# Power supplies for superconducting coils
# Series NTS to 65 V / to 10000 A


**Design example**

**NTS 250000M - 50**
front plate

## Features:

- High efficiency
- Short circuit proof and with unlimited operation at full current in short-circuit condition
- Sense terminals for the compensation of the voltage drop on the power lines. By presetting the voltage, a linear current ramp can be generated
- Energizing and de-energizing voltage can be preset with a single potentiometer
- Constant voltage operation for linear up and down control
- Linear de-energization, with reverse voltage permitted up to the nominal value of the output voltage (2-quadrant operation)
- 4½ digit DVM for current and voltage
- Interlock loop to monitor the external load and internal loop as a standard

## Function:

Designed specifically for superconducting coil applications, this power supply family is series regulated via a set of parallel transistors which are driven from a pre-regulation stage which utilises phase controlled thyristors. In this manner, the power lost across the output transistors is kept to as minimum. Thus, the final control element always has a low power dissipation in energizing and static constant current mode.
In de-energizing mode, the transistor stage is working as a current sink and the power is dissipated by means of either air or water cooling.

## Design:

- Up to 200A (or approx. 2.5 kW) table-top cases or plug-in units.
- Units with higher current or power are supplied as 19" cabinets. The side panels can be removed, the rear door can be locked.
- All cabinets have removable crane-eyes.
- All cabinets are suitable for fork lift transport.

## Cooling:

Up to approx. 1000A (or approx. 5kW de-energizing power), air cooling. For higher currents, or higher powers, water cooling with thermostatic valves for the control of the water flow is used (depending on the power)

## Output:

- Output isolation:

  The output is floating. Operating voltage with respect to earth: for air cooled units max. ±300V DC. For water cooled units max. ±100V DC.
- Output terminals:

  Up to 100 A, clamps on the rear. For higher currents we use copper bars.

## Technical Data:

- Mains connection:

  Up to approx. 200A nominal current or approx. 1000W: 230V ±10% 47Hz to 53Hz;

  For higher current or power: 400V ±10% 47Hz to 53Hz 3-phase
- Ambient temperature:

  0°C to +40°C

All following data are guide values and will be modified according to the specification. (For explanations please refer to Definitions and Terms on page 61.)

- Setting range for current: from approx. 0,1% to 100%
- Setting range for voltage: from -100% to +100%
- Reproducibility: ±1 x $10^{-4}$ to ±1 x $10^{-6}$
- Setting resolution: 1 x 10-4
- Residual ripple (Voltage): approx. 1 x $10^{-3}$pp
- Residual ripple (Current): ±1 x $10^{-4}$pp to ±1 x $10^{-6}$pp depending on inductivity of the load
- Run up time: from 1sec. to 100 h
- Deviation: for ±10% mains voltage variation: <± 1 x $10^{-5}$ for no load / full load: <2 x $10^{-4}$ over 8 h under constant conditions: <±1 x $10^{-4}$ to ±1 x $10^{-5}$ within the temperature range: <±1 x $10^{-4}$ to ±5 x $10^{-6}$ / K

## Possible Options:

- Analogue programming (see page 52)
- Analogue programming, floating (see page 52)
- Roller blades for cabinet units
- Computer interface - IEEE 488, RS 232, RS 422, Profibus DP (more on request) (see page 54)
- Higher stability
- Current control by electronic ramp with digital control; rise and fall times are adjustable manually or via computer interface
- Current limit setting either manually or via computer interface. Resolution up to 1 x $10^{-5}$ for external setting
- High speed turn-off input with adjustable threshold
- Quench detector to monitor the magnet
- Fast de-energizing in the event of quench or mains failure: A DC circuit breaker or a semiconductor switch disconnects the power supply from the magnet. De-energization takes place with a power resistor, actuated at quench, or via an external circuit
- Short circuit switch (Current source 100mA for heating a sector of the superconducting circuit)
- Water cooling

More options and special solutions on request.

**For this type of power supplies we don't indicate a range of standard types since it is meaningful to adapt the power and equipment of the units for each single application.**



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## Design examples

**NTS 1200M - 10**
10V / 120 A
customer specific design,
with remote control unit

**NTS 20000M - 10**
10V / 2000 A

**NTS 250000M - 50**
50V / 5000 A



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