

Fig.1: DP-D Series Power Supply 6KW cabinet (DP6H-10D)

1. Introduction

Designed for high-performance laboratory or industrial applications, the DP-D series is designed for 24/7 use at full load, completely maintenance-free. Laboratory power supplies of this series can be manufactured on request with output power up to the megawatt range and configured with a variety of options. Depending on the configuration, DP-D Series Laboratory Power Supplies can be completely externally analog or digitally controlled and are available as either Stand-Alone or Rack-Mount versions, allowing for easy integration into existing infrastructures.

2. Features of the DP-D series

- **Maximum output Voltage 3000V**
- **Maximum output Current 5000A**
- **Maximum output Power 1MW**
- **4 Digit LED Display for Voltage, Current and optional Power (Preset and actual values)**
- **19 Inch cabinet with rack-mount accessories or stand alone rack on rubber wheels**
- **Constant Voltage (CV), Constant Current (CC) and optional Constant Power (CP) operation**
- **Modern digital connection possibilities optionally available: RS485, RS232, USB Adapter**
- **Analog connection possibilities optionally available: 0 - 10V, 0 - 5V, 4 - 22mA**
- **Constant operation 24/7 at full load possible**
- **Capable of complete remote operation through analog or digital connections (set & control)**
- **Can be manufactured without front panel controls for remote operation only**

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 DC Laboratory Power Supply series comparison

	DP-D SERIES	DP-S SERIES	DP-P SERIES	DP-PH SERIES	DP-H SERIES
Voltage:	0 ... 2kV	0 ... 600V	0 ... 600V	0 ... 12kV	0 ... 150V
Current:	0 ... 5kA	0 ... 150A	0 ... 300A	0 ... 1.2A	0 ... 60A
Power:	0 ... 1MW	0 ... 5kW	0 ... 6kW	0 ... 1200W	0 ... 900W
Cabinet:	19"	Non-Standard	19"	19"	Non-Standard
Regulation:	U / I / P*	U / I	U / I	U / I	U / I
Load Regulation U:	≤0.3% + 2 dig	≤0.5% + 2 dig	≤0.1% + 2 LSB	≤0.5% + 2 LSB	≤0.1% + 5mV
Load Regulation I:	≤0.3% + 2 dig	≤0.5% + 2 dig	≤0.2% + 2 LSB	≤0.5% + 2 LSB	≤0.2% + 5mV
Line Regulation U:	≤0.2% + 2 dig	≤0.2% + 2 dig	≤0.1% + 2 LSB	≤0.1% + 2 LSB	≤0.01% + 4mV
Line Regulation I:	≤0.3% + 2 dig	≤0.5% + 2 dig	≤0.1% + 2 LSB	≤0.1% + 2 LSB	≤0.2% + 3mV
Noise U:	≤0.3%FS + 10mVrms	≤1%FS (rms)	Depending o. Model ≤50mV to ≤200mV	≤0.05%FS	≤2mVrms / ≤30mVpp
Noise I:	≤0.5%FS + 10mArms	≤1%FS (rms)	Depending o. Model ≤50mA to ≤200mA	≤0.05%FS	≤10mArms
Recovery Time (50% Chg.):					≤1.5ms
Display Accuracy U:	±1% reading ± 5 dig	±1%FS ± 1 dig	≤0.2% + 2 LSB	≤0.2% + 2 LSB	±0.02% reading + 5mV
Display Accuracy I:	±1% reading ± 10 dig	±1%FS ± 1 dig	≤0.5% + 2 LSB	≤0.5% + 2 LSB	±0.1% reading + 0.1%FS
Setting Accuracy U:	±0.5% reading ± 5 dig	±0.5% reading ± 2 dig	≤0.2% + 2 LSB	≤0.2% + 2 LSB	±0.03% reading + 10mV
Setting Accuracy I:	±1% reading ± 20 dig	±1% reading ± 2 dig	≤0.5% + 2 LSB	≤0.5% + 2 LSB	±0.1% reading + 0.1%FS
Ext. Control Analogue:	Yes*	Yes*	No	No	Yes
Ext. Feedback Analogue:	Yes*	No	No	No	Yes
RS232:	Yes*	No	Yes	Yes	Yes
RS485:	Yes*	No	Yes	Yes	Yes*
RS422:	No	No	Yes	Yes	No
Open Protocol:	Yes	–	Yes	Yes	Yes
Modbus-RTU:	No	–	Yes	Yes	Yes*
SCPI:	No	–	No	No	Yes
Reverse Current Protection:	Yes*	Yes*	No	No	Yes
Polarity Switch:	Yes*	No	No	No	No
Interlock:	Yes*	Yes*	No	No	No
Ext. Outp. On/Off Contr.:	Yes*	Yes*	No	No	Yes

* Optional

5. Typical Electrical Characteristics Of The DP-D Series

Voltage:	0 ... 2kV
Current:	0 ... 5kA
Power:	0 ... 1MW
Cabinet:	19"
Regulation:	U / I / P*
Load Regulation U:	≤0.3% + 2 dig
Load regulation I:	≤0.3% + 2 dig
Line Regulation U:	≤0.2% + 2 dig
Line Regulation I:	≤0.3% + 2 dig
Noise U:	≤0.3%FS + 10mVrms
Noise I:	≤0.5%FS + 10mArms
Recovery Time (50% Chg.):	
Display Accuracy U:	±1% reading ± 5 dig
Display Accuracy I:	±1% reading ± 10 dig
Setting Accuracy U:	±0.5% reading ± 5 dig
Setting Accuracy I:	±1% reading ± 20 dig
Ext. Control Analogue:	Yes*
Ext. Feedback Analogue:	Yes*
RS232:	Yes*
RS485:	Yes*
RS422:	No
Open Protocol:	Yes
Modbus-RTU:	No
SCPI:	No
Reverse Current Protection:	Yes*
Polarity Switch:	Yes*
Interlock:	Yes*
Ext. Outp. On/Off Ctrl...:	Yes*

* Optional

4.1 Power Grid Requirements

4.1.1 EU Version

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

4.1.2 US Version

Max. Output P ≤ 3.5kW	Max. Output P > 3.5kW
Power grid: 1 Ph. (PE, L1, N) 120V AC 50/60Hz ±10% Nominal operation Current (A): $I = (\text{Output P} / 120) + 2$ Slow start circuit type: Active Maximal inrush Current (A): $I = \leq(\text{Max. device P} / 120) + 10$ Suggested circuit breaker type: C, D, K	Power grid select-able with order: A: 3 Ph. (PE, L1, L2, L3) 480V AC 50/60Hz ±10% B: 3 Ph. (PE, L1, L2, L3) 208V AC 50/60Hz ±10% Nominal operation Current (A): $I = ((\text{Output P} / \text{Inp. V}) / 1,73) + 2$ Slow start circuit type: Active Maximal inrush Current (A): $I = \leq((\text{Max. P} / \text{Inp. V}) / 1,73) + 5$ Suggested circuit breaker type: C, D, K

6. Mechanical Characteristics

5.1 Cabinet Types

Cabinet Size	Dimensions	DIN 41494 SC48D	Used With
1	210W x 88H x 352D mm	1/2 19" 2HE	0.1kW - 0.9kW
2	425W x 88H x 402D mm	19" 2HE	1kW - 3.9kW
3	425W x 132H x 502D mm	19" 3HE	4kW - 9.9kW
4	425W x 300H x 610D mm	19" 7HE	10kW - 15kW
5	425W x 554H x 610D mm	Stand-Alone	15.1kW - 25kW
6	505W x 804H x 688D mm	Stand-Alone	25.1kW - 36kW
7	505W x 980H x 760D mm	Stand-Alone	36.1kW - 60kW

Note: The above frame dimension dose 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 (only for service by DSC-Electronics), display and control elements on the front.

Rear: Input & Output connections, fuse.

19" Cabinet Characteristics

Description: Stand alone 19" cabinet optionally with rack-mount brackets (option [E]).

Material: 1.5mm steel plates.

Bottom: Rubber feet, detachable.

Front: Display and control elements on the front, optionally rack mount brackets (option [E]).

Rear: Input & Output connections.

5.2 Size table

Model	Basic Version		Option [R]		Option [V]		Option [K]	
	Cabinet Size	Weight	Cabinet Size	Weight	Cabinet Size	Weight	Cabinet Size	Weight
DP10-4HD	3	27kG	4	55kG	4	55kG	3	27kG
DP10-5HD	3	30kG	4	55kG	5	95kG	3	30kG
DP10-10HD	4	65kG	5	95kG	6	130kG	4	65kG
DP15-1HD	2	18kG	2	18kG	4	55kG	2	18kG
DP15-120D	2	18kG	2	18kG	4	55kG	2	18kG
DP15-2HD	2	18kG	3	24kG	4	55kG	2	18kG
DP15-3HD	3	30kG	4	55kG	4	55kG	3	30kG
DP15-4HD	3	30kG	4	55kG	4	55kG	3	30kG
DP15-6HD	4	65kG	4	65kG	5	95kG	4	65kG
DP15-8HD	5	95kG	5	95kG	5	105kG	5	95kG
DP30-1HD	2	18kG	2	18kG	4	55kG	2	18kG
DP30-150D	3	30kG	3	35kG	4	55kG	3	30kG
DP30-2HD	3	30kG	4	55kG	4	55kG	4	55kG
DP30-3HD	4	65kG	4	65kG	4	70kG	4	65kG
DP30-4HD	5	95kG	5	95kG	5	105kG	5	95kG
DP30-5HD	5	100kG	5	100kG	5	110kG	5	100kG
DP30-6HD	5	100kG	5	100kG	6	110kG	5	100kG
DP30-10HD	6	200kG	6	200kG	7	220kG	6	200kG
DP50-1HD	3	30kG	3	35kG	4	55kG	3	30kG
DP50-150D	3	35kG	3	35kG	4	55kG	3	35kG
DP50-2HD	4	65kG	4	65kG	5	95kG	4	65kG
DP50-250D	4	70kG	4	70kG	5	95kG	4	70kG
DP50-3HD	5	95kG	5	95kG	6	105kG	5	95kG
DP50-5HD	5	110kG	5	110kG	6	120kG	5	110kG
DP50-6HD	6	200kG	6	200kG	7	220kG	6	200kG
DP60-1HD	3	30kG	3	35kG	4	55kG	3	30kG
DP60-150D	4	65kG	4	65kG	4	70kG	4	65kG
DP60-2HD	4	70kG	4	70kG	5	95kG	4	70kG
DP60-3HD	5	100kG	5	100kG	6	110kG	5	100kG

DP80-60D	3	27kG	3	35kG	4	55kG	3	27kG
DP1H-20D	2	18kG	2	18kG	3	27kG	2	18kG
DP1H-30D	2	18kG	2	18kG	3	27kG	2	18kG
DP1H-50D	3	27kG	3	35kG	4	55kG	3	27kG
DP1H-60D	3	27kG	3	35kG	4	55kG	3	27kG
DP1H-80D	3	35kG	3	35kG	4	55kG	3	35kG
DP1H-1HD	4	65kG	4	65kG	5	95kG	4	65kG
DP1H-150D	5	95kG	5	95kG	5	105kG	5	95kG
DP150-30D	3	27kG	3	35kG	4	55kG	3	27kG
DP150-50D	3	35kG	3	35kG	4	55kG	3	35kG
DP150-40D	3	30kG	3	35kG	4	55kG	3	30kG
DP150-60D	3	40kG	3	35kG	4	55kG	3	40kG
DP150-80D	4	70kG	4	70kG	4	75kG	4	70kG
DP150-1HD	5	95kG	5	95kG	5	105kG	5	95kG
DP150-150D	5	110kG	5	110kG	5	120kG	5	110kG
DP2H-10D	2	18kG	2	18kG	3	27kG	2	18kG
DP2H-20D	3	27kG	3	35kG	3	40kG	3	27kG
DP2H-30D	3	30kG	3	35kG	4	55kG	3	30kG
DP2H-50D	4	65kG	4	65kG	4	70kG	4	65kG
DP250-20D	3	30kG	3	35kG	4	55kG	3	30kG
DP250-30D	3	35kG	3	35kG	4	55kG	3	35kG
DP250-40D	4	65kG	4	65kG	4	70kG	4	65kG
DP250-50D	4	70kG	4	70kG	4	75kG	4	70kG
DP3H-5D	2	18kG	2	18kG	2	18kG	2	18kG
DP3H-10D	2	18kG	2	18kG	3	27kG	2	18kG
DP3H-20D	3	30kG	3	35kG	4	55kG	3	30kG
DP3H-30D	3	40kG	3	35kG	4	55kG	3	40kG
DP3H-40D	4	70kG	4	70kG	4	75kG	4	70kG
DP4H-1D	2	18kG	2	18kG	2	18kG	2	18kG
DP4H-2D	2	18kG	2	18kG	2	18kG	2	18kG
DP4H-3D	2	18kG	2	18kG	2	18kG	2	18kG
DP4H-5D	2	18kG	2	18kG	2	18kG	2	18kG
DP4H-10D	3	27kG	3	35kG	4	55kG	3	27kG
DP4H-30D	4	70kG	4	70kG	4	75kG	4	70kG
DP5H-1D	2	18kG	2	18kG	2	18kG	2	18kG
DP5H-2D	2	18kG	2	18kG	2	18kG	2	18kG
DP5H-3D	2	18kG	2	18kG	2	18kG	2	18kG
DP5H-5D	2	18kG	2	18kG	2	18kG	2	18kG
DP5H-10D	3	30kG	3	35kG	4	55kG	3	30kG
DP5H-50D	6	180kG	6	180kG	6	200kG	6	180kG
DP6H-1D	2	18kG	2	18kG	2	18kG	2	18kG
DP6H-2D	2	18kG	2	18kG	2	18kG	2	18kG
DP6H-3D	2	18kG	2	18kG	3	27kG	2	18kG
DP6H-5D	3	27kG	3	35kG	3	40kG	3	27kG
DP6H-10D	3	30kG	3	35kG	4	55kG	3	30kG
DP6H-20D	4	70kG	4	70kG	5	75kG	4	70kG
DP6H-25D	5	95kG	5	95kG	5	105kG	5	95kG
DP10H-1D	2	18kG	2	18kG	3	27kG	2	18kG
DP10H-3D	3	27kG	3	35kG	3	40kG	3	27kG
DP10H-5D	3	30kG	3	35kG	4	55kG	3	30kG
DP10H-10D	4	65kG	4	65kG	5	70kG	4	65kG
DP10H-15D	5	95kG	5	95kG	5	105kG	5	95kG
DP10H-20D	5	100kG	5	100kG	5	110kG	5	100kG
DP15H-1D	2	18kG	2	18kG	3	27kG	2	18kG
DP20H-1D	2	18kG	2	18kG	3	27kG	2	18kG
DP20H-2D	3	27kG	3	35kG	3	40kG	3	27kG
DP20H-3D	3	30kG	3	35kG	4	55kG	3	30kG
DP20H-5D	4	65kG	4	65kG	4	70kG	4	65kG
DP20H-10D	5	100kG	5	100kG	5	110kG	5	100kG
DP20H-20D	7	270kG	7	270kG	7	300kG	7	270kG

NOTE: In case more than one option for a model is selected, the highest cabinet size and weight of the selected options is valid.

5.3 Connection Plugs & Terminals

5.3.1 Power Grid Connection

DP-D Series power supplies are equipped with a terminal block on the 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 4 (L1, L2, L3, PE) terminals. The terminals are equipped with M6 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 RS485 / RS232 / USB

Option: [D]

DP-D series devices can be equipped with an RS485 connection to read/write output values in real time. Optionally the device can be shipped with a RS485 → RS232 adapter, or with both, a RS485 → RS232 and RS232 → USB adapter.

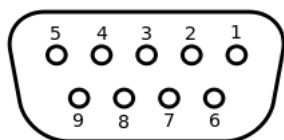
(Please see communication protocol at the end of the manual)

The RS485 connector is a 2 Pin male socket (green) on the rear side of the device, the fitting plug is supplied with the device.

5.3.3 Analog Connections

Option: [U], [L], [P], [F], [G], [H], [A]

The DP-D series devices can be equipped with analog connections to read / write output values. The analog connections can be accessed through the D-SUB connection on the rear side of the device. The pin-out is as follows:



Pin1: GND

Pin2: Voltage External Control +

Pin3: Current External Control +

Pin4: Power External Control +

Pin5: Voltage Feedback +

Pin6: Current Feedback +

Pin7: Power Feedback +

Pin8: External Output ON/OFF & Interlock

Pin9: (Reserved for custom options)

7. Options & Model Number

The DP-D 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 21kW output power.

[E] 19 Inch Rack-Mount Version

The laboratory power supply comes with rack-mount brackets (compatible models only, see point 5.1).

[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.

[L] Ext. analog control I

Input for external control of the output current 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.

[P] Ext. analog control P / Option [K] required.

Input for external control of the output power 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**

[H] Ext. analog feedback P / Option [K] required.

Returns the actual value of the output power.

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**

[R] Reverse current protection

Reverse current protection when operating with large inductive or capacitive loads.

Possible configurations:

- [1] Capacitive**
- [2] Inductive**

Capacitive

The output of the power supply becomes high resistive as soon as triggered (>1 MOhm).

Inductive

The output of the power supply becomes low resistive as soon as triggered (<200 Ohm), and is capable of absorbing excess power of:

10% of max. P -> Continuous

50% of max. P -> 1.5 second shots, every 2 seconds

[S] Remote Sensing

Power supplies of the DP-D series can be equipped with a remote sensing input connection to monitor the voltage at the load and compensate cable losses.

[K] Constant power mode

Allows setting of output power limitation (CP mode), in addition to voltage and current limitation (CV mode / CC mode).

[V] Polarity switch

Allows turning the output polarity during operation.

6.1 Model Number

The model number is encrypted as follows:

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

Example: DP10-5HD Z1 EF2D1K

Example Model: DP10-5HD

Example Accessories: Z1

Example Options: E, F with suboption 2, D with suboption 1, K