
# DF-C 63XXX & 61XXX Series AC Laboratory Power Supplies User's Manual

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## 1. Connection

Our devices are pre-configured to the power grid chosen with order (if not specified otherwise, our devices are manufactured for the EU power grid 230V 50Hz / 400V 50Hz). Subsequent adjustment after delivery is not possible. Connecting the device to an unsuitable power source will void any warranty.

| 1 Phase / EU Power Grid | |
|---|---|
| Voltage (Recommended) | 230V ± 10% AC |
| Voltage (Max.) | 250V AC |
| Frequency | 50Hz - 60Hz |
| Circuit breaker minimum requirements | The maximum current of the device shall be determined as follows:<br><br>I = (maximum power of the device / 230) + 2 |
| 1 Phase / American Power Grid | |
| Voltage (Recommended) | 115V ± 10% AC |
| Voltage (Max.) | 130V AC |
| Frequency | 50Hz - 60Hz |
| Circuit breaker minimum requirements | The maximum current of the device shall be determined as follows:<br>I = (maximum power of the device / 115) + 4 |

| 3 Phase / EU Power Grid (TN-S Network) | |
|---|---|
| Voltage (Recommended) | 380V - 410V |
| Voltage (Max.) | 430V |
| Frequency | 50Hz |
| Circuit breaker Minimum requirements | The maximum phase current of the device shall be determined as follows:<br><br>I = ((maximum power of the device / 400) / 1,73) + 2 |

## 2. General

Please read through and understand this Operation Manual before operating the product. After reading always keep the manual nearby so that you may refer to it as needed. When moving the product to another location, be sure to bring the manual as well.

### Calibration

Before shipment, the instrument has been calibrated carefully in our factory. The calibration procedures and standards are compliant to the national regulations and standards for electronic calibration. If you have requested a certificate with your order, this is enclosed with your device. With ordered off-site calibration (DaKKS) the calibration was not performed in-house, please refer to the laboratory calibration protocol for details.

### Warranty

We guarantee that the instrument has undergone a strict quality test before shipment and has passed all prescribed functional tests. We provide our customers with a warranty period of three years from receipt of the device. During the warranty period, all repairs, as well as spare parts are always free of charge. The warranty is void in the case of defects which have been caused by user's fault, or in case of unauthorized opening.

## 2.1 Safety Instructions

This chapter contains important safety instructions that you must follow when operating the instrument and when keeping it in storage. Read the following before any operation to insure your safety and to keep the device in a proper condition.

### Safety Symbols

The following safety symbols may appear in this manual or on the instrument:

| | | |
|---|---|---|
|   | **WARNING** | Identifies conditions or practices that could result in injury or loss of life. |
|   | **CAUTION** | Identifies conditions or practices that could result in damage to the instrument or to other properties. |
|  | **DANGER** | High Voltage |
|  | **ATTENTION** | Refer to the Manual |
|  | | Protective Earth (PE) |
|  | | Earth (Ground) |

### 2.2 Safety Guidelines

Please follow the safety guidelines when using and putting the device into operation in order to prevent safety risks and to ensure the correct operation of the product.

- **Before connecting the device to the local power supply, make sure that the device is switched off.**
- **Check if the product is compatible with the local power supply before connecting it.**
- **Be careful on the correct earthing of the device (PE connection)**
- **Do not use the product in humid environments**
- **Do not touch the output terminals of the product with unprotected hands while it is switched on.**
- **Do not use the device in extremely dusty rooms**
- **Do not use the device outside the parameters specified in the data sheet**

### 2.3 Unpacking and Examination

Our products are delivered carefully packed in cardboard boxes or in wooden crates, depending on place of destination and the type of the device (dimensions, weight). We pay attention to the environmental compatibility of the upholstery and packaging materials used and ask you to dispose the filling material correctly if present.

Please unpack the device and check the packaging as well as the product for transport damage. Should you notice any damage to the packaging or the device, we ask you to log it with photos and inform us immediately.

ATTENTION: If the device has been delivered in a wooden box, please do not dispose it as it can be used for eventual return transport for service procedures. Also the packaging material of smaller devices can be stored in order to be used if necessary for a return transport.

## 3. Operation Instructions

### 3.1 Front Panel Description 63XXX Series

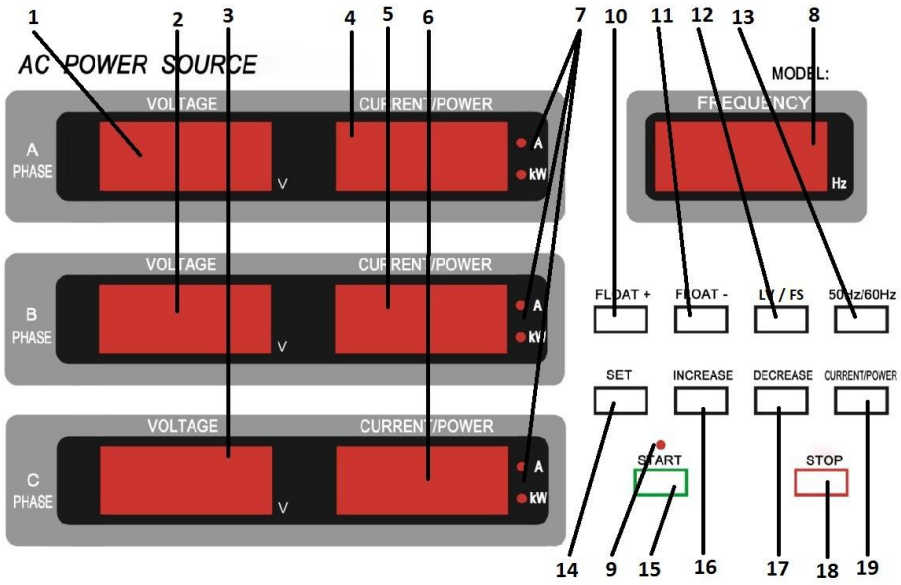


**Fig.1: Front Panel 63XXX Series (CV Version)**

| Nr. | Name | Description |
|---|---|---|
| 1 | Voltage Phase A | Voltage set or actual value of Phase A |
| 2 | Voltage Phase B | Voltage set or actual value of Phase B |
| 3 | Voltage Phase C | Voltage set or actual value of Phase C |
| 4 | Current / Power Ph. A | Current set or actual value of Phase A |
| 5 | Current / Power Ph. B | Current set or actual value of Phase B |
| 6 | Current / Power Ph. C | Current set or actual value of Phase C |
| 7 | Display Mode | Active „A" LED indicates the current value<br>Active „kW" LED indicates the power value<br>No active LED indicates the power factor value |
| 8 | Frequency | Output frequency „Hz" |
| 9 | Output On/Off Key | Indicates the output status |
| 10 | Float + Hot-Key | Higher the value by X percent |
| 11 | Float - Hot-Key | Lower the value by X percent |
| 12 | LV / FS Key | Switch between Low Voltage range (0 – 150V) and Full Scale range (0 – 300V) |
| 13 | Frequency Key | Fast switch between 50Hz / 60Hz |
| 14 | Setup Key | Output value setup |
| 15 | Start Key | Output ON |
| 16 | Increase Key | Higher the value |
| 17 | Decrease Key | Lower the value |
| 18 | Stop Key | Output OFF |
| 19 | Display Mode Switch Key | Toggle between Current, Power of Power Factor display |

### 3.2 Front Panel Description 61XXX Series

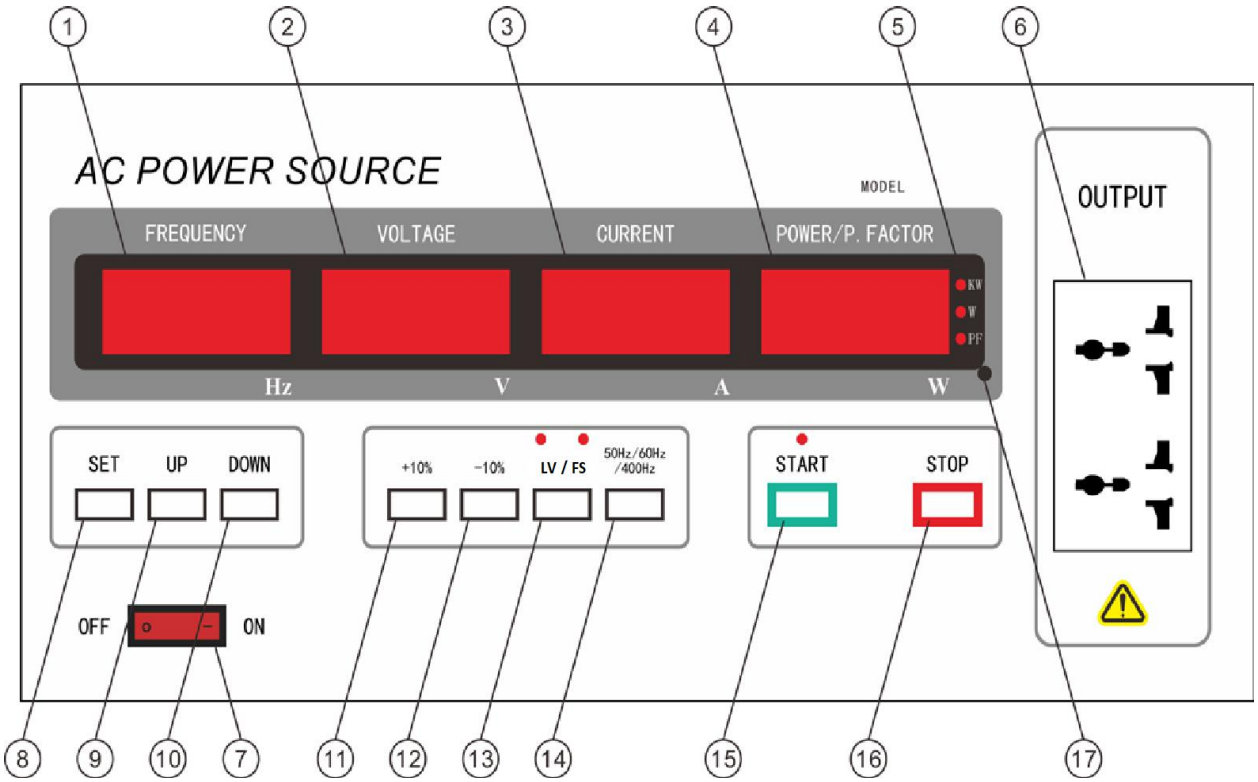


**Fig.2: Front Panel 61XXX Series (CV Version)**

| No. | Name | Description |
|---|---|---|
| 1 | Frequency | Output frequency „Hz“ |
| 2 | Voltage | Voltage set or actual value |
| 3 | Current | Current actual value |
| 4 | Power / Power Factor | Power or Power Factor display |
| 5 | Display Mode | Active „A“ LED indicates the current value<br>Active „kW“ LED indicates the power value<br>No active LED indicates the power factor value |
| 6 | Connections | Secondary connections with universal socket |
| 7 | Power On/Off Key | Power On/Off the power supply |
| 8 | Setup Key | Output value setup |
| 9 | UP Key | Higher value |
| 10 | DOWN Key | Lower value |
| 11 | +10% Hot-Key | Higher value by 10 percent |
| 12 | -10% Hot-Key | Lower value by 10 percent |
| 13 | LV / FS Key | Switch between Low Voltage range (0 – 150V) and Full Scale range (0 – 300V) |
| 14 | Frequency Key | Fast switch between 50Hz / 60Hz |
| 15 | Start Key | Output ON |
| 16 | Stop Key | Output OFF |
| 17 | Display Mode Switch Key | Toggle between Current, Power of Power Factor display |

### 3.3 Power ON

Set the „ON / OFF" switch to the ON position to turn on the device. The device is equipped with a soft-start delay which slowly charges the capacities in the power supply to limit the high inrush currents. After about 10 seconds, the power supply will switch into stand-by mode.

#### 3.3.1 Stand-By Mode

The output is switched off in stand-by mode and the device is ready to set the desired output values. The displays show a voltage of 0V and a current of 0A, which corresponds to the actual values at the output.

Press the SET button once to enter the setup menu.

Press the SET button once
- FREQUENCY display flashes -> Frequency setting

Press the SET button 2x
- VOLTAGE display flashes -> Voltage setting

Press the SET button 3x
- VOLTAGE display flashes -> FLOAT + percentage setting (default 10%)

Press the SET button 4x
- VOLTAGE display flashes -> FLOAT- percentage setting (default -10%)

Press the SET button 5x
- CURRENT display flashes -> Setting of Over Current Protection value
(In the range 0 - max. output current of the power supply / max. 0 - 50A)

Press the SET button 6x
- Save settings, back to stand-by mode

#### 3.3.3 Setup Menu (CV Version) DF-C61XXX

Press the SET button once to enter the setup menu.

Press the SET button once
- FREQUENCY display flashes -> Frequency setting

Press the SET button 2x
- VOLTAGE display flashes -> Voltage setting

Press the SET button 3 x
- CURRENT display flashes -> setting of the Over Current Protection value
(In the range 0 - max. output current d of the power supply / max. 0 - 50A)

Press the SET button 4x
- Save settings, back to stand-by mode

#### 3.3.4 Setting the output values for constant current sources of the DF-C series (CC version)

Constant current sources of the DF-C series which work in CC mode have no setup menu and a simplified Control panel. If you are in stand-by mode (output OFF), values can be entered directly using the arrow keys, saving is not necessary.

#### 3.3.5 Voltage Range Setting (LV / FS)

Press the LV / FS key to switch between the voltage ranges, the currently set voltage range is displayed on the frequency display for 3 seconds with L for LV and F for FS. Normally the range is LV for 0 - 150V and FS for 0 - 300V, this may differ for custom-made devices.

## 4. Optional: Analogue In- / Outputs

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

### 4.1 Optional: 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.

### 4.2 Optional: Potential-free output / configurable output

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 (please see the „DF-C Series Function and Wiring Diagram" PDF for details):

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

**5. Connection of the load**

Depending on the model the output / input connections are located on the back, on the front or behind the service door of the device. We recommend protecting the connectors from wear if the load will be frequently connected and disconnected by connecting it not directly to the device, but to use an intermediate bridge. In this case, the intermediate bridge can remain connected to the power supply - so the connection terminal of the power supply is used less often.

**Communication Protocol for DF-C63XXX Series Power Supplies**

**Interface:** RS-232 (9 pin female) / RS-485 (2 pin male)
**Command format:** Asynchronous, 1start bit, 8 data bits, 1 stop bit
**Baud rate:** 9600
**Communication mode:** ASIIC code, "X" stands for numbers.
**Termination:** Each command sent by the power supply as reply is terminated with a ";"

| Command | Function | Response | Description |
|---|---|---|---|
| #G | Output START | Received | The command is accepted |
| | | Error | The power supply is not in standby mode or output may be already active |
| #U | Output STOP | Received | The command is accepted |
| | | Error | The power supply output is not active |
| #D | Read the output status | XXX.XHz;A:XXX.XV XXX.XAXX.XXkW; B:XXX.XV XXX.XAXX.XXkW; C:XXX.XV XXX.XAXX.XXkW | The reply is a sequence of output frequency, voltage, current and power. For example: 060.0Hz;A:090.0V010.0A00.90kW;B:090.0V010.0A00.90kW;C:090.0V010.0A00.90kW. |
| | | Error | The power supply output is not active |
| #SXXXX XXXX (S followed by 8 data digits.) | Set the output parameter. The first 4 digits are the frequency value (resolution 0.1Hz). The last 4 digits are the voltage setting (resolution 0.1V). The number "0" cannot be omitted in the command. For example setting the parameters 101Hz 62V would result in: #S10100620 | Received | The command is accepted |
| | | Error | The power supply is not in standby mode, or the parameter exceeds range |
| #H | Switch to FS (0 – 300V) mode | Received | The command is accepted |
| | | Error | Wrong command |
| #L | Switch to LV (0 – 150V) mode | Received | The command is accepted |
| | | Error | Wrong command |
| #R | STOP output and CLEAR alarm | Received | The command is accepted |
| #C | Read the status of the power supply | 000 | Standby mode |
| | | 001 | Started |
| | | 002 | Setup mode |
| | | 005 | Short circuit alarm |
| | | 006 | Over temperature alarm |
| | | 007 | Over current alarm |

**Communication Protocol for DF-C61XXX Series Power Supplies**

| Command | Function | Response | Description |
|---|---|---|---|
| #G | Output START | Received | The command is accepted |
| | | Error | The power supply is not in standby mode or output may be already active |
| #U | Output STOP | Received | The command is accepted |
| | | Error | The power supply output is not active |
| #D | Read the output status | XXX.XHzXXX.XV X.XXXAXXXX.XW | The reply is a sequence of output frequency, voltage, current and power. For example: 050.0Hz110.2V0.950A0099.5W |
| | | Error | The power supply output is not active |
| #SXXXX XXXX (S followed by 8 data digits.) | Set the output parameter. The first 4 digits are the frequency value (resolution 0.1Hz). The last 4 digits are the voltage setting (resolution 0.1V). The number "0" cannot be omitted in the command. For example setting the parameters 101Hz 62V: #S10100620 | Received | The command is accepted |
| | | Error | The power supply is not in standby mode, or the setting parameter exceeds range |
| #H | Switching to FS (0 – 300V) mode | Received | The command is accepted |
| | | Error | Wrong command |
| #L | Switching to LV (0 – 150V) mode | Received | The command is accepted |
| | | Error | Wrong command |
| #R | STOP output and CLEAR alarm | Received | The command is accepted |
| #C | Read the status of the power supply | 000 | Standby mode |
| | | 001 | Started |
| | | 002 | Setting mode |
| | | 005 | Short circuit alarm |
| | | 006 | Over temperature alarm |
| | | 007 | Over current alarm |