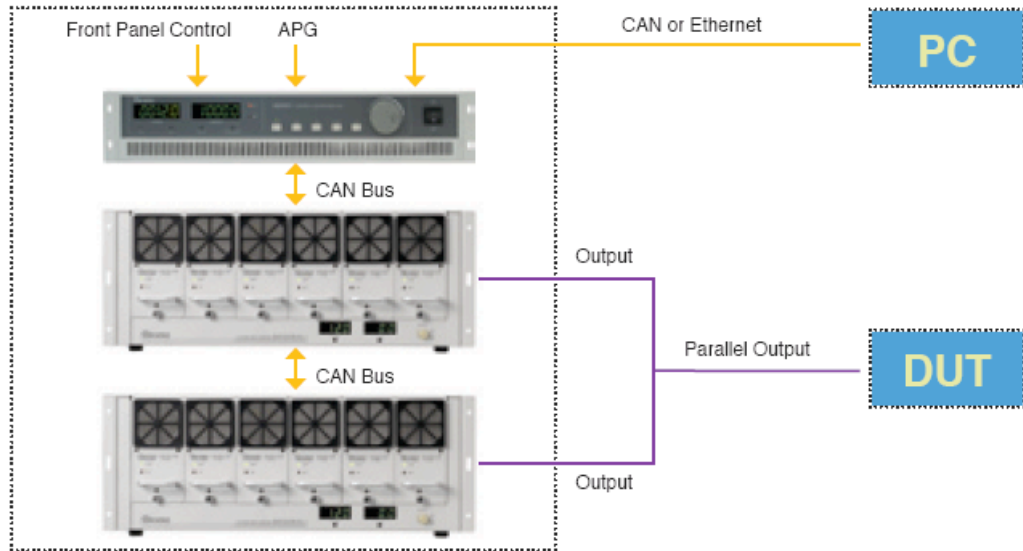
① NOTICE

The Remote Sensing Wire won't be damaged due to wrong polarity connection at this time. Just follow the steps below:

1. First, shut down the device.
2. Connect the remote sensing wire correctly.
3. Reboot the device.
4. Remote Sense needs to be connected to hardware properly when DC Output is OFF. Do not remove or connect the Remote Sense in the DC ON state, or it may cause the hardware to misjudge while performing voltage compensation and stopping output after the DC Module Fault LED is on alarm.
5. Do not insert the DC Module back to the Mainframe connector right away after removing it from the Mainframe connector in a normal operation mode. It is necessary to wait until the Fault LED on the DC Module front panel is off to reinsert the DC Module.
6. Precautions when replacing the power module: Insert the power module accordingly without hesitation and wait until the Output and Fault LEDs are off. Now, the Output LED will blink and turn on to indicate the module is working normally. If the Output and Fault LEDs are on from the beginning it means the power module is not inserted properly. Please take out the power module and reinsert it after the Fault LED is off.

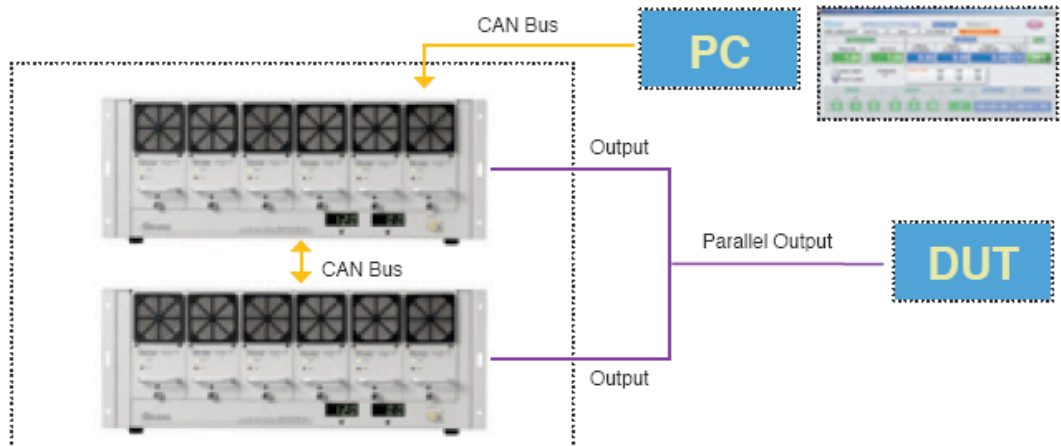
3.7 Application & Control Method for 43000 Series DC Power Supply

Type A - Control with CSU : User can control via APG, CAN Bus/ Ethernet, and front panel manual control for paralleled operation.



Type B - Control without CSU : User can only control via CAN Bus for paralleled operation.

Note: The SoftPanel can control four mainframes for paralleled operation.



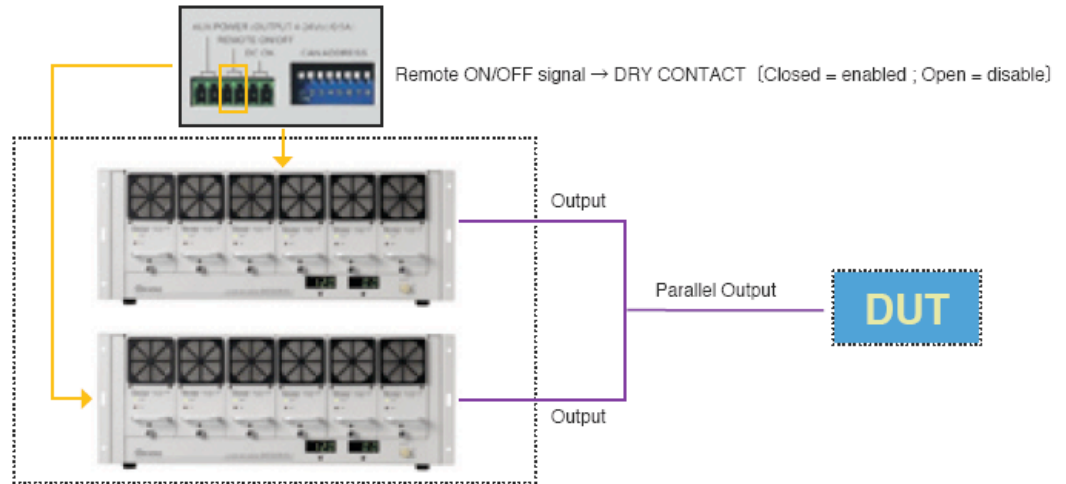
Type C - Control without CSU or PC : User can only control via remote on/off signal for paralleled operation.

Note 1 : User can NOT adjust the output voltage when parallel the output.

Note 2 : The output voltage will fixed in factory default voltage.

Note 3 : If need to adjust the output voltage, please adjust when stand alone.

Note 4 : Time delay from output enable until output stable: 10s max.



4. Communication Protocols

4.1 Preface

The 43000 Series is the DC Power Supply that is suitable for a burn-in test. The communication interface of the physical layer is CAN bus with the Standard Commands for Programmable Instruments (SCPI) applied.

4.2 Introduction to Editing

All commands and response messages should be transmitted in ASCII code format. Before sending out a new command, the response message must be read completely or the remaining message will disappear and generate a query-interrupted error.

4.2.1 Conventions

The following table lists the conventions used in the command.

Angle brackets	< >	The item in angle brackets is the abbreviation of the parameter.
Vertical line		The vertical line divides the replaceable parameter.
Square brackets	[]	The item in square brackets is an option. Ex: OUTP [:STATe] indicate STATe can be ignored.
Braces	{ }	The item in braces means the parameter can be repeated. The <A> {<, B>} mark indicates parameter “A” is necessary and parameter “B” can be ignored, input once or many times.

Table 4-1

4.2.2 Numerical Data Format

Table 4-2 lists the numerical data format the 43000 DC Power Supply receives. The numerical data can be appended at the end to distinguish the data.

Symbol	Description	Example
NR1	A digit without a decimal point. The decimal is assumed to be at the right of the least significant digit.	123, 0123
NR2	A digit with a decimal point.	12.3, .123
NR3	A digit with a decimal point and an exponent.	1.23E+2
NRf	Flexible decimal format including NR1 or NR2 or NR3.	123, 12.3, .23E+3
NRf+	Extended decimal format including NRf, MIN and MAX. MIN and MAX is the high and low limit of the parameter.	123, 12.3, 1.23E+3, MIN, MAX

Table 4-2

4.2.3 Basic Definition

4.2.3.1 Command Tree Structure

The commands of the DC Power Supply are based on a hierarchical structure, also known as a tree system. In order to obtain a particular command, the full path to that command must be specified. This path is represented in the structure by placing the highest node in the farthest left position of the hierarchy. Lower nodes in the hierarchy are indented in the position to the right, below the parent node.

4.2.3.2 Program Headers

Program headers are key words that identify the command. The DC Power Supply accepts characters in both upper and lower case without distinguishing the difference. Program headers consist of two distinctive types—common command headers and instrument-controlled headers.

4.2.3.3 Common Command and Query Headers

The commands leading with a “ * ” are common commands.

4.2.3.4 Instrument-Controlled Headers

Instrument-controlled headers are used for all other instrument commands. Each of them has a long form and a short form. The AC source only accepts the exact short and long forms. A special notation will be given to differentiate two of the same header in this subsection. The short form header is shown in characters of upper case, whereas the rest of the headers are shown in the characters of the lower case.

4.2.3.5 Program Header Separator (:)

If a command has more than one header, the user must separate them with a colon (FETC:CURR FUNC:SHAP). Data must be separated from program headers by at least one space.

4.2.3.6 Program Message

Program messages consist of a sequence of zero or other elements of the program message unit that is divided by separator elements of the program message unit.

4.2.3.7 Program Message Unit

The program message unit represents a single command, programming data or query.

Example: VOLT?, OUTPut ON.

4.2.3.8 Program Message Unit Separator (;)

The separator (semicolon ;) divides the program message unit elements from one another in a program message.

Example: VOLT 80; CURR 15<PMT>

4.2.3.9 Program Message Terminator (<PMT>)

A program message terminator represents the end of a program message. The new command line is a single byte 0Ah (line feed) in ASCII code. Meanwhile, the 43000 response message will use 0Ah as the end.

4.2.4 Traversal of the Command Tree

Multiple program message unit elements can be sent in a program message. The first command is always referred to as the root node. Subsequent commands are in reference to the same tree level as the previous command in a program message. A colon preceding a program message unit changes the header path to root level.

Example:

SOURce:VOLTage:SLEW 1	All colons are header separators.
:SOURce:VOLTage:SLEW 1	Only the first colon is the specified root.
SOURce:VOLTage:SLEW 1;:VOLT 100	Only the third colon is the specified root.

4.2.5 Execution Order

The 43000 DC Power Supply executes program messages by the order received. Program message units, except coupled commands, are executed in order of reception. The execution of the coupled commands is deferred until the program message terminator is received.

4.3 Commands of DC Power Supply

This section describes the syntax and parameters of all commands for DC Power Supply.

- (1) ***CLS** **Clear Status**
 Type: Device status
 Description: *CLS command acts the follows:
 Clear Error Code and Reset Error Message.
 Syntax: *CLS
 Parameter: None
 Example: *CLS
- (2) ***IDN?** **Identification Query**
 Type: System interface
 Description: This query requests the 43000 to identify itself.
 Query Syntax: *IDN?
 Return Parameter: <aard>
 Query Example: *IDN?
 String Description
 QuadTech Manufacturer
 43000-15-90 Model
 01.00 Firmware version
 2005/07/14 Date
 Return Example: QuadTech 43000-15-90, 01.00, 2005/07/14
- (3) ***RST** **Reset Command**
 Type: Device status
 Description: Reset the system and all parameters will return to factory default.
 Syntax: *RST
 Parameter: None
 Example: *RST
- (4) ***SAV** **Save Command**
 Description: It saves the settings of voltage/current and baudrate to EEPROM.
 Syntax: *SAV
 Parameter: None
 Example: *SAV
 Note: All parameters have to execute *SAV command to save to EEPROM, or it will return to the previous settings when the system is rebooted.
- (5) **CONFigure: OUTPut**
 Description: It sets the output voltage/current.
 Syntax: CONFigure: OUTPut ON
 CONFigure: OUTPut OFF
 Parameter: ON/ OFF
 Example: CONFigure: OUTPut ON The power supply starts output.
 Query Syntax: CONFigure: OUTPut?
 Return Parameter: <aard>

Query Example: CONF: OUTP?
 Return Example: ON or OFF

(6) CONFigure: BAUDrate

Description: It sets the baudrate (default is 125000).
 Syntax: CONFigure: BAUDrate <NR1>[suffix]
 Parameter: 10000, 20000, 50000, 100000, 125000, 250000, 500000, 800000, 1000000
 Example: CONFigure:BAUD 250000 It sets the baudrate to 250kbps.
 Note: Once the 43000 DC Power Supply received this command, the baudrate will change immediately to the new setting. Therefore, users have to change it to new baudrate first for the continuing monitoring of the 43000 DC Power Supply.

(7) SOURce: VOLTage

Description: It sets the voltage output (volt.)
 Syntax: SOURce: VOLTage <NRf+>[suffix]
 Parameter: Refers to individual specs for the valid numeric range.
 Example: SOUR:VOLT 15 It sets the output voltage to 15 volt.
 Query Syntax: SOUR:VOLT?
 Return Parameter: <NR2> [Unit=Volt]
 Query Example: SOUR:VOLT? It returns the voltage setting.
 Return Example: 15.00

(8) SOURce: CURRent

Description: It sets the current output (ampere.)
 Syntax: SOURce:CURRent <NRf+>[suffix]
 Parameter: Refers to individual spec for the valid numeric range.
 Example: SOUR:CURR 60.00 It sets the output current to 60 amps.
 Query Syntax: SOUR:CURR?
 Return Parameter: <NR2> [Unit=Amp]
 Query Example: SOUR:CURR? It returns the current setting.
 Return Example: 60.0

(9) SOURce: VOLTage?

Description: It queries the minimum, maximum or default voltage setting.
 Syntax: SOURce:CURRent? < NRf+>[suffix]
 Parameter: MIN|MAX|DEF
 Query Example: SOUR:VOLT? MAX It queries the maximum output voltage set.
 Return Example: 15.00

(10) SOURce: CURRent?

Description: It queries the minimum, maximum or default current setting.
 Syntax: SOURce:CURRent? < NRf+>[suffix]
 Parameter: MIN|MAX|DEF
 Query Example: SOUR:CURR? MAX It queries the maximum output current set.
 Return Example: 546.00

(11) FETCh: VOLTage?

Description: It measures the output of the power supply module and returns the measured voltage.
 Query Syntax: FETCh: VOLTage?
 Return Parameter: <NR2> [Unit=Volt]
 Query Example: FETC:VOLT?
 Return Example: 8.12

(12) FETCh: CURRent?

Description: It measures the output of the power supply module and returns the measured current.
 Query Syntax: FETCh:CURRent?
 Return Parameter: <NR2> [Unit=Amp]
 Query Example: FETC:CURR?
 Return Example: 3.15

(13) FETCh: STATus?

Description: It returns the status code of the power supply's state.
 Query Syntax: FETCh:STATus?
 Return Parameter: aard
 Query Example: FETC:STAT?
 Return Example: 4096, 0 (status flag, alarm flag), voltage output OK without alarm.

Status Flag

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Rsvd	Rsvd	S.W ON	PWR OK	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd

Bit 12 =1: Voltage outputs OK

Bit 12 =0: No voltage output or voltage is not stable yet.

Bit 13 =1: Send CONF:OUTP ON command or the panel switch is at ON.

Bit 13 =0: Send CONF:OUTP OFF command or the panel switch is at OFF.

Alarm Flag (1: Alarm beeps, 0: Normal)

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Alarm	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	Rsvd	OCP OFF	OVP SW	OVP HW	OCP	OTP SW	OTP HW	AC	FAN

Bit 0: Module FAN Fail

Bit 2: Module OTP (Hardware)

Bit 4: OCP (CC Mode)

Bit 6: Module OVP (Software)

Bit 8: Reserved

Bit 10: Reserved

Bit 12: Reserved

Bit 14: Reserved

Bit 1: Mainframe AC Fail

Bit 3: Module OTP (Software)

Bit 5: Module OVP (Hardware)

Bit 7: OCP Shutdown (CV Mode)

Bit 9: Reserved

Bit 11: Reserved

Bit 13: Reserved

Bit 15: Alarm Flag

(14) SYSTem: ERRor?

Description: It returns the error message and code of power supply.
 Query Syntax: SYSTem:ERRor?
 Return Parameter: aard
 Query Example: SYST:ERR?
 Return Example: -203, "Data out of range"

Code	Error Message	Code	Error Message
0	"No Error"	-101	"Invalid character"
-102	"Syntax error"	-103	"Invalid separator"
-104	"Data type error "	-105	"GET not allowed"
-106	"Illegal parameter value"	-108	"Parameter not allowed"
-109	"Missing parameter"	-112	"Programming mnemonic too long"
-113	"Undefined header"	-121	"Invalid character in number"
-123	"Numeric overflow"	-124	"Too many digits"
-131	"Invalid suffix"	-141	"Invalid Character data"
-148	"Character data not allowed"	-151	"Invalid string data"
-158	"String data not allowed"	-202	"Setting conflict"
-203	"Data out of range"	-204	"Too much data"
-211	"Data stale"	-224	"Self-test failed"
-225	"Too many errors"		

4.4 CAN bus Configuration

CAN bus is the abbreviation of Controller Area Network Bus, which is a distribution supported, real-time control, with highly secured serial transmission protocols. The transmission speed is up to 1 Mbits/s. For detailed specification, please refer to *CAN Specification 2.0*.

4.4.1 Limitations of Communication Protocol

Following are the defined limitations of communication protocol, taking the entire system into consideration.

- ◆ Address: Although CAN bus does not apply the concept of address, it will be used for explanation. The address of Master or Slave cannot be set to 0x00, 0xFF. Also, it cannot be duplicated.
- ◆ The Master address cannot be the same as the 43000 Power Supply module.
- ◆ Server/Client Structure: The power module of 43000 Series is Slave and does not send messages actively. However, it uses the way of question and answer.
- ◆ Broadcasting Message: The Slave executes the broadcasted message without responding to it. The address is 0xFF.
- ◆ End code of Packet: The response packet of the 43000 is to end with 0x0a.
- ◆ Extended Frame: It limits the usage of the 29Bit extended frame mode (CAN 2.0B).

4.4.2 Rule for Setting 43000 CAN bus Parameter (Slave)

The initialization of a CAN device usually requires the following parameters: Mode (2.0A or 2.0B), Acceptance Code, Acceptance Mask and Baudrate. The acceptance Code is similar to the address in general. The acceptance Mask is used to filter the message. For 43000, the address set by DIP SWITCH, the conversion rule of Acceptance Code and Acceptance Mask are explained below:

Mode:	2.0B (29-bit identifier)		
Baudrate:	125Kbps (default)		
Acceptance Code:			
	ACC.28~ ACC.21	=0xNN	43000 DIP SWITCH Address
	ACC.20~ ACC.13	=0x00	
	ACC.12~ ACC.5	=0xFF	Broadcast Address
	ACC.4~ ACC.0	=0x00	
Acceptance Mask:			
	ACM.28~ACM.21	=0x00	Filter Enable
	ACM.20~ACM.13	=0xFF	Don't Care
	ACM.12~ACM.5	=0x00	Filter Enable
	ACM.4~ ACM.0	=0xFF	Don't Care

4.4.3 Rule for Setting CAN Adapter Parameter (Master)

The master has to set the parameter as the section described above. One thing to consider, some definitions for Adapter to Acceptance Mask are different (0: Don't Care; 1: Filter Enable). The following explanation uses the PCI-7841 card of ADLINK Technology Inc.

Mode:	2.0B (29-bit identifier)		
Baudrate:	125Kbps (default)		
Acceptance Code:			
	ACC.28~ACC.21	=0xNN	PC Address (user define:1~254)
	ACC.20~ACC.13	=0x00	
	ACC.12~ACC.5	=0x00	
	ACC.4~ ACC.0	=0x00	
Acceptance Mask:			
	ACM.28~ ACM.21	=0x00 or 0xFF	
	ACM.20~ ACM.13	=0xFF	Don't Care
	ACM.12~ ACM.5	=0x00 or 0xFF	
	ACM.4~ ACM.0	=0x00 or 0xFF	

4.4.4 Description of CAN Packet

Figure 4-1 is an example of the Adapter and 43000 CAN parameter setting when a PC is controlling multiple 43000 Power Supply Modules. Physically, it can have 109 CAN devices

(not limited to the 43000 DC Power Supply) connected to bus. The actual controllable power supply module is dependent on the maximum number of addresses that can be set.

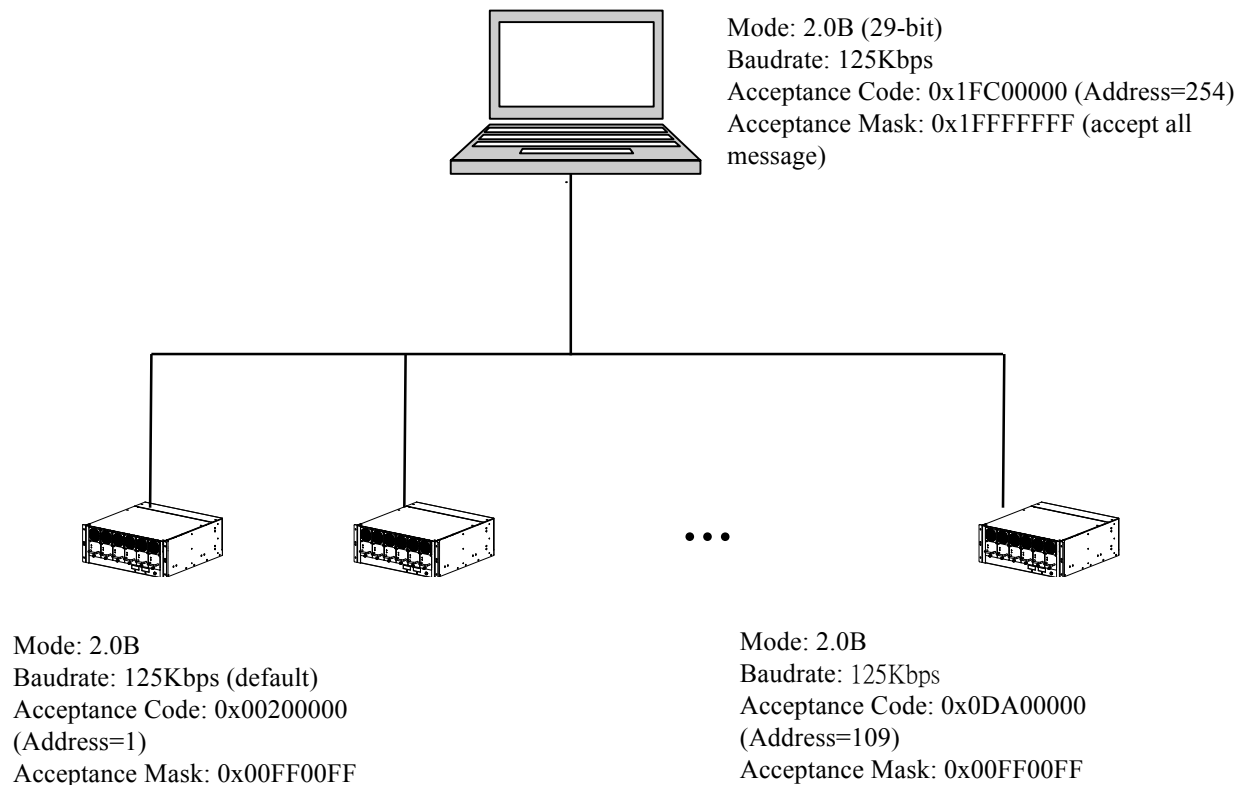


Figure 4-1

S O F	11-Bit Identifier ID28-ID18	S R R	I D E	18-Bit Identifier ID17-ID0	R T R	R 1	R 0	D L C	0-8 Bytes Data	C R C	A C K	E O F	I F S
Extended CAN: 29-Bit Identifier (CAN 2.0 B) Bit Fields													

The above figure is the packet format of CAN 2.0B. Users can compare it to the below example for a better understanding of the meaning for each column. To control the 43000 with the Address, the ID column can be obtained with the following conversion formula, see also *CAN_Tx() Function* in section 4.4.5 *Example Program*:

$$ID = (PC_Address + (43000_Address * (2 ^ 8))) * (2 ^ 13)$$

$$0x3FC000 = (254 + (1 * (2 ^ 8))) * (2 ^ 13)$$

Example 1: SOUR:VOLT 12 →Change mainframe voltage to 12V (Address 1)
 ID=0000000100100000xxxxxxxxxxxxxxxxb
 DCL=8
 RTR=0
 DATA= " SOUR:VOL" +0x0A

Example: FETC:CURR? → Fetch mainframe output current (Address 1)
 ID=0000000100100000xxxxxxxxxxxxxb
 DCL=8
 RTR=0
 DATA=" FETC:CUR " +0x0A

Destination Address: 1 (mainframe) Source Address: 254 (PC) RTR=0 (Data Packet) DLC=8 (Data Length) DATA=8 Bytes

S	O	0	0	0	0	0	0	1	1	1	1	S	I	R	D	1	1	1	1	0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0	R	R	1	0	8	'F'	'E'	'T'	'C'	'.'	'C'	'U'	'R'	C	A	E	L	
F												R	E																																						R	C	O	F

PC Tx Packet 1: Fetch mainframe output current, the first packet

ID=0000000100100000xxxxxxxxxxxxxb
 DCL=3
 RTR=0
 DATA=" R? " +0x0A

Destination Address: 1 (mainframe) Source Address: 254 (PC) RTR=0 (Data Packet) DLC=3 (Data Length) DATA=3 Bytes

S	O	0	0	0	0	0	0	1	1	1	1	S	I	R	D	1	1	1	1	0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0	R	R	1	0	3	'R'	'?'	'A'	x	x	x	x	x	C	A	E	L				
F												R	E																																								R	C	O	F

PC Tx Packet 2: Fetch mainframe output current, the second packet

Destination Address: 254 (PC) Source Address: 1 (Mainframe) RTR=0 (Data Packet) DLC=6 (Data Length) DATA=6 Bytes

S	O	1	1	1	1	1	1	1	1	0	0	S	I	R	D	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	'6'	'0'	'.'	'0'	'0'	A	x	x	C	A	E	L						
F												R	E																																										R	C	O	F

PC Rx Packet: Mainframe responds packet

ID=11111110000000010000000000000b
 DCL=6
 RTR=0
 DATA=" 60.00 " +0x0A

4.4.5 Example Program

The following example is a Visual Basic program code using Port 0 of PCI-7841 to control 43000 Power Supply Module.

```
Dim port0 As PORT_STRUCT
Dim handle0 as Integer
Dim port0status As PORT_STATUS
Dim can0 As CAN_PACKET
Dim PC_Address as Long
```

```
Dim TxBuf (128) As Byte
Dim message As String
'CAN Port Status Define
Const RxBuffer = 1
Const DataOverrun = 2
Const TxBuffer = 4
Const TxEnd = 8
Const RxStatus = 16
Const TxStatus = 32
Const ErrorStatus = 64
```

```
Function Open_7841_CanPort 0()           ' Open PCI_7841 Port 0
    handle0 = CanOpenDriver (0, 0)
    If handle0 = -1 Then
        MsgBox "No PCI-7841 Port Found!"
End Function
```

```
Function Configure_7841_CanPort0()      'Configure PCI_7841 Port 0
    port0.mode = 1                        'CAN 2.0B (29 bit)
    port0.accCode = PC_Address * (2 ^ 21) 'Acceptance Code...Left Shift 21bit
    port0.accMask = &H1FFFFFFF           'Acceptance Mask Filter (Accept all message,filter
                                           function is disable)
    port0.baudrate = 4                    ' User defined baudrate
    CanConfigPort handle0, port0         ' Configure port 0
    CanEnableReceive (handle0)          ' Enable receive function
End Function
```

```
Function Set_Baudrate (baudrate As Long) 'Configure PCI_7841 Port 0 Baudrate
    Select Case (baudrate)
        Case 10000: ' 10K.....BTR0=0x31   BTR1=0x1C
            port0.sjw = 0
            port0.brp = &H31
            port0.sam = 0
            port0.tseg2 = 1
            port0.tseg1 = &HC
        Case 20000: ' 20K..... BTR0=0x18   BTR1=0x1C
            port0.sjw = 0
            port0.brp = &H18
            port0.sam = 0
            port0.tseg2 = 1
            port0.tseg1 = &HC
        Case 50000: ' 50K..... BTR0=0x09   BTR1=0x1C
            port0.sjw = 0
            port0.brp = &H9
            port0.sam = 0
            port0.tseg2 = 1
            port0.tseg1 = &HC
        Case 100000: ' 100K..... BTR0=0x04   BTR1=0x1C
            port0.sjw = 0
```

```

        port0.brp = &H4
        port0.sam = 0
        port0.tseg2 = 1
        port0.tseg1 = &HC
    Case 125000: ' 125K..... BTR0=0x03    BTR1=0x1C
        port0.sjw = 0
        port0.brp = &H3
        port0.sam = 0
        port0.tseg2 = 1
        port0.tseg1 = &HC
    Case 250000: ' 250K..... BTR0=0x01    BTR1=0x1C
        port0.sjw = 0
        port0.brp = &H1
        port0.sam = 0
        port0.tseg2 = 1
        port0.tseg1 = &HC
    Case 500000: ' 500K..... BTR0=0x00    BTR1=0x1C
        port0.sjw = 0
        port0.brp = &H0
        port0.sam = 0
        port0.tseg2 = 1
        port0.tseg1 = &HC
    Case 800000: ' 800K..... BTR0=0x00    BTR1=0x16
        port0.sjw = 0
        port0.brp = &H0
        port0.sam = 0
        port0.tseg2 = 1
        port0.tseg1 = &H6
    Case 1000000: ' 1000K..... BTR0=0x00    BTR1=0x14
        port0.sjw = 0
        port0.brp = &H0
        port0.sam = 0
        port0.tseg2 = 1
        port0.tseg1 = &H4
    End Select
End Function

Function Can_Tx(buf() As Byte, ByVal Length As Integer, _43000_Address As Byte)
    ' Tx data
    Dim i As Byte
    Dim j As Byte
    Dim port As Integer

    j = 0
    For i = 0 To Length
        If j > 7 Then
            j = 0
        End If
        can0.data(j) = buf(i)
    
```

```

j = j + 1
If j = 8 Or i = Length Then
  If BroadcastCheck.value = 1 Then
    can0.CAN_ID = 65535 * (2 ^ 13)           'ID.....Broadcast command
  Else
    can0.CAN_ID = (PC_Address + (_43000_Address * (2 ^ 8))) * (2 ^ 13)
  End If
  can0.rtr = 0                               'data packet
  can0.len = j                               'data length
  CanSendMsg handle0, can0                  'call PCI_7841 function CanSendMsg()
                                           to send Packet

End If
CanGetPortStatus (handle0, port0status)     'read PCI_7841 Port0 status
port = port0status.reg

While (((port And TxEnd) = 0) Or (port And RxStatus)) 'Wait for Port0 is ready for
                                                    Tx and Check Port0 is
                                                    receiving data or not

  DoEvents
Wend
Next i
End Function

Function Can_Rx ( ) As String             'Rx data
  Dim i As Integer

  message = ""
  CanGetRcvCnt (handle0)                   'call PCI_7841 function CanGetRcvCnt ( ) to
                                           get message size

  Do While (CanRcvMsg(handle0, can0) = 0) 'Check PCI_7841 Rx Buffer is empty or not
    For i = 0 To (can0.len - 1)
      If can0.data(i) = &HA Then           'Mark terminal message Character 0x0A
        message = CANRXMessage + "\n"
      Else
        message = CANRXMessage + Chr(can0.data(i))
      End If
    Next
    i = 0
  Loop
  Can_Rx = message
End Function

Function Main ( )
  PC_Address = 254                         'Set PC Address as 254
  Open_7841_CanPort 0                      'Open PCI_7841 Port 0
  Set_Baudrate 12500                       'Set baudrate 125kbps
  Configure_7841_CanPort0                  'Configure CAN Port 0
  TxBuf(0) = &H53                          'S
  TxBuf(1) = &H4F                          'O
  TxBuf(2) = &H55                          'U
  TxBuf(3) = &H52                          'R

```

```

TxBuf(4)= &H3A  ':
TxBuf(5)= &H56  'V
TxBuf(6)= &H4F  'O
TxBuf(7)= &H4C  'L
TxBuf(8)= &H54  'T
TxBuf(9)= &H20  '
TxBuf(10)= &H31 '1
TxBuf(11)= &H35 '5
TxBuf(12)= &HA  'line feed'
Can_Tx TxBuf,13,1      'Set voltage 15V for 43000 with address 1

```

```

TxBuf(0)= &H53  'S
TxBuf(1)= &H4F  'O
TxBuf(2)= &H55  'U
TxBuf(3)= &H52  'R
TxBuf(4)= &H3A  ':
TxBuf(5)= &H43  'C
TxBuf(6)= &H55  'U
TxBuf(7)= &H52  'R
TxBuf(8)= &H52  'R
TxBuf(9)= &H20  '
TxBuf(10)= &H39 '9
TxBuf(11)= &H30 '0
TxBuf(12)= &HA  'line feed'
Can_Tx TxBuf,13,1      'Set current 90A for 43000 with address 1

```

```

TxBuf(0)= &H43  'C
TxBuf(1)= &H4F  'O
TxBuf(2)= &H4E  'N
TxBuf(3)= &H46  'F
TxBuf(4)= &H3A  ':
TxBuf(5)= &H4F  'O
TxBuf(6)= &H55  'U
TxBuf(7)= &H54  'T
TxBuf(8)= &H50  'P
TxBuf(9)= &H20  '
TxBuf(10)= &H4F 'O
TxBuf(11)= &H4E 'N
TxBuf(12)= &HA  'line feed'
Can_Tx TxBuf,13,1      'Set Output On for 43000 with address 1

```

```

TxBuf(0)= &H46  'F
TxBuf(1)= &H45  'E
TxBuf(2)= &H54  'T
TxBuf(3)= &H43  'C
TxBuf(4)= &H3A  ':
TxBuf(5)= &H56  'V
TxBuf(6)= &H4F  'O
TxBuf(7)= &H4C  'L

```

```
TxBuf(8)= &H54    'T
TxBuf(9)= &H3F    '?'
TxBuf(10)= &HA   'line feed'
Can_Tx TxBuf,11,1

Delays
Can_Rx
End Function

'Fetch Output Voltage for 43000 with
address 1
'Delay for 43000 responds
'Receive message
```


5. Self Test & Troubleshooting Overview

Follow the actions described in this chapter to inspect the instrument and troubleshoot the problem if the 43000 Series DC Power Supply is operating abnormally. Please consult the distributor or QuadTech, Inc. if the information provided in this manual is unable to resolve the problem.

Troubleshooting

Operation problems and suggestions for resolution:

Problem	Cause	Resolution
Bad measurement for V, I	Feature swings due to aged components.	Consult a local sales agent for assistance.
Output is not within Accuracy SPEC.	Feature swings due to aged components.	Consult a local sales agent for assistance.
Over Temperature Protection (OTP)	1. The ambient temperature is too high. 2. The vent is blocked.	1. Operate the instrument within the temperature of 0 ~ 50°C. 2. Clear the vent.
Over Current Protection (OCP)	The output current exceeds the specifications or OCP settings.	Remove the over load or enlarge the OCP settings.
Fan Fail Protection (FAN LOCK)	1. The fan is out of order. 2. The feedback circuit is abnormal.	Consult a local sales agent if it is unable to reset to the protection state.
Input Error Protection	The voltage of AC input line is either too low or too high.	Adjust the voltage if it exceeds the spec. when measuring the input voltage.
No output voltage	1. The output voltage feedback is abnormal. 2. The D/D power stage is damaged.	Consult a local sales agent if unable to reset to the protection state.
Over Voltage Protection (OVP)	The output voltage exceeds the specifications or OVP settings	1. Check the OVP settings. 2. Consult a local sales agent if it is unable to reset to the protection state.
Unable to control DC Module via CAN bus	1. The address of the 43000 Mainframe is incorrect. 2. The CAN bus cable is loose and fallen at the rear.	1. Update the Mainframe address at the rear. 2. Check the CAN bus interface and secure it with screws.
Power module is inserted improperly	The LEDs of power module Output and Fault are always on.	Take out the power module and wait until the Fault LED is off for reinsertion.