

DATASHEET

MEDIUM-VOLTAGE POWER SUPPLIES – MCP SERIES



TABLETOP MODELS UP TO 15KW
RACK-MOUNTED MODELS UP TO 15kW – ON REQUEST



PRODUCT PROPERTIES AND DATA

FUNCTION:

The MCP series power supplies (**M**edium **V**oltage-**C**hopper-**P**ower Supply) are highly stable switch-mode power supplies with low ripple. Due to the high switching frequency the power supply has a low residual ripple in the generated output voltage with high stability, good regulation dynamics, and at the same time only a low amount of stored energy.

CHARACTERISTICS:

- Compact design (19" housing), low weight, even at high output voltages
- Floating output
- Permanently short-circuit and flash-over proof
- Can be operated indefinitely with rated current in case of a short-circuit
- Voltage and current control with automatic transfer and control mode display with LEDs
- 4½-digit digital display for current and voltage in all power classes
- Voltage and current are set using a ten-turn potentiometer with a lockable precision knob.
- Set-point display via a button
- Set-point adjustment possible with disabled output
- Push-button switch for output voltage (OUTPUT)
- Any load type, in principle, any passive two-terminal network is possible

We will be pleased to advise you – contact us at: sales@fug-elektronik.de or +49 8039 400 77 0.

POSSIBLE OPTIONS:

- Coarse/fine-potentiometers (99% / 1%) for more accurate adjustment of voltage and / or current
- Analog programming/interface
- Analog programming/interface, floating
- Computer interfaces -IEEE 488, RS 232, RS 422, Profi-bus DP, USB, LAN (more on request)
- Electronically controlled polarity reversal switch (up to 35kV remotely controllable when ordered with a programming or interface, for higher voltages, please contact us). Please specify the output polarity, when ordering without polarity reversal switch.
- Lower ripple
- Higher stability
- Lower stored energy

More options and special solutions on request. Some options may involve changes to the description of the unit - especially concerning the mechanical design.

HIGH-VOLTAGE POWER SUPPLY OPERATING MODES:

The power supplies can be operated in the LOCAL, ANALOG (optional) and DIGITAL (optional) operating modes.

TECHNICAL SPECIFICATIONS

All data given here apply for voltage and current control during internal operation (LOCAL) and refer to the maximum values of output data.

DIMENSIONS:

Depending on the output voltage and/or power, either a 1/2 19" or 19" desktop housing. The height and depth of the high-voltage power supply depends on its power rating and output voltage.

Detailed information can be found in the type table at the end of this document.

A special version as 19" rack-mounted or with optional rack adapter is available.

ELECTRICAL SPECIFICATION:

Mains connection:	Up to 1400W rated power 230V $\pm 10\%$ 47 - 63Hz From 2800W rated power 400V $\pm 10\%$ 3-phase 47 - 63Hz, also refer to the details on the type plate. The N and PE (protective earth) connections are always required!
Protection class:	I
Overvoltage category:	II
Output:	Output values, voltage / current, see front panel or the equipment card
Short-circuit resistance:	The power supply is short-circuit and flash-over proof. The maximum current can be drawn at any output voltage, even in the event of a short-circuit.
Efficiency:	approx. 90%
Output polarity:	Both output poles are isolated. Either the positive or the negative pole can be earthed.
Output isolation:	Devices with a rated voltage of up to 350V are isolated for $\pm 500V$. Devices with a rated voltage between 650V and 2000V are isolated for $\pm 2000V$. With these devices, always both connection cables must be connected to the load, as the outputs do not have a potential against ground. If the cable shield is to be used to return the current, the other output must be short-circuited to ground. In devices with non-isolated Analog programming/interface (option), one pole is permanently earthed.
Voltage setting range:	Using the VOLTAGE potentiometer, approx. 0.1% to 100% of the rated value
Current setting range:	Using the CURRENT potentiometer, approx. 0.1% to 100% of the rated value
Setting resolution:	$< \pm 1 \times 10^{-3}$ of rated value with potentiometer on front panel $< \pm 1 \times 10^{-5}$ of rated value with fine potentiometer 1×10^{-4} of rated value with option interface
Displays:	DVM for voltage and current, range ± 20000 LEDs for status messages voltage control / current control.
Reproducibility:	$\pm 1 \times 10^{-3}$ of rated value with potentiometer on front panel $\pm 1 \times 10^{-4}$ of rated value with option interface
Residual ripple:	Up to 350W rated power: $< 5 \times 10^{-5}ss + 50mVss$, for 700W and higher: $< 2 \times 10^{-4}ss + 200mVss$ (measuring bandwidth 30Hz to 10MHz) up to 350W $< 1,5 \times 10^{-5} + 20mV$ of rated value RMS for 700W and higher $< 6 \times 10^{-5} + 70mV$ of rated value RMS
Control time:	
Voltage control:	$< 1ms$ with load changes from 10% to 100% or 100% to 10%, respectively
Current control:	$< 10ms$ with load changes that effect a change of less than 10% in the output voltage.
Setting time at rated load:	$< 300ms$ for changes in the output voltage from 10 to 90% or 90 to 10%, respectively
Discharge time constant:	With output free of load max. 10 sec Discharge time to $< 50V$ max. 1 minute
Control deviation:	with $\pm 10\%$ network change: $< \pm 1 \times 10^{-5}$ of the rated value, with open circuit / full load: 1×10^{-4} of the rated value,

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	over 8 hours: $<\pm 1 \times 10^{-4}$ of the rated value, with temperature deviations $<\pm 1 \times 10^{-4}/K$ of the rated value
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AMBIENT CONDITIONS:

Operation:	
Operation location:	Only for use in dry indoor areas
Temperature:	0°C bis +40°C
Humidity:	Max. relative humidity 80% up to 31°C, decreasing linearly down to 50% relative humidity at 40°C
Altitude:	Up to 2000m above sea level
Pollution degree:	1
Protection type:	IP20
Cooling:	The heat generated in the power supply unit is dissipated by convection or, in the case of high-power units, by forced ventilation.
Transport / Storage:	
Temperature:	-20°C bis +50°C
Humidity:	No precipitation and max. relative humidity of 80%
Storage rooms:	Dust-free and dry

DC POWER SUPPLY COMPONENTS

FRONT VIEW WITH CONTROLS:

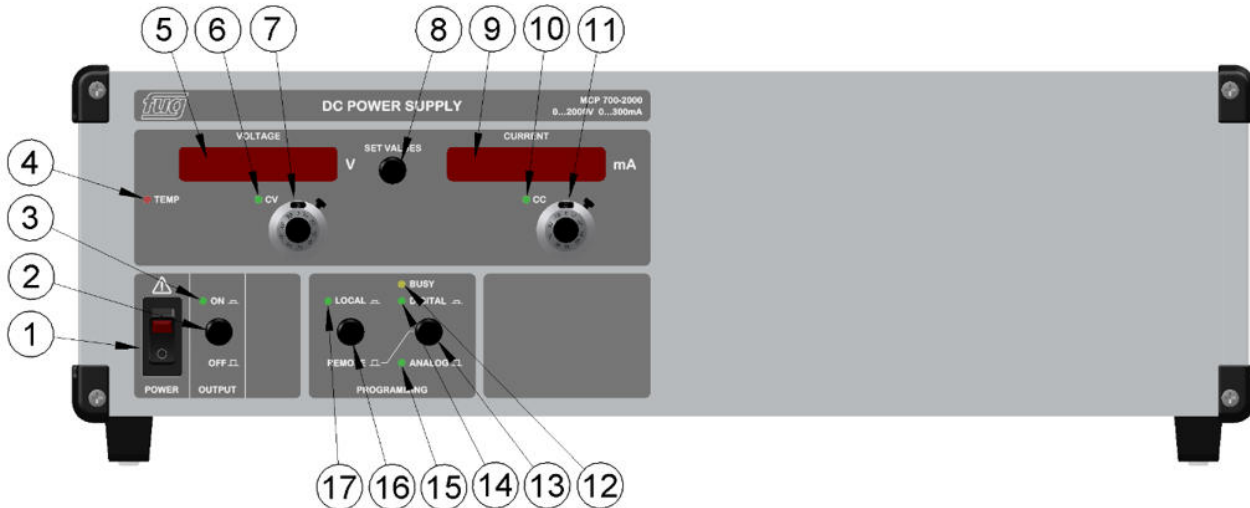


Figure: Sample Front panel MCP 700 – 2000. Different dimensions apply for DC power supplies with higher performance

1	AC power switch with indicator light Disconnects the power supply from the mains, two-pole switching	10	LED for constant current control mode (Constant Current)
2	DC output ON (OUTPUT) There is no mains disconnection!	11	Lockable ten-turn potentiometer for current adjustment

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3	DC output ON LED Lights up green when the controller and therefore the power stage is operating (OUTPUT ON)	12	(Optional) LED BUSY displays data traffic on the digital interface
4	Over-temperature LED: Internal device temperature too high, fan failed or contaminated. (Use is type-dependent)	13	(Optional) Switching the operation mode between REMOTE/ANALOG and REMOTE/DIGITAL
5	Voltage display flashing: Set point; not flashing: Actual value	14	(Optional) LED indicating digital programming active
6	LED for constant voltage control mode (Constant Voltage)	15	(Optional) LED indicating Analog programming/interface active
7	Lockable ten-turn potentiometer for voltage adjustment	16	(Optional) Switching the operation mode between LOCAL and REMOTE
8	SET VALUES Switch displays between Set-point mode and Actual output mode, displays flash when in set-point mode.	17	(Optional) LED LOCAL control mode active
9	Current display flashing: Set point not flashing: Actual value		

REAR VIEW WITH SINGLE-PHASE AC INPUT:



Figure: Rear panel – sample MCP 700 – 2000. For DC power supplies with higher performance or other voltages, other dimensions may apply. The elements' layout may vary from that shown here.

1	AC input with mains fuses Up to 700W: IEC connector (as shown) with integrated fuse, at 1400W, C20 mains cable in accordance with IEC60320-C20, equipped with automatic circuit breaker.
2	(Optional) 15-pin Sub-D connector for Analog programming/interface
3	(Optional) Slot for digital interface (e.g.: IEEE-488, RS232, USB, LAN, ...)
4	Air outlet (depending on device type)
5	For power supplies with 1250V or 2000V output voltage: HV output + (designated for screened output cable with grounded screen. To let the current flow back via the screen, the other (negative) output must be shorted) For power supplies up to 650V output voltage: HV-output with SLB (german abbreviation, safety-laboratory-socket)

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6	For power supplies with 1250V or 2000V output voltage: HV output + (designated for screened output cable with grounded screen. To let the current flow back via the screen, the other (negative) output must be shorted) For power supplies up to 650V output voltage: HV-output with SLB (german abbreviation, safety-laboratory-socket)
7	Earth bolt (is permanently connected to the protective conductor (PE): This connection must be connected to the ground of the load!
8	Polarity indication: BLUE: NEGATIVE
9	Polarity indication: RED: POSITIVE

REAR VIEW WITH THREE-PHASE AC INPUT:

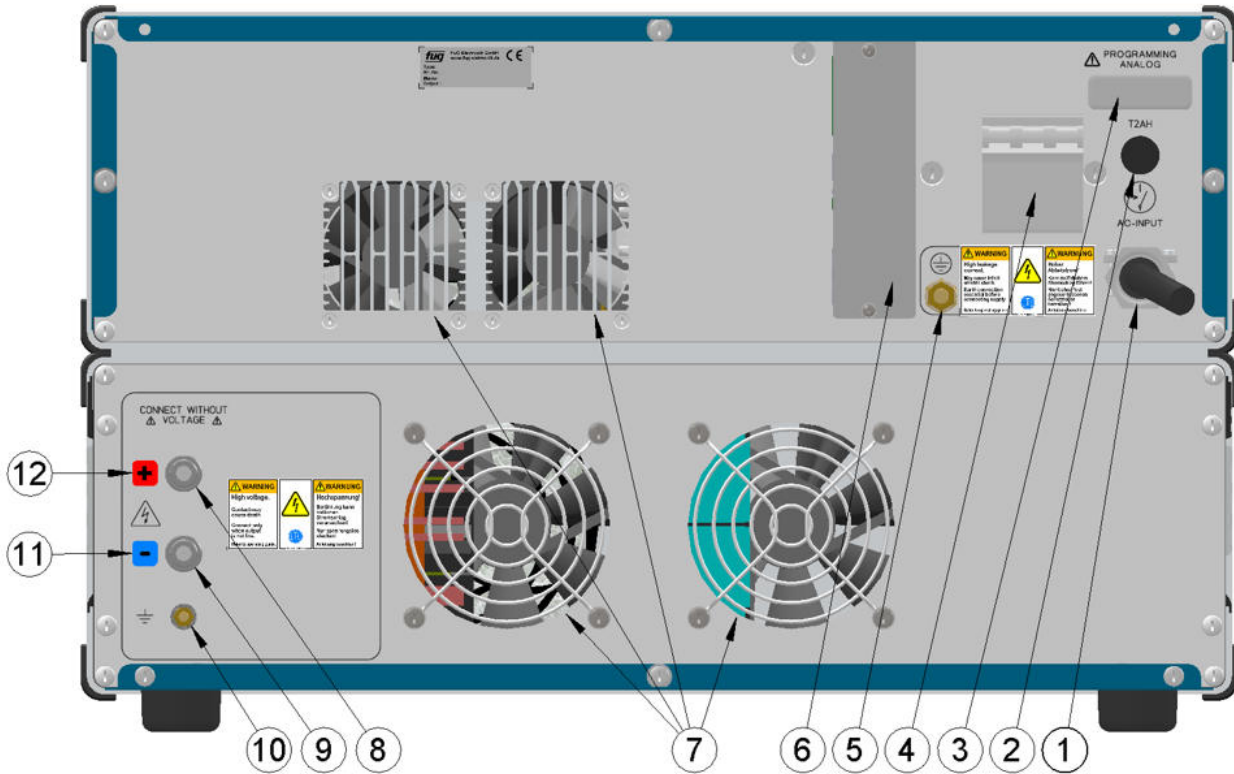


Figure: Sample MCP 5000 – 2000. For DC power supplies with higher performance or other voltages, other dimensions may apply. The elements' layout may vary from that shown here.

1	AC input with permanently installed cable for 3-phase mains connections.
2	Fuse holder for internal control fuse
3	(Optional) 15-pin Sub-D connector for Analog programming/interface
4	Automatic circuit breaker, fuse holder
5	Earth bolts, only for units with three-phase AC power connection. The DC power supply must be professionally earthed using 10mm ² cable to the earth bolt provided.
6	(Optional) Slot for digital interface (e.g.: IEEE-488, RS232, USB, LAN, ...)
7	Air outlet for the power output stage
8	For power supplies with 1250V or 2000V output voltage: HV output + (designated for screened output cable with grounded screen. To let the current flow back via the screen, the other (negative) output must be shorted) For power supplies up to 650V output voltage: HV-output with SLB (german abbreviation, safety-laboratory-socket)
9	For power supplies with 1250V or 2000V output voltage: HV output + (designated for screened output cable with grounded screen. To let the current flow back via the screen, the other (negative) output must be shorted)

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	For power supplies up to 650V output voltage: HV-output with SLB (german abbreviation, safety-laboratory-socket)
10	Earth bolt (is permanently connected to the protective conductor (PE): This connection must be connected to the ground of the load!
11	Polarity indication: BLUE: NEGATIVE
12	Polarity indication: RED: POSITIVE

TYPE TABLE

Type	Voltage	Current	Width	Height	Depth	Weight
MCP 35 - 125 ●	0 - 125 V	0 - 250 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP 140 - 125 ●	0 - 125 V	0 - 1 A	½19" / 222 mm	3 HE / 133 mm	350 mm	5 kg
MCP 350 - 125 ●	0 - 125 V	0 - 2,5 A	½19" / 222 mm	3 HE / 133 mm	350 mm	6 kg
MCP 700 - 125 ●	0 - 125 V	0 - 5 A	19" / 443 mm	3 HE / 133 mm	350 mm	9 kg
MCP 1400 - 125 ●	0 - 125 V	0 - 10 A	19" / 443 mm	3 HE / 133 mm	450 mm	12 kg
MCP 2800 - 125 3)	0 - 125 V	0 - 20 A	19" / 443 mm	3 HE / 133 mm	550 mm	23 kg
MCP 5000 - 125 3)	0 - 125 V	0 - 40 A	19" / 443 mm	6 HE / 266 mm	650 mm	40 kg
MCP 10000 - 125 3)	0 - 125 V	0 - 80 A	19" / 443 mm	9 HE / 399 mm	650 mm	75 kg
MCP 15000 - 125 3)	0 - 125 V	0 - 120 A	19" / 443 mm	12 HE / 535 mm	650 mm	110 kg
MCP 35 - 200 ●	0 - 200 V	0 - 150 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP 140 - 200 ●	0 - 200 V	0 - 600 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	5 kg
MCP 350 - 200 ●	0 - 200 V	0 - 1,5 A	½19" / 222 mm	3 HE / 133 mm	350 mm	6 kg
MCP 700 - 200 ●	0 - 200 V	0 - 3 A	19" / 443 mm	3 HE / 133 mm	350 mm	9 kg
MCP 1400 - 200 ●	0 - 200 V	0 - 6 A	19" / 443 mm	3 HE / 133 mm	450 mm	12 kg
MCP 2800 - 200 3)	0 - 200 V	0 - 12 A	19" / 443 mm	3 HE / 133 mm	550 mm	23 kg
MCP 5000 - 200 3)	0 - 200 V	0 - 25 A	19" / 443 mm	6 HE / 266 mm	650 mm	40 kg
MCP 10000 - 200 3)	0 - 200 V	0 - 50 A	19" / 443 mm	9 HE / 399 mm	650 mm	75 kg
MCP 15000 - 200 3)	0 - 200 V	0 - 75 A	19" / 443 mm	12 HE / 535 mm	650 mm	110 kg
MCP 35 - 350 ●	0 - 350 V	0 - 100 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP 140 - 350 ●	0 - 350 V	0 - 400 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	5 kg
MCP 350 - 350 ●	0 - 350 V	0 - 1 A	½19" / 222 mm	3 HE / 133 mm	350 mm	6 kg
MCP 700 - 350 ●	0 - 350 V	0 - 2 A	19" / 443 mm	3 HE / 133 mm	350 mm	9 kg
MCP 1400 - 350 ●	0 - 350 V	0 - 4 A	19" / 443 mm	3 HE / 133 mm	450 mm	12 kg
MCP 2800 - 350 3)	0 - 350 V	0 - 8 A	19" / 443 mm	3 HE / 133 mm	550 mm	23 kg
MCP 5000 - 350 3)	0 - 350 V	0 - 14 A	19" / 443 mm	6 HE / 266 mm	650 mm	40 kg
MCP 10000 - 350 3)	0 - 350 V	0 - 28 A	19" / 443 mm	9 HE / 399 mm	650 mm	75 kg
MCP 15000 - 350 3)	0 - 350 V	0 - 42 A	19" / 443 mm	12 HE / 535 mm	650 mm	110 kg
MCP 14 - 650 ●	0 - 650 V	0 - 20 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP 35 - 650 ●	0 - 650 V	0 - 50 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP 140 - 650 ●	0 - 650 V	0 - 200 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	5 kg
MCP 350 - 650 ●	0 - 650 V	0 - 500 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	6 kg

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MCP	700 - 650	●	0 - 650 V	0 - 1 A	19" / 443 mm	3 HE / 133 mm	350 mm	9 kg
MCP	1400 - 650	●	0 - 650 V	0 - 2 A	19" / 443 mm	3 HE / 133 mm	450 mm	12 kg
MCP	2800 - 650	3)	0 - 650 V	0 - 4 A	19" / 443 mm	3 HE / 133 mm	550 mm	23 kg
MCP	5000 - 650	3)	0 - 650 V	0 - 7 A	19" / 443 mm	6 HE / 266 mm	650 mm	40 kg
MCP	10000 - 650	3)	0 - 650 V	0 - 15 A	19" / 443 mm	9 HE / 399 mm	650 mm	75 kg
MCP	15000 - 650	3)	0 - 650 V	0 - 22,5 A	19" / 443 mm	12 HE / 535 mm	650 mm	110 kg
MCP	14 - 1250	●	0 - 1250 V	0 - 10 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP	35 - 1250	●	0 - 1250 V	0 - 25 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP	140 - 1250	●	0 - 1250 V	0 - 100 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	5 kg
MCP	350 - 1250	●	0 - 1250 V	0 - 250 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	6 kg
MCP	700 - 1250	●	0 - 1250 V	0 - 500 mA	19" / 443 mm	3 HE / 133 mm	350 mm	9 kg
MCP	1400 - 1250	●	0 - 1250 V	0 - 1 A	19" / 443 mm	3 HE / 133 mm	450 mm	12 kg
MCP	2800 - 1250	3)	0 - 1250 V	0 - 2 A	19" / 443 mm	3 HE / 133 mm	550 mm	23 kg
MCP	5000 - 1250	3)	0 - 1250 V	0 - 4 A	19" / 443 mm	6 HE / 266 mm	650 mm	40 kg
MCP	10000 - 1250	3)	0 - 1250 V	0 - 8 A	19" / 443 mm	9 HE / 399 mm	650 mm	75 kg
MCP	15000 - 1250	3)	0 - 1250 V	0 - 12 A	19" / 443 mm	12 HE / 535 mm	650 mm	110 kg
MCP	14 - 2000	●	0 - 2000 V	0 - 6 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP	35 - 2000	●	0 - 2000 V	0 - 15 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	4 kg
MCP	140 - 2000	●	0 - 2000 V	0 - 60 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	5 kg
MCP	350 - 2000	●	0 - 2000 V	0 - 150 mA	½19" / 222 mm	3 HE / 133 mm	350 mm	6 kg
MCP	700 - 2000	●	0 - 2000 V	0 - 300 mA	19" / 443 mm	3 HE / 133 mm	350 mm	9 kg
MCP	1400 - 2000	●	0 - 2000 V	0 - 600 mA	19" / 443 mm	3 HE / 133 mm	450 mm	12 kg
MCP	2800 - 2000	3)	0 - 2000 V	0 - 1,2 A	19" / 443 mm	3 HE / 133 mm	550 mm	23 kg
MCP	5000 - 2000	3)	0 - 2000 V	0 - 2,5 A	19" / 443 mm	6 HE / 266 mm	650 mm	40 kg
MCP	10000 - 2000	3)	0 - 2000 V	0 - 5 A	19" / 443 mm	9 HE / 399 mm	650 mm	75 kg
MCP	15000 - 2000	3)	0 - 2000 V	0 - 7 A	19" / 443 mm	12 HE / 535 mm	650 mm	110 kg

3) Three phase mains connection

*) With polarity reversal switch these units will be 2 HU higher.

**) With polarity reversal switch these units will be 100mm deeper.

***) The dimensions are valid for the power part. The high voltage part is housed in a separate oil filled container. Weight stated: Power part / High voltage container

All specifications are subject to change without further notice.

Please feel free to contact our sales team for any further questions:

Mail: sales@fug-elektronik.de

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