

# Medium voltage power supplies



Design example

**MCL 14 - 2000**  
2000 V / 6 mA

## Function

The rectified line voltage maintains a square wave generator of constant frequency, whose AC voltage is transformed, rectified and filtered, producing the output voltage. For the regulation the square wave voltage is pulse width modulated.

## Features

- Compact size
- Light-weight
- Efficiency appr. 90%
- Unlimited operation with rated current in a short-circuit condition

- Unlimited operation with nominal power
- Voltage and current regulation with automatic, sharp transition
- Control mode indicated by LED
- Voltage and current setting with 10-turn potentiometers with precision scale; the adjusting knob can be locked
- 4½-digits DVM for voltage and current
- Suitable for inductive and capacitive loads

## Design

- ½19" table-top case
- 19" rackadapters are available as accessories

## Outputs

- At units up to 350 V nominal voltage 4 mm safety connectors.

From 650 V nominal voltage on SHV high-voltage connectors, mating cable connectors are included.

## Technical Data

- Mains connection:  
230 V ±10% 47 Hz to 63 Hz

- Ambient temperature:  
0°C to +40°C
- Output isolation:  
The output is floating, either the positive or the negative pole may be connected to earth. (Not with standard analog programming)
- Maximum isolating voltage:  
**Up to 350 V** nominal voltage ±500 V  
**From 650 V** nominal voltage on ±2000 V

Further medium-voltage power supplies see page 32

# Medium voltage power supplies

## Series MCL from 125 V to 2000 V / 14 W to 350 W

All further data apply for voltage and current regulation and refer to the rated value, if not otherwise stated.

- Setting range:  
from appr. 0,1% to 100%
- Reproducibility:  
 $1 \times 10^{-3}$
- Residual ripple:  
 $<5 \times 10^{-5}$ pp + 50 mVpp

- Deviation:  
for  $\pm 10\%$  mains voltage variation:  $\pm 1 \times 10^{-5}$   
for no load / full load:  $<1 \times 10^{-4}$   
over 8 hours under constant conditions:  $<\pm 1 \times 10^{-4}$   
within the temperature range:  
 $<\pm 1 \times 10^{-4}/K$
- Recovery time:  
Voltage control:  
 $<1$  ms for load changes from 10% to 100%  
or from 100% to 10%.

### Current control:

- $<10$  ms for load changes causing an output change of less than 10% of the rated voltage
- Setting time at nominal load:  
 $<300$  ms for changes of the output voltage from 10% to 90% or from 90% to 10%, depending on type
- Discharging time constant  
approx. 2 to 10 sec. depending on type

### Options

- Analog programming
  - Analog programming, floating
- For information about the output isolation please see page 60
- Computer interface  
IEEE 488 and RS 232

Type	Voltage	Current	Width	Height	Depth	Weight
MCL 35 - 125	0 - 125 V	0 - 250 mA	½19" / 222 mm	2 HU 89 mm	450 mm	4 kg
MCL 140 - 125	0 - 125 V	0 - 1 A	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 350 - 125	0 - 125 V	0 - 2,5 A	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 35 - 200	0 - 200 V	0 - 150 mA	½19" / 222 mm	2 HU 89 mm	450 mm	4 kg
MCL 140 - 200	0 - 200 V	0 - 600 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 350 - 200	0 - 200 V	0 - 1,5 A	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 35 - 350	0 - 350 V	0 - 100 mA	½19" / 222 mm	2 HU 89 mm	450 mm	4 kg
MCL 140 - 350	0 - 350 V	0 - 400 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 350 - 350	0 - 350 V	0 - 1 A	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 14 - 650	0 - 650 V	0 - 20 mA	½19" / 222 mm	2 HU 89 mm	450 mm	4 kg
MCL 35 - 650	0 - 650 V	0 - 50 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 140 - 650	0 - 650 V	0 - 200 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 350 - 650	0 - 650 V	0 - 500 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 14 - 1250	0 - 1250 V	0 - 10 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 35 - 1250	0 - 1250 V	0 - 25 mA	½19" / 222 mm	2 HU 89 mm	450 mm	4 kg
MCL 140 - 1250	0 - 1250 V	0 - 100 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 350 - 1250	0 - 1250 V	0 - 250 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 14 - 2000	0 - 2000 V	0 - 6 mA	½19" / 222 mm	2 HU 89 mm	450 mm	4 kg
MCL 35 - 2000	0 - 2000 V	0 - 15 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 140 - 2000	0 - 2000 V	0 - 60 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg
MCL 350 - 2000	0 - 2000 V	0 - 150 mA	½19" / 222 mm	2 HU / 89 mm	450 mm	4 kg

From 650 V on mating SHV connectors are included; recommended cable RG 58, see page 57

# Medium voltage power supplies



Design examples

Two ½19" table-top units

**MCN 140 - 350**

350 V / 400 mA

**MCN 35 - 2000**

2000 V / 15 mA

Up to 350 W

the units are ½19" wide



**MCN 700 - 2000**

2000 V / 300 mA



**MCN 1400 - 1250**

1250 V / 1 A

# Medium voltage power supplies

## Series MCN from 125 V to 2000 V / 14 W to 4200 W

### Function

The rectified line voltage maintains a square wave generator of constant frequency, whose AC voltage is transformed, rectified and filtered, producing the output voltage. For the regulation the square wave voltage is pulse width modulated.

### Features

- Compact size
- Light-weight
- Efficiency appr. 90%
- Short-circuit and flashover proof
- Unlimited operation with rated current in a short-circuit condition
- Unlimited operation with rated power
- Voltage and current regulation with automatic, sharp transition
- Control mode indicated by LEDs
- Voltage and current setting with 10-turn potentiometers with precision scale; the adjusting knob can be locked
- 3½ digit DVM for voltage and current (at ½19" units switch-selected)
- Suitable for inductive and capacitive loads
- Suitable for photomultiplier

### Design

- Up to 350 W nominal power ½19" table-top case, from 700 W nominal power on 19" table-top case
- 19" rack-adapters see page 56

### Outputs

- Units up to 350 V nominal voltage have 4mm safety connectors.
- From 650 V nominal voltage on SHV connectors are provided. HV-connectors are included.

### Technical Data

- Mains connection: up to 1400 W nominal power 230 V  $\pm 10\%$  47 Hz to 63 Hz; from 2800 W nominal power on 400 V  $\pm 10\%$  47 Hz to 63 Hz three-phase

- Ambient temperature: 0°C to +40°C

- Output isolation: The output is floating. Either the positive or the negative pole may be connected to earth.

(Not valid with the option analog programming. If the floating function should remain, the floating analog programming option must be chosen)

- Maximum isolation voltage:

**Up to 350 V** nominal voltage  $\pm 500$  V

**from 650 V** nominal voltage on  $\pm 2000$  V

All further data apply for voltage and current regulation and refer to the rated value, if not otherwise stated.

- Setting range: from appr. 0,1% to 100%

- Setting resolution:  $\pm 1 \times 10^{-4}$
- Reproducibility:  $\pm 1 \times 10^{-3}$
- Residual ripple: Up to 350 W nominal power  $< 5 \times 10^{-5}$ pp + 50 mVpp, from 700 W nominal power on  $< 2 \times 10^{-4}$ pp + 200 mVpp
- Deviation: for  $\pm 10\%$  mains voltage variation:  $< \pm 1 \times 10^{-5}$

for no load / full load:  $< 1 \times 10^{-4}$

over 8 hours under constant conditions:  $< \pm 1 \times 10^{-4}$

within the temperature range:  $< \pm 1 \times 10^{-4}/K$

- Recovery time: Voltage control:  $< 1$  ms for load changes from 10% to 100% or from 100% to 10%.

Current control:  $< 10$  ms for load changes causing an output change of less than 10% of the rated voltage

- Setting time at nominal load:  $< 300$  ms for changes of the output voltage from 10% to 90% or from 90% to 10%. depending on type
- Discharging time constant approx. 2 to 10 sec. depending on type

### Options

- Analog programming
- Analog programming, floating

For information about the output isolation please see page 60

- Computer interface IEEE 488 and RS 232
- DVM with higher resolution
- Lower ripple
- Higher stability

For more information on our options please see pages 60 and 61. Also, some options may contain changes of the description of the unit.

Types see next pages

Power supplies for higher voltages please see series HCN from page 38 on and from page 42 on, series HCH.

# Medium voltage power supplies

## Series MCN from 125 V to 650 V / 14 W to 4200 W

Type	Voltage	Current	Width	Height	Depth	Weight
MCN 35 - 125	0 - 125 V	0 - 250 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 140 - 125	0 - 125 V	0 - 1 A	½19" / 222 mm	3 HU / 133 mm	350 mm	5 kg
MCN 350 - 125	0 - 125 V	0 - 2,5 A	½19" / 222 mm*)	3 HU / 133 mm	350 mm	6 kg
MCN 700 - 125	0 - 125 V	0 - 5 A	19" / 443 mm	3 HU / 133 mm	350 mm	9 kg
MCN 1400 - 125	0 - 125 V	0 - 10 A	19" / 443 mm	4 HU / 177 mm	550 mm	19 kg
MCN 2800 - 125 3)	0 - 125 V	0 - 20 A	19" / 443 mm	4 HU / 177 mm	650 mm	23 kg
MCN 35 - 200	0 - 200 V	0 - 150 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 140 - 200	0 - 200 V	0 - 600 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	5 kg
MCN 350 - 200	0 - 200 V	0 - 1,5 A	½19" / 222 mm*)	3 HU / 133 mm	350 mm	6 kg
MCN 700 - 200	0 - 200 V	0 - 3 A	19" / 443 mm	3 HU / 133 mm	350 mm	9 kg
MCN 1400 - 200	0 - 200 V	0 - 6 A	19" / 443 mm	4 HU / 177 mm	550 mm	19 kg
MCN 2800 - 200 3)	0 - 200 V	0 - 12 A	19" / 443 mm	4 HU / 177 mm	650 mm	23 kg
MCN 35 - 350	0 - 350 V	0 - 100 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 140 - 350	0 - 350 V	0 - 400 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	5 kg
MCN 350 - 350	0 - 350 V	0 - 1 A	½19" / 222 mm*)	3 HU / 133 mm	350 mm	6 kg
MCN 700 - 350	0 - 350 V	0 - 2 A	19" / 443 mm	3 HU / 133 mm	350 mm	9 kg
MCN 1400 - 350	0 - 350 V	0 - 4 A	19" / 443 mm	4 HU / 177 mm	550 mm	19 kg
MCN 2800 - 350 3)	0 - 350 V	0 - 8 A	19" / 443 mm	4 HU / 177 mm	650 mm	23 kg
MCN 14 - 650	0 - 650 V	0 - 20 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 35 - 650	0 - 650 V	0 - 50 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 140 - 650	0 - 650 V	0 - 200 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	5 kg
MCN 350 - 650	0 - 650 V	0 - 500 mA	½19" / 222 mm*)	3 HU / 133 mm	350 mm	6 kg
MCN 700 - 650	0 - 650 V	0 - 1 A	19" / 443 mm	3 HU / 133 mm	350 mm	9 kg
MCN 1400 - 650	0 - 650 V	0 - 2 A	19" / 443 mm	4 HU / 177 mm	550 mm	19 kg
MCN 2800 - 650 3)	0 - 650 V	0 - 4 A	19" / 443 mm	4 HU / 177 mm	650 mm	23 kg
MCN 4200 - 650 3)	0 - 650 V	0 - 6 A	19" / 443 mm	4 HU / 177 mm	650 mm	30 kg

3) Mains connection three-phase

\*) With the options computer interface or floating analog programming these units will become 19" wide.

Power supplies with higher power ratings see series NTN and HCH pages 6 and 42

# Medium voltage power supplies

## Series MCN from 1250 V to 2000 V / 14 W to 4200 W

Type	Voltage	Current	Width	Height	Depth	Weight
MCN 14 - 1250	0 - 1250 V	0 - 10 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 35 - 1250	0 - 1250 V	0 - 25 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 140 - 1250	0 - 1250 V	0 - 100 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	5 kg
MCN 350 - 1250	0 - 1250 V	0 - 250 mA	½19" / 222 mm*)	3 HU / 133 mm	350 mm	6 kg
MCN 700 - 1250	0 - 1250 V	0 - 500 mA	19" / 443 mm	3 HU / 133 mm	350 mm	9 kg
MCN 1400 - 1250	0 - 1250 V	0 - 1 A	19" / 443 mm	4 HU / 177 mm	550 mm	19 kg
MCN 2800 - 1250 3)	0 - 1250 V	0 - 2 A	19" / 443 mm	4 HU / 177 mm	650 mm	23 kg
MCN 4200 - 1250 3)	0 - 1250 V	0 - 3 A	19" / 443 mm	4 HU / 177 mm	650 mm	30 kg
MCN 14 - 2000	0 - 2000 V	0 - 6 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 35 - 2000	0 - 2000 V	0 - 15 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	4 kg
MCN 140 - 2000	0 - 2000 V	0 - 60 mA	½19" / 222 mm	3 HU / 133 mm	350 mm	5 kg
MCN 350 - 2000	0 - 2000 V	0 - 150 mA	½19" / 222 mm*)	3 HU / 133 mm	350 mm	6 kg
MCN 700 - 2000	0 - 2000 V	0 - 300 mA	19" / 443 mm	3 HU / 133 mm	350 mm	9 kg
MCN 1400 - 2000	0 - 2000 V	0 - 600 mA	19" / 443 mm	4 HU / 177 mm	550 mm	19 kg
MCN 2800 - 2000 3)	0 - 2000 V	0 - 1 A	19" / 443 mm	4 HU / 177 mm	650 mm	23 kg
MCN 4200 - 2000 3)	0 - 2000 V	0 - 2 A	19" / 443 mm	4 HU / 177 mm	650 mm	30 kg

3) Mains connection three-phase

\*) With the options computer interface or floating analog programming these units will become 19" wide.

Power supplies with higher power ratings see series HCH page 42