



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 provide excellent frequency and voltage stability, as well as a clean sine waveform, and the range of functions, as well as the output characteristics, can be extended and adapted to the requirements.

## 2. Features of the DF-C Series

- Maximum output Voltage 300Vrms L-N (up to 3kVrms 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 on request)
- Maximum output power 1MVA
- Voltage adjustable 0.1Vrms ... Max in 0.1V steps
- Frequency adjustable in 0.1Hz steps 47Hz ... 63Hz with optional 100Hz and 200Hz (DF-C Series)  
350Hz ... 450Hz and up to 5kHz (DF-CM Series)
- 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 (alternatively constant current (CC) operation on request)
- Digital connection with complete remote operation possible: Option D1 - RS232, Option D2 - RS485
- Analog I/O optionally available: 0 ... 10V / 0 ... 5V / 4 ... 20mA
- Short-circuit proof (automatic output shutdown 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 the best possible performance and longevity. Following, you will find guidelines that we strictly recommend following while selecting the correct power supply model.

### 3.1. Definition of „continuous operation“

The power supply is under continuous operation if operated for longer than 6 hours a day without breaks.

### 3.2. Continuous operation guidelines

If the power supply is intended to be used in an industrial process (automated or not) that 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 keeps the components cool, which ensures a significantly longer lifetime for the equipment, better performance, and higher efficiency.

## 4. DSC-Electronics AC Laboratory Power Supply Series Comparison

	DF-C63XXX SERIES	DF-CM63XXX SERIES	DF-C61XXX SERIES	DF-CM61XXX SERIES	DF-S51XXX SERIES	DF-S50XXX SERIES
<b>Output Phase:</b>	3	3	1	1	1	1
<b>Voltage:</b>	0 ... 300Vrms L-N (0 ... 3kVrms L-N)*	0 ... 300Vrms L-N (0 ... 3kVrms L-N)*	0 ... 300Vrms L-N (0 ... 3kVrms L-N)*	0 ... 300Vrms L-N (0 ... 3kVrms L-N)*	0 ... 300Vrms L-N (0 ... 3kVrms L-N)*	0 ... 300Vrms L-N (0 ... 3kVrms L-N)*
<b>Current L-N:</b>	0 ... 1260A LV** / 0 ... 630A FS** (0 ... 3kA L-N)*	0 ... 1260A LV** / 0 ... 630A FS** (0 ... 3kA L-N)*	0 ... 540A LV** / 0 ... 270A 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*	350Hz ... 450Hz (up to 5kHz)*	47Hz ... 63Hz / 100Hz* / 200Hz* / 400Hz*	350Hz ... 450Hz (up to 5kHz)*	45Hz ... 250Hz	45Hz ... 250Hz
<b>Power:</b>	0 ... 1MVA	0 ... 1MVA	0 ... 1MVA	0 ... 1MVA	0 ... 5KVA	0 ... 1200VA
<b>Cabinet:</b>	Stand-Alone Rack	Stand-Alone Rack	Stand-Alone Rack	Stand-Alone Rack	Non-Standard	Non-Standard
<b>Regulation:</b>	U	U	U	U	U	U
<b>Load Regulation U:</b>	≤1%	≤1%	≤1%	≤1%	≤1%	≤1%
<b>Line Regulation U:</b>	≤1%	≤1%	≤1%	≤1%	≤1%	≤1%
<b>Frequency Stability:</b>	≤0.1% FS	≤0.1% FS	≤0.1% FS	≤0.1% FS	≤0.01% FS	≤0.01% FS
<b>Voltage Stability:</b>	±1%	±1%	±1%	±1%	±1%	±1%
<b>Harmonic Distortion:</b>	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%
<b>Crest Factor:</b>	≤2%	≤2%	≤2%	≤2%	≤2%	≤2%
<b>Recovery Time (50% Chg.):</b>	≤15ms	≤15ms	≤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	±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	±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	±0.5% FS + 5 dig	±0.5% FS + 5 dig
<b>Display Accuracy F:</b>	±0.5% FS + 5 dig	±0.5% FS + 5 dig	±0.5% FS + 5 dig	±0.5% 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	±1% FS	±1% FS
<b>Setting Accuracy F:</b>	±0.1% FS	±0.1% FS	±0.1% FS	±0.1% FS	±0.1% FS	±0.1% FS
<b>Ext. Control Analog:</b>	Yes*	Yes*	Yes*	Yes*	No	No
<b>Ext. Feedback Analog:</b>	Yes*	Yes*	Yes*	Yes*	No	No
<b>RS232:</b>	Yes*	Yes*	Yes*	Yes*	Yes	No
<b>RS485:</b>	Yes*	Yes*	Yes*	Yes*	No	No
<b>RS422:</b>	No	No	No	No	No	No
<b>Open Protocol:</b>	Yes*	Yes*	Yes*	Yes*	Yes	-
<b>Modbus-RTU:</b>	Yes*	Yes*	Yes*	Yes*	No	-
<b>SCPI:</b>	No	No	No	No	No	-
<b>Interlock:</b>	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*
<b>Ext. Outp. On/Off Contr.:</b>	Yes*	Yes*	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-C/CC/CM 6XXXX Series

Phase:	1 / 3
Voltage:	0 ... 300Vrms L-N (0 ... 3kVrms L-N)*
Current:	0 ... 1260A LV** / 0 ... 630A FS** (0 ... 3kA L-N)*
Frequency:	47Hz ... 63Hz / 100Hz* / 200Hz* / 400Hz* (up to 5kHz for DF-CM Series on order)*
Power:	0 ... 1MVA
Cabinet:	Stand-Alone Rack
Regulation:	U / I (DF-CC Series only)
Load Regulation U:	≤1%
Line Regulation U:	≤1%
Frequency Stability:	≤0.1% FS
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:	±0.5% FS + 5 dig
Setting Accuracy U	±1% FS
Setting Accuracy F:	±0.1% FS
Ext. Control Analog:	Yes*
Ext. Feedback Analog:	Yes*
RS232:	Yes*
RS485:	Yes*
RS422:	No
Open Protocol:	Yes*
Modbus-RTU:	Yes*
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

## 5.1 Power Grid Requirements

### 5.1.1. 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> $I = (\text{Output P}/230) \cdot 1.15$ <b>Slow start circuit type:</b> Active <b>Maximal inrush Current (A):</b> $I = \leq (\text{Max. device P}/230) \cdot 1.15$ <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> $I = (\text{Output P}/\text{Inp. V})/1,73 \cdot 1.15$ <b>Slow start circuit type:</b> Active <b>Maximal inrush Current (A):</b> $I = (\text{Output P}/\text{Inp. V})/1,73 \cdot 1.15$ <b>Suggested circuit breaker type:</b> C, D, K

### 5.1.2. 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> $I = (\text{Output P}/120) \cdot 1.15$ <b>Slow start circuit type:</b> Active <b>Maximal inrush Current (A):</b> $I = \leq (\text{Max. device P}/120) \cdot 1.15$ <b>Suggested circuit breaker type:</b> C, D, K	<b>Power grid select-able with order:</b> A: 3 Ph. (PE, L1, L2, L3) 480V AC 50/60Hz ±10% B: 3 Ph. (PE, L1, L2, L3) 208V AC 50/60Hz ±10% <b>Nominal operation Current (A):</b> $I = (\text{Output P}/\text{Inp. V})/1,73 \cdot 1.15$ <b>Slow start circuit type:</b> Active <b>Maximal inrush Current (A):</b> $I = (\text{Output P}/\text{Inp. V})/1,73 \cdot 1.15$ <b>Suggested circuit breaker type:</b> C, D, K

## 6. Mechanical Characteristics

### 6.1. 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 brakes.

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

**Rear:** Output connections, fuse.

## 6.2. Size table

Standard Version		
Model	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

## 6.3. Connections & Terminals

### 6.3.1. Power In- & Outputs

DF-C Series power supplies are equipped with a terminal block on the front side / rear side for the connection of the input power and output 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 operating current calculated with the formula provided in point 5.1 of the data sheet.

### 6.3.2. Digital Connections

The DF-C Series can be equipped with digital connections (RS232 / RS485) to read/write output values in real time through a proprietary open protocol or Modbus-RTU. Both protocols are explained in detail in the last chapter of the user's manual. Please note that the communication protocol must be selected during the order. To change the communication protocol afterward, a physical replacement of the controller PCB is required.

#### Option D1: RS232

The connection is established through a D-SUB 9 Pin male socket on the side of the device. The pinout meets the defined standard characteristics of the RS232 over D-SUB standard.

#### Option D2: RS485

The RS232 connection is established through a D-SUB 9 Pin male socket on the side of the device.

### 6.3.3. Analog Connections

Devices of the DF-C series can optionally be equipped with analog inputs/outputs for setting and reading the output parameters. The analog inputs/outputs are accessible via a labeled terminal block, which is located either on the back, the front, or behind the service door (depending on the device model). The pin assignment is explained on the terminal block for a simple and straightforward connection and may change depending on the configuration ordered.

## 7. Options & Model Number

The DF-C Series consists of several versions, each can be configured with options; these are described below.

### Variants

**DF-C** - Base version of the series.

**DF-CC** - Constant current regulation version.

**DF-CM** - High-frequency version with 350 ... 450Hz output frequency (up to 5kHz on order).

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

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

Possible configurations:

**[U1] 0 - 10V Signal**

**[U2] 0 - 5V Signal**

**[U3] 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:

**[F1] 0 - 10V Signal**

**[F2] 0 - 5V Signal**

**[F3] 4 - 20mA Signal**

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

Returns the actual value of the output current.

Possible configurations:

**[G1] 0 - 10V Signal**

**[G2] 0 - 5V Signal**

**[G3] 4 - 20mA Signal**

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

Two-pin loop, can be selected during the order to operate either as an interlock or a remote output status control. By default, the interlock loop operates as a security loop that blocks the output if interrupted and thus prevents the output from being enabled or temporarily disables it if the output is in the enabled state while the loop has been interrupted.

Alternatively, the interlock loop can be reprogrammed to operate as a simple remote output status control, triggering the output status to be ON/OFF by closing or opening the loop.

Please note that the operational principle of the interlock loop must be selected during the order, as changing it afterward requires the physical replacement of a control PCB in the power supply.

#### [D] Digital connection

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

Possible configurations:

**[D1] RS232**

**[D2] RS485**

## [0] Output configuration

The output of DF-C series devices in the basic version has a potential to PE (is grounded), which follows the usual protection regulations. All models can also be ordered in the modifications listed below. Please see the „DF-C Series Function and Wiring Diagram“ PDF for details.

### [06]: Floating 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 an 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 operational environment (Laboratory).

### [07]: Floating output with built-in ELCB

The model with integrated ELCB offers the following possible configurations:

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

##### Connections output

L (1, 2, 3): Phase (floating)

N: Neutral conductor (floating)

GND: In this configuration, to be used 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 (grounded)

N: Neutral → Bridge to input N (grounded)

GND: Do not connect

##### Connections input

L1: Input phase 1

L2: Input phase 2

L3: Input phase 3

N: Neutral conductor

PE: Earth conductor

## 7.1. Model Number

The model number is encrypted as follows:

Series and Version plus Model Number [Option (Suboption), Option (Suboption), ... ]

Example: DF-CM6310 D2N2

Example Version/Series: DF-CM

Example Model: 6310

Example Options: D2, N2

## 7.2. 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 at [service@dsc-electronics.de](mailto:service@dsc-electronics.de)

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