

MARATON moderate HE

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MARATON is a family of MAGnetic field and RAdiation TOLeraNt power supplies developed for CERN LHC. MARATON MHE represents a 12 channel low-voltage power supply for installation in a moderate hostile environment with integrated CANbus remote monitoring and control interface.

Voltages, currents, temperatures and output power are controlled by the internal processor and illegal modes as well as failure will be detected.

Magnetic field tolerance is achieved by water cooling (up to 300G) and shielded components (up to 1200G). For moderate radiation hardness (<30Gy) a quasi-redundant principle of power conversion is combined with special components.

The modular construction with a 19" rack mountable power bin and a plug-in power supply box allows to swap the power supply without any tools and within shortest time.

Main Features

- Up to 12 independent, potential free outputs, total up to 3 kW(air cooled) or 3.6kW (water cooled) DC power
- Fully microprocessor controlled, programmable warning and trip levels
- Programmable voltages, current limits, ramping up/down and group behavior
- Sense line compensation or impedance control selectable
- Extremely low noise and ripple
- 94V – 265VAC world-wide auto-range AC input, with power factor correction, CE

PL512 Features

- Up to 12 independent, potential free low voltage DC outputs, total up to 3 kW (air cooled) or 3.6kW (water cooled) output power
- Channels can be operated in Master-Slave mode for paralleling of two ore more outputs (current boosting).
- Extremely low noise and ripple
- Fully microprocessor controlled, programmable voltages and thresholds on voltages, currents and temperatures, ramp rates, fully controlled, programmable trip levels and action / group behavior , voltage or current controlled mode
- CE conform EN 50 081/82 part 2 or 1, safety in accordance with EN 60 950
- CAN-bus interface for remote monitoring and control
- DC 385V or 94V - 265VAC world-wide auto-range AC input, with power factor correction / sinusoidal mains current EN 61000-3-2, CE
- Dimensions: 430mm x 3U (133mm) x 325mm [whd], weight: from 9.6 to 19 kg depending on the number of power modules
- Optional with Interlock input
- Optional with logic register for peripheral control, CAN-bus operated
- Optional water cooled for highest performance. Water connections pluggable and self sealing when unplugged. Internal water pipes are made of stainless steel

MARATON consists of:

=> **Power Bin:** 19" bin for rack mounting hosting a power box

Type	Dimensions	Features
<i>PBNMARA – 3U RASO</i>	3U x 19" x 445mm	Folded metal frame
<i>PBNMARA – 4U</i>	4U x 19" x 445mm	Aluminum side panels

=> **Power Box** containing a PFC mains input module, a control card and slots for up to 6 modules (MDM / MDC types, dual channel, 250W) for a maximum of 12 channels. The power box includes the CAN-bus interface and can be outfitted with an individual channel interlock feature (**1 option**)

Type	Dimensions	Features
<i>PBXMARA</i>	3U x 19" x 445mm	Ethernet, USB, "Easy Lever" extraction mechanism

=> **Power Modules** integrated into Power Box for a maximum of 6 modules / 12 channels

Type AL (up to 300G)	Voltage range	Channels	Peak output / Power
<i>MDC – 02/07</i>	2V ... 7V/8V	2	2 x 55A or 1 x 110A / 330W (660W total)
<i>MDC – 07/16</i>	5/7V ... 15/16V	2	2 x 22A or 1 x 44A / 330W (660W total)
<i>MDC – 07/24</i>	7V ... 24V	2	2 x 11,5A or 1 x 23A / 275W (550W total)
<i>MDC – 30/60</i>	30V ... 60V	2	2 x 6,6A or 1 x 13,2A / 330W (660W total)
Type FE (up to 1200G)	Voltage range	Channels	Peak output / Power
<i>MDM – 02/07</i>	2V ... 7V/8V	2	2 x 55A or 1 x 110A / 330W (660W total)
<i>MDM – 07/16</i>	5/7V ... 15/16V	2	2 x 22A or 1 x 44A / 330W (660W total)

<i>MDM – 07/24</i>	7V ... 24V	2	2 x 11,5A or 1 x 23A / 275W (550W total)
<i>MDM – 30/60</i>	30V ... 60V	2	2 x 6,6A or 1 x 13,2A / 330W (660W total)

Specs:

Rated Input Voltage:	385 V DC +/- 10 V
Rated Input Current:	11:00 AM
Output Isolation :	CE EN 60950 , ISO 380, VDE 0805, UL 1950, C22.2.950

Regulation fast remote sense circuit (short sensed distance, sense connected to output at the MARA power bin):

Static:	MDC/M 2-8 V / 30–60 V	< 15 mV	(+/-100% load, +/- full mains range)
	MDC/M other voltages	< 0.05 %	(+/-100% load, +/- full DC input range)
Dynamic (0.5 m wire):	MDC/M 2-8 V	< 100 mV	(50 % - 75 % load change)
	other	< 0.7 %	(50 % - 75 % load change)
Recovery Time:	MDC/M 2-8V	1%: 0.2 ms	(50 % - 75 % load change)
		0.1%: 0.5 ms	
	MDC/M 5-16V, 7-24V	1%: 0.0 ms	(50 % - 75 % load change)
		0.1%: 1.0 ms	
MDC/M 30-60V	1%: 0.5 ms	(50 % - 75 % load change)	
	0.1%: 1.0 ms		
Conditions	Current slope <1000A/ms, 20mF per 100A parallel to load		

Regulation slow remote sense circuit (long sensed distance):

Static:	MDC/M 2-8V/ 30-60V	< 15 mV	(+/-100% load, +/- full mains range)
	Other	< 0.05 %	(+/-100% load, +/- full mains range)
Dynamic:	Dynamic deviation depends on current slope resp. filter capacitors at load side only		
	30m cable to load, 0,3mF capacitance at load side, 1V drop at nominal load, 10% - 90 % load change with 3ms slope (50A output= 13,33A/ms) leads to less than 10% temporary output voltage deviation		
Recovery Time (40m wire, 5V at load side, Udrop < 2 V):	MDC 2-7V, 2-8V	10%: <15 ms	(50 % - 75 % load change)
		1%: <25 ms	
	Other	10%: <15 ms	(50 % - 75 % load change)
		1%: <33 ms	

DC Output Characteristics:

Sense compensation range:	Limited to < 10V or nominal voltage (whichever is lower).
Regulation mode:	The voltage at the sense connection point is regulated.
Floating range:	> nominal output voltage for MEH, min. +/-10V for voltage ranges <10V MEH, MDH, MDM and MDC

Noise and ripple:

Voltage < 8 V	< 10 mVPP	(0.5 m wire, 0–20 MHz)
Voltage > 8 V	< 15 mVPP	
	< 3 mVPP	(10 m wire, 0-300 MHz)
	< 1.5 mVRMS	
Conditions at the load:	Parallel (X) 330µF and 1µF ceramic, 100nF HF- conducting to case (Y) each line	

Other

Emission:	CE EN 50081-1 (EN 55 022-B)
Immunity:	CE EN 50082-1 or 2
Operating temperature:	10 °C – 40 °C
Storage Temperature:	- 30 °C - + 85 °C (cooling water must be completely removed, else +3 °C - +85 °C)
Temp.- Coefficient:	< 0.2% / 10K
Stability (constant conditions)	<5mV or 0.1% within 24 h, <25mV or 0.3% within 6 months
Current limiting:	Fast protection programmable to lower than peak values via trim-pots (constant current mode) Via Remote Controller channel wise I _{max} trip off set point programmable independently
Status control / DC Off (trip off):	Processed in external Remote Controller. Tripping global, group- or channel wise programmable (after overload, overheat , overvoltage, undervoltage)
Interlock input:	optional
Efficiency (pro Module):	65% 2V/ -81% >5V/ -85% >7V -87% >12V/ -90% >48V at nominal input voltage
M T B F, cooled by:	Conditions: 3kW DC output with 80% efficiency (600W internal power dissipation: WORST CASE)

Water, 30°C inflow:

ca. 120,000 h , put through > 50l/h for <10°C DT of cooling water. Minimum differential pressure >0.5 bar, abs. max. pressure <15bar

Forced Air, 30°C entrance:

ca. 90,000 h , put through > 153m³/h for <15°C DT of cooling air, ambient air pressure 1 bar. Adequate airflow is roughly 1,4m/s.

Values for air cooled units are valid for new ones. Abrasive dust, corrosion, etc. can limiting the heat transfer to the cooling air during lifetime. Higher operating temperature is the consequence.

Increasing of internal temperater at the most critical points of 10°C will reduce the MTBF by 50% Lower operating temperatures will increase the MTBF accordingly, independent of cooling medium.

Construction features, Accessories:**3 U box with extraction lever:**

max. 6 modules, up to 3 kW / 3,6kW output power

Connections / plugs:

24 female pins 80A, parallel used for higher currents, 3 x 9pin Sub D for sensing (each for 4 channels)

Dimensions (w, h, d)

434 mm x 132 mm x 325 mm

Weight:

31,5 kg

Accessories:

19" Power Bin for plug in MARATON power supplies. 24 power contacts with M5 threaded bolts and sense terminals at rear side.

Type 44 :

4U x 450mm mounting depth, 1 U air baffle, strain relief, cooling air entry front- or bottom side, for 3U – Box

Special power bins / 19" assembly with 3U and 6U (for two MARATON boxes) available. 450mm mounting depth

Product Data Sheet

MARATON moderate HE:

[Print Product Data Sheet](#)

Documentation

Manual and Tech-Notes :

[Manual MARATON](#)

Introduction:

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