



Fig.1: DF-C Series Power Supply (DF-C6310)

## 1. Introduction

Designed for high-performance lab and industrial applications, the DF-C Series AC Laboratory Power Supplies are fully maintenance-free up to the megawatt range, even at 24/7 full load. Switchable low voltage high current (LV 0 ... 150Vrms) or high voltage low current (FS 0 ... 300Vrms) ranges offer maximum flexibility. These laboratory power supplies offer excellent frequency and voltage stability as well as a clean sine waveform, and the range of functions can be extended by many options and adapted to the requirements.

## 2. Features of the DF-C series

- **Maximum output Voltage 300Vrms L-N (up to 2kVrms L-N on request)**
- **Two output ranges: LV 0 - 150Vrms L-N (high current) / FS 0 - 300Vrms L-N (high voltage)**
- **Maximum output Current 1260A (LV) / 630A (FS) (up to 3kA L-N L-N on request)**
- **Maximum output Power 1MVA**
- **Voltage adjustable 0.1Vrms ... Max in 0.1V steps**
- **Frequency adjustable 47Hz ... 63Hz (Optionally 100Hz, 200Hz, 400Hz) in 0.1Hz steps**
- **Clean True-Sine Waveform**
- **Intuitive front panel operation**
- **4 Digit LED Display for Voltage, Current, Frequency, Power and Power Factor (Preset and actual values)**
- **Constant Voltage (CV) operation**
- **Digital connection possibilities available: RS232, RS485**
- **Constant operation 24/7 at full load possible**
- **Capable of complete remote operation through RS232 / RS485**
- **Short-Circuit proof (Automatic output shut down in case of over-current)**

## 3. Dimensioning Guidelines

All of our laboratory power supplies and industrial power sources are designed and tested to supply the maximum rated power continuously, but the recommended power range for continuous use is 0 ... 80% of the rated power to ensure best possible performance and longevity. Following you will find guidelines which we strictly recommend to follow while picking the correct power supply model.

### 3.1 Definition of „continuous operation“

The power supply is under continuous operation if operated longer than 12 hours a day, or 8 hours a day for at least 5 following days.

### 3.2 Continuous operation guidelines

If the power supply is intended to be used in a industrial process (automated or not) which requires continuous (See point 3.1) power supply at a given capacity x it is strictly recommended to use a power supply with a maximum power of 120% of x. This will ensure that the power supply does not operate near its limits and thus keep the components cool what ensures a significantly longer life time of the equipment and better performance.

## 4. DSC-Electronics AC Laboratory Power Supply series comparison

	DF-C63XXX SERIES	DF-C61XXX SERIES	DF-S51XXX SERIES	DF-S50XXX SERIES
<b>Output Phase:</b>	3	1	1	1
<b>Voltage:</b>	0 ... 300Vrms L-N (0 ... 2kVrms L-N)*	0 ... 300Vrms L-N (0 ... 2kVrms L-N)*	0 ... 300Vrms L-N	0 ... 300Vrms L-N
<b>Current L-N:</b>	0 ... 1260A LV** / 0 ... 630A FS** (0 ... 3kA L-N)*	0 ... 540A LV** / 0 ... 270A FS** (0 ... 3kA L-N)*	0 ... 42A L-N	0 ... 42A L-N
<b>Frequency:</b>	47Hz ... 63Hz / 100Hz* / 200Hz* / 400Hz*	47Hz ... 63Hz / 100Hz / 200Hz / 400Hz*	45Hz ... 250Hz	45Hz ... 250Hz
<b>Power:</b>	0 ... 1MVA	0 ... 1MVA	0 ... 5KVA	0 ... 1200VA
<b>Cabinet:</b>	Stand-Alone Rack	Stand-Alone Rack	Non-Standard	Non-Standard
<b>Regulation:</b>	U	U	U	U
<b>Load Regulation U:</b>	≤1%	≤1%	≤1%	≤1%
<b>Line Regulation U:</b>	≤1%	≤1%	≤1%	≤1%
<b>Frequency Stability:</b>	≤0.01%	≤0.01%	≤0.01%	≤0.01%
<b>Voltage Stability:</b>	±1%	±1%	±1%	±1%
<b>Harmonic Distortion:</b>	≤2%	≤2%	≤2%	≤2%
<b>Crest Factor:</b>	≤2%	≤2%	≤2%	≤2%
<b>Recovery Time (50% Chg.):</b>	≤15ms	≤15ms	≤15ms	≤15ms
<b>Display Accuracy U:</b>	±0.5% FS + 5 dig	±0.5% FS + 5 dig	±0.5% FS + 5 dig	±0.5% FS + 5 dig
<b>Display Accuracy I:</b>	±0.5% FS + 5 dig	±0.5% FS + 5 dig	±0.5% FS + 5 dig	±0.5% FS + 5 dig
<b>Display Accuracy P:</b>	±0.5% FS + 5 dig	±0.5% FS + 5 dig	±0.5% FS + 5 dig	±0.5% FS + 5 dig
<b>Display Accuracy F:</b>	±0.01% FS + 5 dig	±0.01% FS + 5 dig	±0.01% FS + 5 dig	±0.01% FS + 5 dig
<b>Setting Accuracy U:</b>	±1% FS	±1% FS	±1% FS	±1% FS
<b>Setting Accuracy F:</b>	±0.1% FS	±0.1% FS	±0.1% FS	±0.1% FS
<b>Ext. Control Analogue:</b>	Yes*	Yes*	No	No
<b>Ext. Feedback Analogue:</b>	Yes*	Yes*	No	No
<b>RS232:</b>	Yes*	Yes*	Yes	No
<b>RS485:</b>	Yes*	Yes*	No	No
<b>RS422:</b>	Yes*	Yes*	No	No
<b>Open Protocol:</b>	Yes	Yes	Yes	-
<b>Modbus-RTU:</b>	No	No	No	-
<b>SCPI:</b>	No	No	No	-
<b>Interlock:</b>	Yes*	Yes*	Yes*	Yes*
<b>Ext. Outp. On/Off Contr.:</b>	Yes*	Yes*	Yes*	Yes*

\* Optional

\*\* LV = High current range 0 - 150Vrms L-N / FS = High voltage range 0 - 300Vrms L-N

## 5. Typical Electrical Characteristics Of The DF-C6XXXX Series

Phase:	3
Voltage:	0 ... 300Vrms L-N (0 ... 2kVrms L-N)*
Current:	0 ... 1260A LV** / 0 ... 630A FS** (0 ... 3kA L-N)*
Frequency:	47Hz ... 63Hz / 100Hz* / 200Hz* / 400Hz*
Power:	0 ... 1MVA
Cabinet:	Stand-Alone Rack
Regulation:	U
Load Regulation U:	≤1%
Line Regulation U:	≤1%
Frequency Stability:	≤0.01%
Voltage Stability:	±1%
harmonic Distortion:	≤2%
Crest Factor:	≤2%
Recovery Time (50% Chg.):	≤15ms
Display Accuracy U:	±0.5% FS + 5 dig
Display Accuracy I:	±0.5% FS + 5 dig
Display Accuracy P:	±0.5% FS + 5 dig
Display Accuracy F:	±0.01% FS + 5 dig
Setting Accuracy U	±1% FS
Setting Accuracy F:	±0.1% FS
Ext. Control Analogue:	Yes*
Ext. Feedback Analogue:	Yes*
RS232:	Yes*
RS485:	Yes*
RS422:	Yes*
Open Protocol:	Yes
Modbus-RTU:	No
SCPI:	No
Interlock:	Yes*
Ext. Outp. On/Off Ctrl.:	Yes*

\* Optional

\*\* LV = High current range 0 - 150Vrms L-N / FS = High voltage range 0 - 300Vrms L-N

### 4.1 Power Grid Requirements

#### 4.1.1 EU Version

Max. Output P ≤ 6kW	Max. Output P > 6kW
<b>Power grid:</b> 1 Ph. (PE, L1, N) 230V AC 50/60Hz ±10% <b>Nominal operation Current (A):</b> $I = (\text{Output P} / 230) + 2$ <b>Slow start circuit type:</b> Active <b>Maximal inrush Current (A):</b> $I = \leq(\text{Max. device P} / 230) + 10$ <b>Suggested circuit breaker type:</b> C, D, K	<b>Power grid:</b> 3 Ph. (PE, L1, L2, L3) 400V AC 50/60Hz ±10% <b>Nominal operation Current (A):</b> $I = ((\text{Output P} / 400) / 1,73) + 2$ <b>Slow start circuit type:</b> Active <b>Maximal inrush Current (A):</b> $I = \leq((\text{Max. device P} / 400) / 1,73) + 5$ <b>Suggested circuit breaker type:</b> C, D, K

#### 4.1.2 US Version

Max. Output P ≤ 3.5kW	Max. Output P > 3.5kW
<b>Power grid:</b> 1 Ph. (PE, L1, N) 120V AC 50/60Hz ±10% <b>Nominal operation Current (A):</b> $I = (\text{Output P} / 120) + 2$ <b>Slow start circuit type:</b> Active <b>Maximal inrush Current (A):</b> $I = \leq(\text{Max. device P} / 120) + 10$ <b>Suggested circuit breaker type:</b> C, D, K	<b>Power grid select-able with order:</b> <b>A:</b> 3 Ph. (PE, L1, L2, L3) 480V AC 50/60Hz ±10% <b>B:</b> 3 Ph. (PE, L1, L2, L3) 208V AC 50/60Hz ±10% <b>Nominal operation Current (A):</b> $I = (\text{Output P} / \text{Inp. V}) + 2$ <b>Slow start circuit type:</b> Active <b>Maximal inrush Current (A):</b> $I = \leq(\text{Max. device P} / \text{Inp. V}) + 5$ <b>Suggested circuit breaker type:</b> C, D, K

## 6. Mechanical Characteristics

### 5.1 Cabinet Types

Cabinet Size	Dimensions	DIN 41494 SC48D	Used With
1	360W x 520H x 500D mm	Stand-Alone	See Table 5.2
2	430W x 630H x 520D mm	Stand-Alone	See Table 5.2
3	480W x 800H x 600D mm	Stand-Alone	See Table 5.2
4	520W x 1000H x 820D mm	Stand-Alone	See Table 5.2
5	720W x 1220H x 1080D mm	Stand-Alone	See Table 5.2
6	500W x 900H x 680D mm	Stand-Alone	See Table 5.2
7	590W x 1100H x 800D mm	Stand-Alone	See Table 5.2
8	720W x 1220H x 1080D mm	Stand-Alone	See Table 5.2
9	750W x 1330H x 1380D mm	Stand-Alone	See Table 5.2
10	1380W x 1450H x 870D mm	Stand-Alone	See Table 5.2
11	2100W x 1650H x 1350D mm	Stand-Alone	See Table 5.2
12	2600W x 1800H x 1550D mm	Stand-Alone	See Table 5.2

**Note:** The above frame dimensions do not include knobs, terminals or standing feet/wheels.

### Stand-Alone Rack Characteristics

**Description:** Stand alone rack with massive rubber wheels.

**Material:** 1.5mm steel plates.

**Bottom:** Rubber wheels, with breaks.

**Front:** Service door with key, output connections behind the door, display and control elements on the front.

**Rear:** Output connections, fuse.

### 5.2 Size table

Model	Basic Version	
	Cabinet Size	Weight
DF-C6105	1	80kG
DF-C6106	1	80kG
DF-C6110	4	150kG
DF-C6115	4	180kG
DF-C6120	4	200kG
DF-C6130	4	270kG
DF-C6145	5	340kG
DF-C6160	5	420kG
DF-C6303	6	60kG
DF-C6306	6	120kG
DF-C6310	6	150kG
DF-C6315	6	200kG
DF-C6320	7	260kG
DF-C6330	7	300kG
DF-C6345	8	340kG
DF-C6360	8	400kG
DF-C63100	9	600kG
DF-C63150	10	900kG
DF-C63200	11	1300kG
DF-C63300	12	1750kG
DF-C63400	12	1900kG
DF-C63450	12	2100kG

### 5.3 Connection Plugs & Terminals

#### 5.3.1 Power Grid Connection

DF-C Series power supplies are equipped with a terminal block on the front side / rear side for connection of the input power. Depending on the model (1 Phase Input / 3 Phase Input) the terminal block has 3 (N, L1, PE) or 5 (L1, L2, L3, N, PE) terminals. The terminals are equipped with M6 / M8 screws to connect power line cables in cable lugs. The proper cable wire size can be selected according to the nominal operation current calculated with the formula provided in point 4.1 of the datasheet.

## 5.3.2 RS232

### Option: [D]

DF-C series devices can be equipped with an RS232 or RS485 connection to read/write output values in real time.

(Please see communication protocol at the end of the manual)

The RS485 connector is a 2 Pin male socket on the rear side of the device, the fitting plug is supplied with the device while the RS232 connector is a standard D-SUB 9 Pin female connector located on the rear side of the device.

## 5.3.3 Analog Connections

The DF-C series devices can be equipped with optional functions. If these optional functions require any signal In- / Output connections, these are located on the front side of the device accessible through a terminal block. The pin-out is described below the terminal block and depends on the configuration you choose.

## 7. Options & Model Number

The DF-C Series can be configured with options, which are described below.

### **[Z1] ACCESSORY: 2m Cable with CEE Plug male blue 32A / red 32A**

The laboratory power supply will be supplied with a 2m connection cable and matching CEE plug Blue 32A / Red 32A. Power supplies with 1 Phase input are shipped with CEE plug Blue 32A, devices with 3 Phase input come with CEE plug Red 32A. See point 4.1 for more information on the input configuration of specific models.

NOTE: Available only for models under 21KVA output power.

### **[U] Ext. analog control U**

Input for external control of the output voltage via an analog control signal.

Possible configurations:

- [1] 0 - 10V Signal**
- [2] 0 - 5V Signal**
- [3] 4 - 20mA Signal**

The Power supply can either be controlled internally, or externally which is selected by a switch on the rear side of the device.

### **[F] Ext. analog feedback U**

Returns the actual value of the output voltage.

Possible configurations:

- [1] 0 - 10V Signal**
- [2] 0 - 5V Signal**
- [3] 4 - 20mA Signal**

### **[G] Ext. analog feedback I**

Returns the actual value of the output current.

Possible configurations:

- [1] 0 - 10V Signal**
- [2] 0 - 5V Signal**
- [3] 4 - 20mA Signal**

## [A] Ext. Output On/Off Ctrl. & Interlock

Input for controlling the status of the output of the laboratory power supply (on / off), switchable as "Interlock" or external control. This input is configured as a two pin connection, a „true" state is triggered by shorting the two pins and a „false" state is triggered by removing any connection between the two pins of the input.

This option can be configured as either an interlock input, which disables the output of the power supply if the state is false, or as an external output status control which enables or disables the output of the power supply depending on the control signal state (true = on/false = off) if the „Output On/Off" switch of the power supply is always in the ON position.

## [D] Digital connection

Digital connection for setting and reading the device parameters in real time via an open protocol.

Possible configurations:

- [1] RS485 plus RS485 -> RS232 Adapter
- [2] RS485

## [N] Galvanic separation

The output of DF-C series devices in the basic version has a potential to PE, which follows the usual protection regulations. All models can also be ordered in the following modifications:

### [1] Configurable output without ELCB

The output of the power supply has no potential to the input (PE), so the output of the device has no protective earth for loads that may require a PE connection and the load is not protected by a ELCB ! By bridging output N to input N, the output can be pulled to the input potential, in this case input PE = output PE and the load is protected by the ELCB installed in the operation environment (Laboratory).

### [2] Configurable output with built-in ELCB

The model with integrated ELCB offers the following switchable configurations:

#### A). Potential-free output with its own ELCB

Connections output

L (1, 2, 3): Phase (potential-free)

N: Neutral conductor (potential-free)

GND: In this configuration to use as PE connection for the load

Remark: ELCB triggers as soon as a residual current flows through the GND conductor.

Connections input

L1: Input phase 1

L2: Input phase 2

L3: Input phase 3

N: Neutral conductor

PE: Earth conductor

#### B). Output with potential to input (potential to input PE)

Connections output

L (1, 2, 3): Phase

N: Neutral → Bridge to input N

GND: Do not connect

Connections input

L1: Input phase 1

L2: Input phase 2

L3: Input phase 3

N: Neutral conductor

PE: Earth conductor

## 6.1 Model Number

The model number is encrypted as follows:

Model Number [Accessory, Accessory, ... ] [Option (Suboption), Option (Suboption), ... ]

Example: DF-C6310 Z1 D2N2

Example Model: DF-C6310

Example Accessories: Z1

Example Options: D2, N2

## 6.2 Models

This table lists our basic models with their Voltage / Current / Power combinations, but the Series is not limited to the models listed. For any custom requests please contact us under [service@dsc-electronics.com](mailto:service@dsc-electronics.com).

MODEL	PHASE	VOLTAGE	CURRENT (LV)**	CURRENT (FS)**	POWER
DF-C6105	1	300Vrms L-N	45 A	22.5 A	5000 VA
DF-C6106	1	300Vrms L-N	54 A	27 A	6000 VA
DF-C6110	1	300Vrms L-N	90 A	45 A	10000 VA
DF-C6115	1	300Vrms L-N	136 A	68 A	15000 VA
DF-C6120	1	300Vrms L-N	180 A	90 A	20000 VA
DF-C6130	1	300Vrms L-N	270 A	135 A	30000 VA
DF-C6145	1	300Vrms L-N	408 A	204 A	45000 VA
DF-C6160	1	300Vrms L-N	540 A	270 A	60000 VA
DF-C6303	3	300Vrms L-N / 520Vrms L-L	8.4 A	4.2 A	3000 VA
DF-C6306	3	300Vrms L-N / 520Vrms L-L	16.8 A	8.4 A	6000 VA
DF-C6310	3	300Vrms L-N / 520Vrms L-L	28 A	14 A	10000 VA
DF-C6315	3	300Vrms L-N / 520Vrms L-L	42 A	21 A	15000 VA
DF-C6320	3	300Vrms L-N / 520Vrms L-L	58 A	29 A	20000 VA
DF-C6330	3	300Vrms L-N / 520Vrms L-L	84 A	42 A	30000 VA
DF-C6345	3	300Vrms L-N / 520Vrms L-L	126 A	63 A	45000 VA
DF-C6360	3	300Vrms L-N / 520Vrms L-L	168 A	84 A	60000 VA
DF-C63100	3	300Vrms L-N / 520Vrms L-L	276 A	138 A	100000 VA
DF-C63150	3	300Vrms L-N / 520Vrms L-L	416 A	208 A	150000 VA
DF-C63200	3	300Vrms L-N / 520Vrms L-L	556 A	278 A	200000 VA
DF-C63300	3	300Vrms L-N / 520Vrms L-L	834 A	417 A	300000 VA
DF-C63400	3	300Vrms L-N / 520Vrms L-L	1112 A	556 A	400000 VA
DF-C63450	3	300Vrms L-N / 520Vrms L-L	1260 A	630 A	450000 VA

\*\* LV = High current range 0 - 150Vrms L-N / FS = High voltage range 0 - 300Vrms L-N