Power supply units for nTMM at GP-SANS

We need two identical channels for 2 identical magnets

Candidates were proposed by Matt Frost

Parameters* of the magnet power circuit:
Coil resistance ~ 156 ohm (8 serial layers)
Current (for max 30 Gauss) ~ 0.3575 A
Voltage max ~ 56 V
Consumed power ~ 20 W

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* Exact parameters will be known after magnets assembly

From June 23, 2024, YK
"Accuracy of parameters in nTMM measurement"
we need the stability of magnet current at the level

$$\frac{\Delta i}{i} \approx 0.01\%$$

Requirements per magnet

- Single-channel power supply (need 2 units)
- Max current 1 A
- Max voltage 100 V
- Constant Current Mode
- Power 100W
- Current setting precision > 12 bit (0.1 mA)
- Stability, ripples, noise < 0.1 mA
- Integration with GP-SANS DAQ
- Use EPICS interface software
- Supplementary Low Pass Filter (EMI filter)

Inside the metal case of GP-SANS guide the magnet circuit is shielded against the EMI. Common mode and differential interference can be induced on the connecting wires and/or ground outside the vacuum guide vessel. In situ test is needed.

Matt's suggestion

TDK·Lambda

Genesys™ Series

General-Purpose Programmable DC Power Supplies (Single Output in 1U, 2U and 3U Profile)

https://www.us.lambda.tdk.com/products/programmable-power/genesys.html

Test | Industrial | Medical | COTS | Renewable | LED | COMM | Broadcast

The *Genesys*™ DC Programmable Power Supply Series is a general-purpose, solution that provides high power density from 600W to 15kW with a complete set of reliable and user-friendly front panel, Remote Analog programming and Remote Digital communication interfaces. This series offers Output voltages from 6V to 1500V and several AC Inputs (single-phase/three-phase) with Power-Factor Correction.

Remote interfaces include the built-in Analog (5V/10V) Program/Monitor/Control and Digital (RS-232/RS-485) Communication Interfaces along with the optional LAN (*LXI* 1.5), IEEE (488.2), USB (2.0) and Isolated Analog (5V/10V or 4-20mA) Interfaces.

Features	Benefits
• Single Output: Models from **6V** to **1500V** (750W to 15kW)	• Flexibilty in model choice and AC Input
• Worlwide AC Inputs (single/three-phase) with Active Power Factor Correction	• Lightweight, high efficiency, reliable operation
• CV/CC operation with Auto-Crossover / 0°C to +50°C operation	• Flexibility in Digital/Isolated Analog Interface selection
• Built-In Interfaces: Front Panel, RS-232/RS-485, Remote Analog (5V/10V)	• Easy physical impementation (bench-top or rack-mount)
• Digital Interfaces (optional): **LAN (*LXI* 1.5)**, **USB** (2.0), **IEEE** (488.2)	• Higher power (parallel) or higher voltage (series) capability
• Isolated Analog Interfaces (optional): **IS510** (5V/10V), **IS420** (4-20mA)	• Simple and similar front panel/rear panel operation (750W - 15kW)
• Worldwide Safety Agency Approvals / CE Mark / **5Yr** Warranty	• Built-In Safety/EMC/RoHS compliance

Matt's suggestion

750W Programmable DC Power Supplies

(Single Output in 1U Half-Rack Profile)

Model Number	Voltage Adjust Range (V)	Current Adjust Range (A)	Rated Output Power (W)	Voltage Ripple (20MHz) (mVpp)	Current Ripple (5Hz ~ 1MHz) (mArms)	Efficiency (100VAC/200VAC) (%)
GENH 6-100	0 - 6	0 - 100	600	60	200	76 / 78
GENH 8-90	0 - 8	0 - 90	720	60	180	78 / 81
GENH 12.5-60	0 - 12.5	0 - 60	750	60	120	81 / 84
GENH 20-38	0 - 20	0 - 38	760	60	76	82 / 85
GENH 30-25	0 - 30	0 - 25	750	60	63	82 / 85
GENH 40-19	0 - 40	0 - 19	760	60	48	83 / 87
GENH 60-12.5	0 - 60	0 - 12.5	750	60	38	83 / 87
GENH 80-9.5	0 - 80	0 - 9.5	760	80	29	83 / 87
GENH 100-7.5	0 - 100	0 - 7.5	750	80	23	83 / 87
GENH 150-5	0 - 150	0 - 5	750	100	18	83 / 87
GENH 300-2.5	0 - 300	0 - 2.5	750	150	13	83 / 87
GENH 600-1.3	0 - 600	0 - 1.3	780	300	8	83 / 87

GENH		30	-	25	-	LAN	-	U

Product Series: **GENH** (Half-Rack 750W)

Output voltage

Output current

LAN:	LAN Interface
IEMD:	IEEE (GPIB) Interface
USB:	USB (2.0) Interface
IS510:	Isolated Analog (5V/10V)
IS420:	Isolated Analog (4-20mA)

U: North American Linecord

Examples: **GENH 30-25-U**, **GENH 60-12.5-LAN-U**, **GENH 100-7.5-IEEE-U**

Possible ? alternative

TDK·Lambda

Z+ Low Voltage Series

200-800W, 10 to 100V Programmable Power Supplies

Full Datasheet
https://product.tdk.com/en/power/zplus

Industrial Test

Suitable for bench or 2U rack mounting, the Z+ is a very compact programmable power supply offering power levels from 200 to 800W, voltages of up to 100V and currents of up to 72A. Multiple remote programming methods are available including built-in USB, RS232 & RS485 and optional LAN, GPIB & isolated analogue interfaces. The units can operate in either constant current or constant voltage mode and accept a wide 85-265Vac input. The product is backed with a five year warranty.

Features	Benefits
• 2U high	• Low Profile
• Built-in USB, RS-232 & RS-485 Interface	• No Additional Cost
• Optional LAN, GPIB & Isolated Analog Programming	• Programmable Remote Operation
• Bench or Rack Mount	• Flexible Mounting
• Constant Current or Voltage Modes	• Seamless Transition (Auto Crossover)
• Five Year Warranty	• Low Cost of Ownership

Possible ? alternative

Model	Voltage Adjust Range	Current Adjust Range	Max Power (W)	Ripple 5Hz-1MHz (mV)	Noise 20MHZ BW (mV)	Ripple 5Hz-1MHz (mA)	Efficiency % (100-200VAC)	Front Panel Output Jacks (Option)
Z10-20-U	0 - 10	0 - 20	200	5	50	25	80 / 82	Yes
Z10-40-U	0 - 10	0 - 40	400	5	50	70	80 / 82	Yes
Z10-60-U	0 - 10	0 - 60	600	5	50	150	80 / 82	Yes
Z10-72-U	0 - 10	0 - 72	720	5	50	180	80 / 82	Yes
Z20-10-U	0 - 20	0 - 10	200	6	50	15	82 / 84	Yes
Z20-20-U	0 - 20	0 - 20	400	6	50	40	81 / 83	Yes
Z20-30-U	0 - 20	0 - 30	600	5	50	75	82 / 84	Yes
Z20-40-U	0 - 20	0 - 40	800	5	50	100	82 / 84	Yes
Z36-6-U	0 - 36	0 - 6	216	6	50	8	83 / 85	Yes
Z36-12-U	0 - 36	0 - 12	432	6	50	15	83 / 85	Yes
Z36-18-U	0 - 36	0 - 18	648	5	50	25	84 / 85	Yes
Z36-24-U	0 - 36	0 - 24	864	5	50	31	84 / 85	Yes
Z60-3.5-U	0 - 60	0 - 3.5	210	7	50	4	83 / 85	Yes
Z60-7-U	0 - 60	0 - 7	420	7	50	8	83 / 85	Yes
Z60-10-U	0 - 60	0 - 10	600	12	50	8	83 / 85	Yes
Z60-14-U	0 - 60	0 - 14	840	12	60	28	83 / 85	Yes
Z100-2-U	0 - 100	0 - 2	200	8	80	3	83 / 85	No
Z100-4-U	0 - 100	0 - 4	400	8	80	3	84 / 86	No
Z100-6-U	0 - 100	0 - 6	600	15	80	5	84 / 86	No
Z100-8-U	0 - 100	0 - 8	800	15	80	12	84 / 86	No

In current 0.01%

Need low-pass filter

Part Number Example

Z10	-	20	-	LAN	-	L	-	U

Series and output voltage

Output current

blank	USB, RS-232/RS-485 (All models)
IEEE	GPIB Interface**
IS510	Voltage Programming Isolated Analog Interface**
IS420	Current Programming Isolated Analog Interface**
LAN	LAN Interface (Complies with "LXI" Class C)

blank	No front output jacks
-L	Output jacks*
-L2	Output (insulated) jacks*

Preferred

U	North America AC cord
blank	No AC Cord

Other countries upon request (special order)

* Special order, requires wide body case (105mm wide), limited to 24A maximum
** Requires wide body case (105mm wide)

EMI filter

TDK·Lambda **RSHN Series**

Single phase 250Vac 3 to 300A EMC Filters with DIN rail mount and low leakage options

https://product.tdk.com/en/products/emc/emc/power-line/tec_data/tdk_nf_rshn.html
https://www.emea.lambda.tdk.com/uk/products/r-series

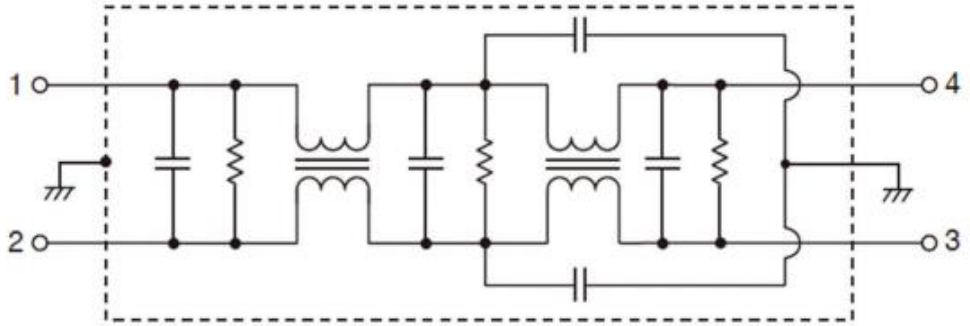
Medical Industrial Test LED COMM Broadcast

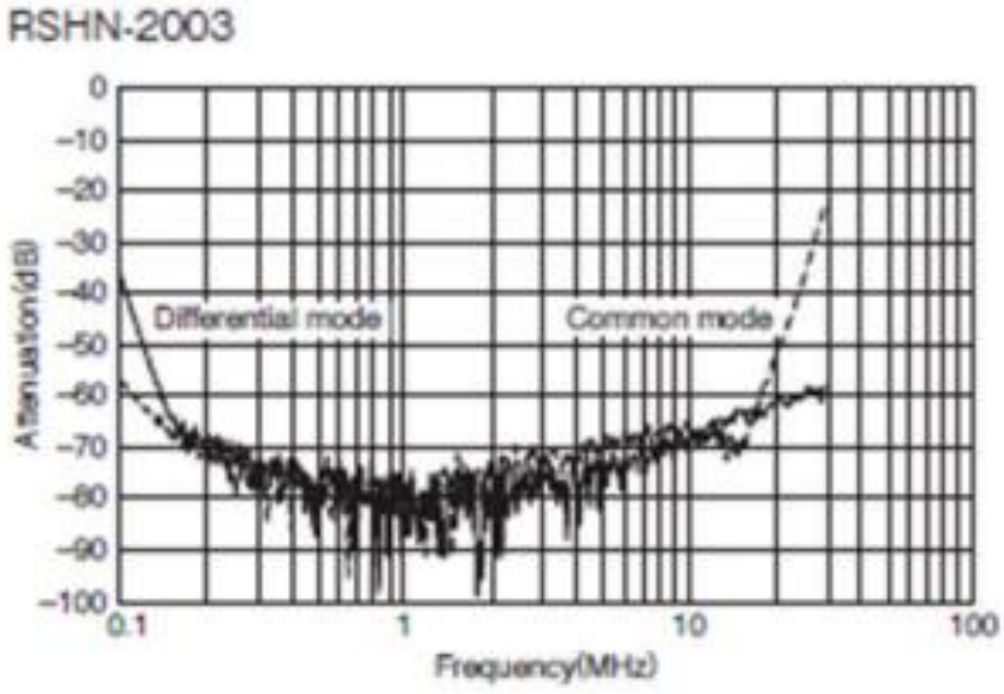
The RSHN single-phase high attenuation EMC filters are enclosed in compact cases and part numbers up to 30A have DIN rail mount and low leakage current options. They are rated for 250Vac with multiple current ratings of 3 to 300A enabling the optimum attenuation to match the current rating. The series uses TDK's ferrite core material to provide noise attenuation. The connection terminals are integrated into the case with both the screws and terminal covers captive, avoiding dropped or lost hardware. The RSHN 3A to 30A models are UL certified for a short circuit current rating of up to 14kA, the 40, 50 and 60A 35kA with the appropriate breaker.

Features	Benefits
• 3 to 300A Current Ratings	• Optimizes the Attenuation for the Current Rating
• DIN Rail Mount Option	• Flexible Mounting
• Captive Hardware	• No Lost Screws or Terminal Covers
• Safety Certified (up to 60A)	• Global Use

Model Selector

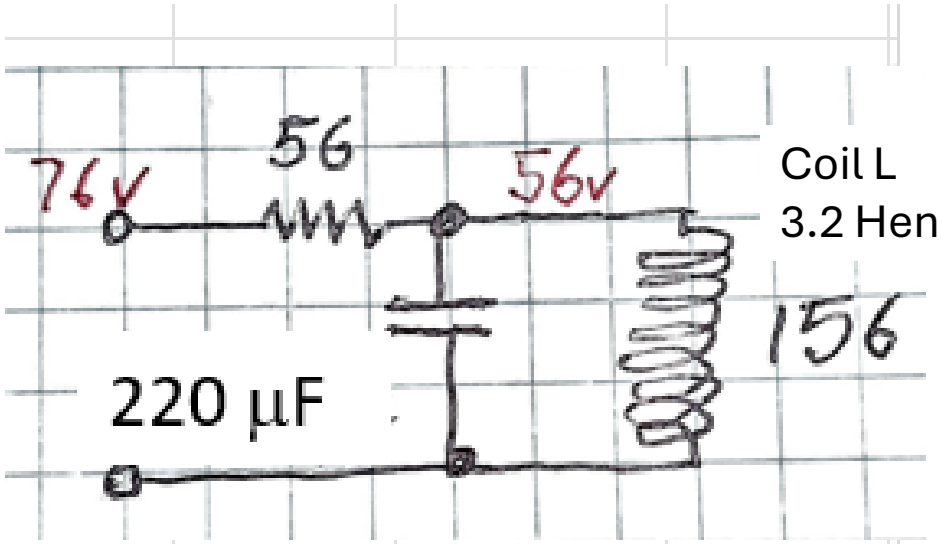
Model	Rated Current (A)	SCCR (kA)[1]	Leakage Current 250V/60Hz (mA)	Maximum DC Resistance (mΩ)	Attenuation frequency range (MHz)			Weight (g)
					Common mode at 25dB	Common mode at 10dB	Differential mode at 25dB	
RSHN-2003	3	14	1.0	350	0.1 to 10	-	0.2 to 30	190





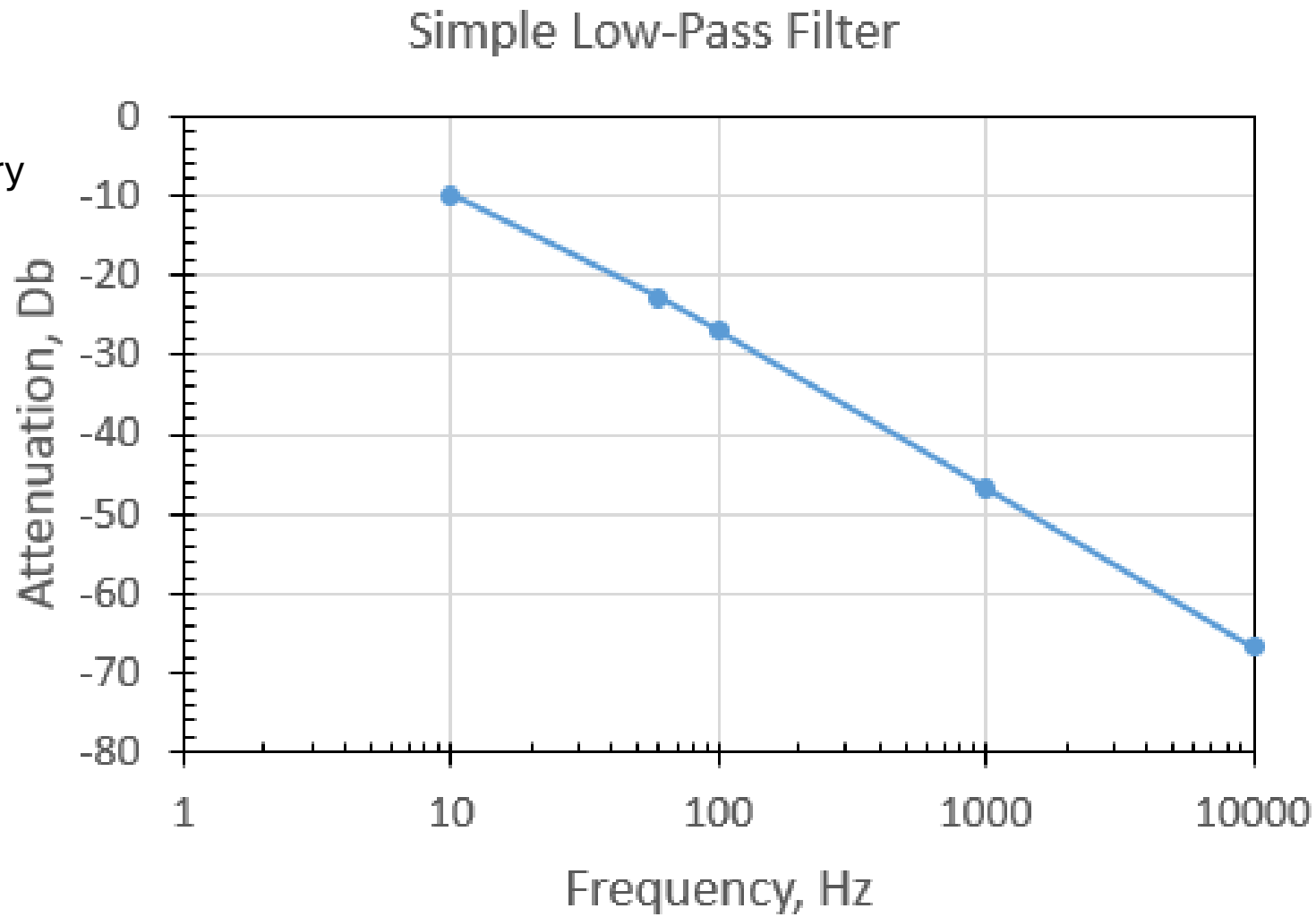
MHz

See also other filters: https://us.rs-online.com/product/tdk-lambda/rshn-2003/70564081/



Coil L
3.2 Henry

Hz	Xc,ohm	Attenuation	Db
10	72	0.3158	-10.01
60	12	0.07143	-22.92
100	7.2	0.04412	-27.11
1000	0.72	0.004594	-46.76
10000	0.072	0.00046	-66.74



Switch-on transition in L-C-R circuit