MAraTON

Power Supply System

Technical Manual

General Remarks

The only purpose of this manual is a description of the product. It must not be interpreted as a declaration of conformity for this product including the product and software.

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Control Cabinet

In the context of this user manual, the control cabinet must fulfill the requirements on fire-protective enclosures according to EN 60950 / IEC 60950 / UL 60950.

All devices are intended for operation in control cabinets or in closed areas. The LAN connection and all wire connections between the different system parts must be done via shielded cable with conductive connector shells, which are fixed with screws.

Furthermore, an additional fire-protective enclosure is required which must not affect proper air circulation.

Mains Voltage and Connection

The Power supplies are equipped with a “World”- mains input (rated voltage range: 100-240 VAC, frequency: 50-60 Hz, rated current: 16 A). Before connecting to the mains please double-check correspondence.

This is a permanently connected equipment. Mains input connection at the power supply primary rectifier is done with screw terminals. A combined circuit breaker / main switch (16A at maximum operating temperature) is included.

Before working at the terminals, the power mains to which the device shall be connected must be absolutely reliable switched off or disconnected.

The DC output terminals are connected to hazardous voltage. After disconnecting the mains the capacitors connected to the DC-outputs must be discharged by a well isolated resistor 22 Ohm, 10 Watt.

Terminal Label	Description	Color of the Wire
+	Positive DC Output	
-	Negative DC Output	
PE	Protective Earth	green/yellow
L	Phase	black or brown
N	Return, Neutral	blue

Connection to Earth

Safety

After connecting the Power box to the mains, the mains input module is powered permanently. Filter and storage capacitors of the power factor correction module are charged with about **400VDC**. Any DC-On-Signal as well as a power switch at control board (if any installed) operates as a low voltage DC on/off switch only and not as a mains breaker. **Therefore it becomes dangerous if the box cover is open. In this case a lot of components on high voltage potential get touchable!**

Before starting any kind of work inside the power box remove the unit from mains and wait a couple of minutes with your activities! Discharge the primary DC Filter-capacitors by use of a well isolated 22 ohm 10W resistor.

We recommend in case of any malfunction to send the power box to Wiener or to one of our representative for service

Declaration of Conformity

Low Voltage Directive 73/23/EEC and EMC Directive Art. 10.1 of 89/336/EEC

W-IE-NE-R

Plein & Baus GmbH

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declare under our own responsibility that the product

MAraTON Power Supply System

Items: 0M01; 0M02; 0M05; 0PFC

is in accordance with the following standards or standardized documents:

1.	**EN 60 950-1:2001** + Corr:2004-09	Niederspannungsrichtlinie [low voltage directive]
2.	**EN 61 000-6-3:2001**	Störaussendung EMA [RF emission]
	EN 55 022:1998 + Corr:2001 + A1:2000 Kl. B	Störspannung [conducted noise]
	EN 55 022:1998 + Corr:2001 + A1:2000 Kl. B	Störfeldstärke [radiated noise]
	EN 61 000-3-2:2001	Oberschwingungen [harmonics]
	EN 61 000-3-3:1995 +Corr:1997 +A1:2001	Spannungsschwankungen [flicker]
3.	**EN 61 000-6-2:2001**	**Störfestigkeit EMB [immunity]**
	EN 61 000-4-6:1996 + A1:2001	HF-Einströmung [injected HF currents]
	EN 61 000-4-3:1996 + A1:1998 + A2:2001	HF-Felder [radiated HF fields] incl. ”900MHz”
	EN 61 000-4-4:1995 + A1:2001	Burst
	EN 61 000-4-5:1995 + A1:2001	Surge
	EN 61 000-4-11:1994 + A1:2000	Spannungs-Variationen [voltage variations]
	EN 61 000-4-2:1995 + A1:1998 + A2:2001	ESD

Conditions:

This unit is not a final product and is foreseen for use inside a closed cabinet. The supplying of loads over long distances (>3m) needs possibly additional RF rejection hardware to get in conformity of the definition.

Name and signature of authorized person — Place and Date

Juergen Baus

Techn. Director
Mai. 2008

Contents

Figures

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1 General Information

Features

- **up to 8 independent, quasi-floating outputs, ≥3 kW DC output power (385VDC input),**
  3.6 kW water cooled
- **Fully controlled, adjustable trip levels**
- **Adjustable voltages, current limits and OVP-trip levels**
- **Extremely low noise and ripple**
- **CE conform EN 50 081/82 part 2 or 1, safety in accordance with EN 60 950**
- **385V DC input for low cross section cabling**
- **CAN-Bus**
- **Water cooled (recommended) or by forced air**

A MAraTON (***Ma***gnetism ***To***lerant ***N***ew power supply system) is a distributed power supply designed to provide up to 8 low voltage / high current channels at magnetic environment.

It offers up to 8 channels in a 3U high box.

Dynamic behavior adjustable by internal jumper (long or short sensed distances to loads).

The power supply system is consisting of two main components

- Primary Rectifier
- Power Box

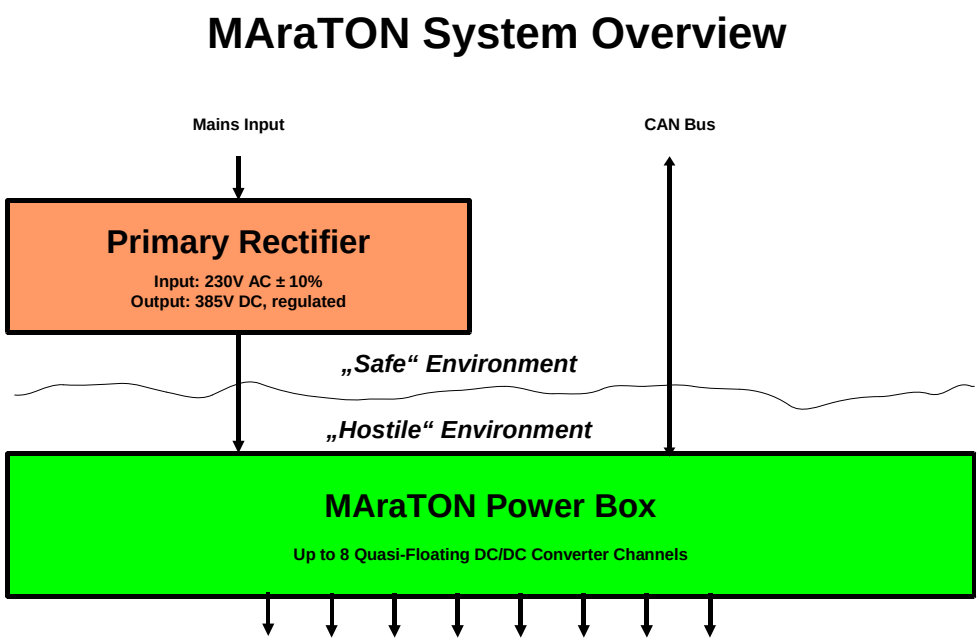


Figure 1.1: MARATON System Overview

The *Primary Rectifier is* operating at locations with standard industrial conditions (Safe Environment).

The *Power Box* is located near to the electronics which shall be supplied, and is capable to operate in a “Hostile Environment” (strong magnetic field).

The distance between the DC/DC-Converter and the other components may be up to 120 m.

2 Primary Rectifier

This module converts the standard mains voltage (100 V ... 230 V AC, 16 A) to a regulated DC voltage (nominal 385 V). There is no galvanic isolation.

Up to 6 *Primary Rectifiers* can be plugged into one *Primary Rectifier Bin*.

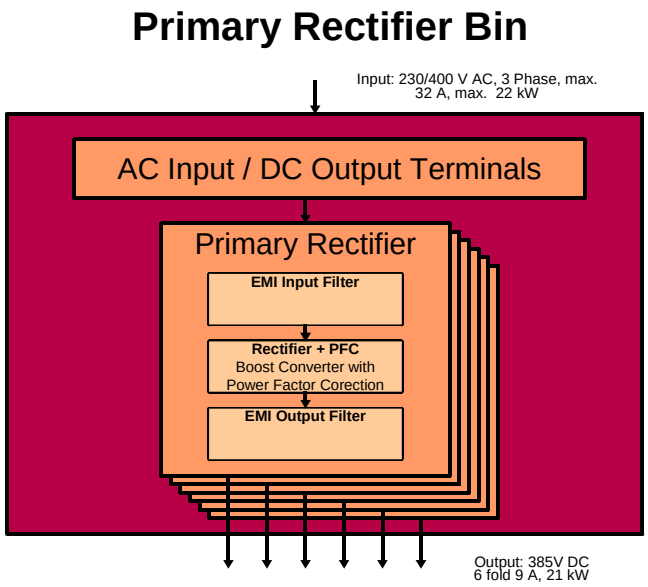


Figure 2.1: Primary Rectifier

The screw terminal connections to the mains are separate for each *Primary Rectifier*. So it is possible to connect all 6 inputs in parallel to a 230V/96A mains connection. Another solution is to connect each two modules in parallel, and connect the three groups in a star connection to a 400V/230V mains (The central point conductor must be provided!).

The screw terminal connections of the high voltage DC outputs may not be connected in parallel. Each output shall be routed to one (or max. two in a low power configuration) *Power Box*.

Before working at the terminals, the power mains to which the device is connected must be absolutely reliable switched off or disconnected.

The DC output terminals are connected to hazardous voltage. After disconnecting the mains the capacitors connected to the DC-outputs must be discharged by a well isolated resistor 22 Ohm, 10 Watt.

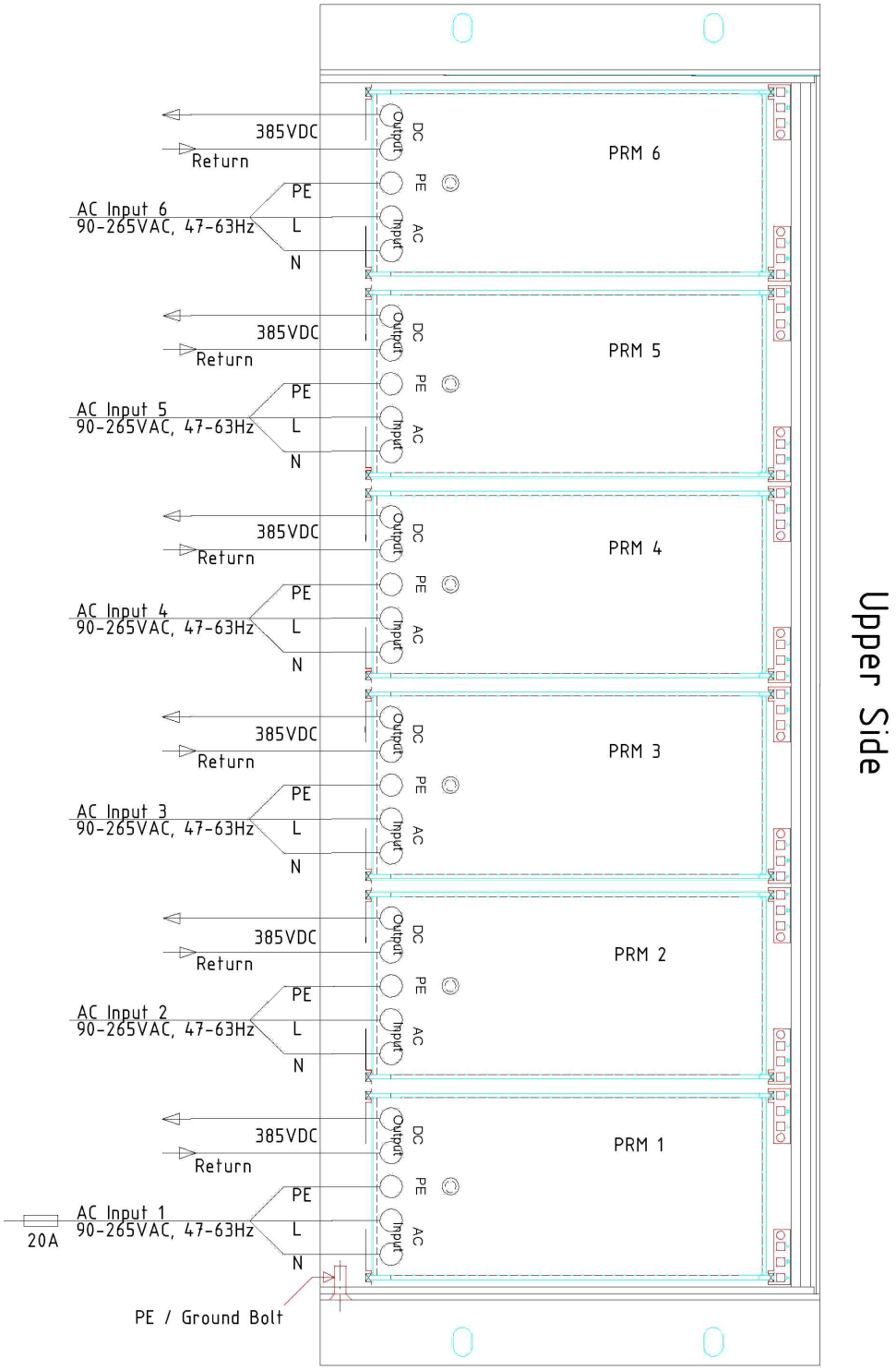


Figure 2.2: 4U Primary Rectifier Power Bin fox six Primary Rectifier Modules

The conductor cross section is max. 2.5 mm²,
PR-Modules are plugged to a six-fold rear plug/screw terminal combination. The terminals are foreseen for wire cross section of max. 2.5mm².
For different paralleled DC outputs the version 0PFC0.000P without integrated circuit breaker is available. In that case the AC inputs of the paralleled PR-Modules have to be the same phasing. Otherwise a short circuit occurs.

3 MAraTON Power Box

The MAraTON Power Box uses the 385 VDC of the Primary Rectifier and generates up to 8 independent low voltage quasi-floating output voltages. Referring to the ground reference (VME-LOGIC-GND, pin 30 of the 37 pin D-Sub connector) the maximal floating voltage for proper regulation should not exceed +/-10V.

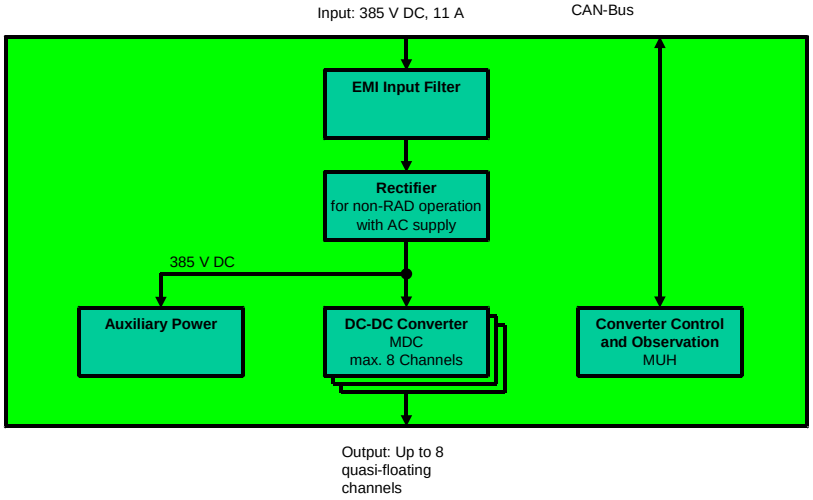


Figure 3.1: MAraTON Power Box

Voltage, current limit and the supervision limits (minimum and maximum sense voltage, maximum current) can be programmed for each channel independently via CAN-bus.
A global INHIBIT input allows to disable all outputs with just one signal.

Figure 3.2: Power Box Front

Figure 3.3: Power Box Rear Side (Power Output Connections)

3.1 High Voltage DC Input

The DC input connections are made with the *Amphenol* circular connector series ECTA 133 (standard polarization: 0° rotation between insert and shell).

We recommend the mating plug 1331-M-303-FS with the backshell 1330-3-PES1.

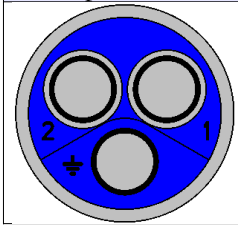
DC Input	Pin	Signal	Comment
	1	+ 385 V	DC Power Input. There is a bridge rectifier inside, so exchange of the polarity does not harm.
	2	+ 385 V Return	
	PE	Protective Earth	Safety Ground

Table 1: High Voltage DC Input Connector Pin Assignment

3.2 Water Cooling Connection

The water connections are made with quick couplings series LC 6.4 mm from *Colder Products Company* (CPC). We recommend an elbow mating plug with shutoff, e.g. LCD230-04.

Consider that water inlet and water outlet are **not** exchangeable.

The safety valve may not be readjusted by the customer.

3.3 Main Switch

The green illuminated switch works as a global inhibit input.

- 0 Power outputs disabled
- I Switch is lighting, power outputs may be enabled by the remote control.

3.4 Control Connector Input

The power inhibit input (POWER) is provided to force all outputs to be switched off. The default configuration is:

- connected to GND Power outputs disabled
- floating Power outputs may be enabled by the remote control

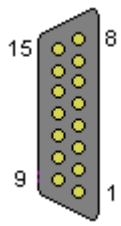
DSUB15 female	Pin	Signal	Comment
	8	NC	reserved
	15	NC	reserved
	7	NC	reserved
	14	+5V INTERLOCK	reserved
	6	NC	reserved
	13	GLOBAL_TRIPOFF_DISABLE	reserved
	5	NC	reserved
	12	INTERLOCK_RETURN	reserved
	4	GND	Ground of the aux. supply, connected to DGND
	11	CAN-H	reserved
	3	INHIBIT	Inhibit input
	10	CAN-L	reserved
	2	NC	reserved
	9	CAN-GND	reserved
	1	NC	reserved

Table 2: Control Connector Pin Assignment

This default configuration can be changed with the RS232 configuration software (see manual 00461.A0)

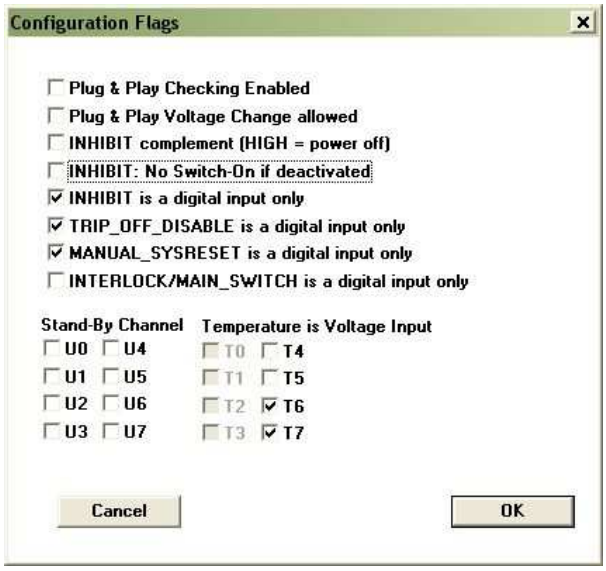


Figure 3.4: Programming of the Control Connector Behavior

The signals shall be connected by an isolated contact (e.g. relays), and must not be connected to other potentials.

3.5 Connection of a Personal Computer

Equipment: A PC running Windows, the control program and a simple adapter.
This RS232 connection is intended for setup and repair operation and should not be used for permanent monitoring during normal operation.

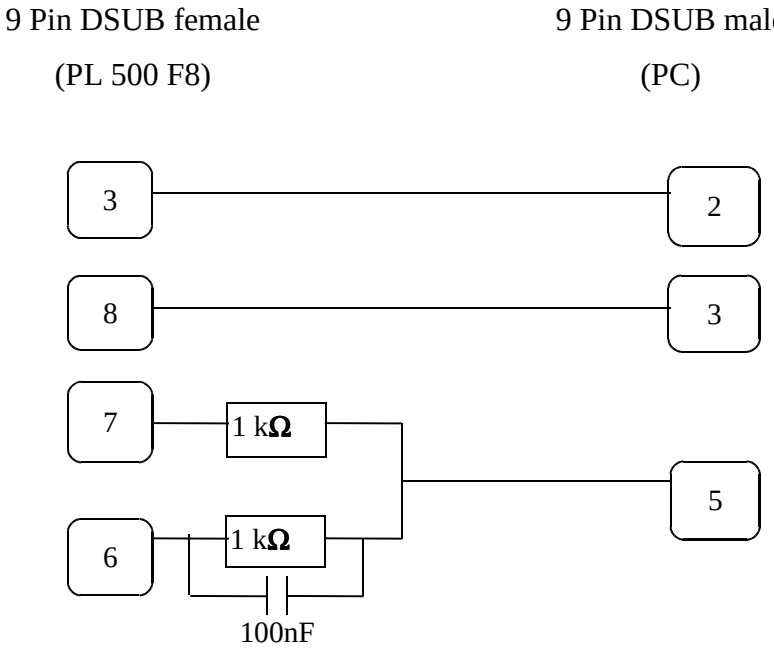


Figure 3.5: Connection of a Personal Computer

Note:
If you use Pin 3 and 8 for a serial connection to a computer, you can't use this pins any more for the „Remote On" and „Status Out" functions and you can neither connect the power supply to an alphanumeric control panel (see below 4) nor operate with remote on / off (see below 3).

3.6 Control via CAN-Bus

The CAN Bus Signals are provided on the 9 Pin DSUB of the power supply.

This pinning is NOT identical to the 9-pin DSUB of the power bin!

CAN_H: Pin 5

CAN_L: Pin 9

CAN_GND: Pin 4

The software protocol is described in a separate document (Part No *00183)

Index	Max. Distance	Bit Rate	Type
0	10 m	1.6 Mbit/s	high- speed
1	40 m	1.0 Mbit/s	
2	130 m	500 kbit/s	
3	270 m	250 kbit/s	(needs termination)
4	530 m	125 kbit/s	
5	620 m	100 kbit/s	low-speed
6	1.300m	50 kbit/s	
7	3.300 m	20 kbit/s	
8	6.700 m	10 kbit/s	
9	10.000 m	5 kbit/s	

Table 3: CAN Transmission Speed Index

3.7 Control of the Power Supply without PC

There is a remote on/off input and a status output function:

Remote On: 9 Pin DSUB: Close a "make" contact or switch between Pin 8 (Serial Data In) and Pin 2 or 7.

Status Output: 9 Pin DSUB: Connect a LED between Pin 3 (Serial Data Out,+) and Pin 1 or 6.

3.8 Control of the Power Supply by the "Main Switch"

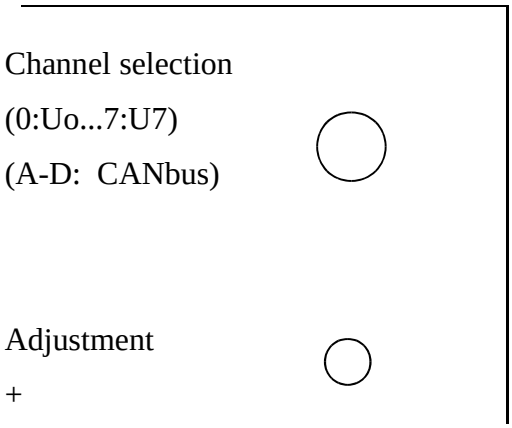
Use "mains switch" at the rear side to start the power supply.

Also this optional rocker switch acts as a DC on / off switch and doesn't disconnect mains from the unit!

4 Power Supply Adjustments

All output voltages can be adjusted manually via the two rotary switches situated on the power supply top.

1. the 1. rotary switch selects the function which has to be adjust
2. the 2. rotary switch will change the settings when turned (right/left = +/-)



Mode Selection	Function
0-7	Adjust Voltage of U0-U7
A	CAN Address (low, Bit 0-3)
B	CAN Address (high, Bit 4-6)
C	CAN General Call Address (low, Bit 0-3)
D	CAN General Call Address (high, Bit 4-6)
E	CAN Transmission Speed Index

Table 4: Power Supply Adjustment with the Rotary Switches

To change the CAN-Bus parameters, the following sequence is recommended *(Example: address 58 = 0x3A, general call address 127 = 0x7F, transmission speed index 1)*:

1. Set the MODE to "A"
2. Set the ADJUST to the low address value *("A")*
3. Set the MODE to "B"
4. Set the ADJUST to the high address value *("3")*
5. Set the MODE to "C"

6. Set the ADJUST to the low G. Call address value *(“F”)*
7. Set the MODE to “D”
8. Set the ADJUST to the high G. Call address value *(“7”)*
9. Set the MODE to “E”
10. Set the ADJUST to the speed index *(“1”)*
11. Set the MODE to “F” (park position)

5 The Power Bin

For easy exchange of the MAraTON Power Box the special bin is provided: The low voltage/high current cabling is connected to M8 (pin 1..9 and 12) and M6 (pin 10, 11 and 13..18) threaded bolts (MULTICONTACT).

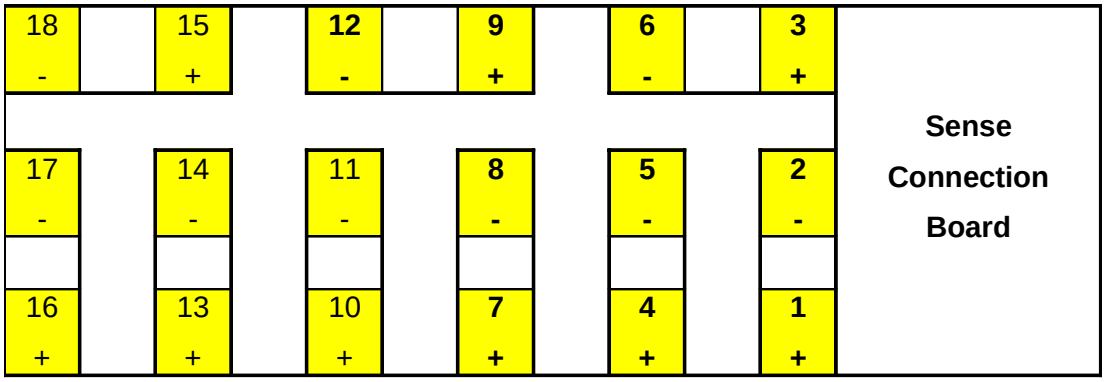


Figure 5.1: Power Bin Pin Assignment

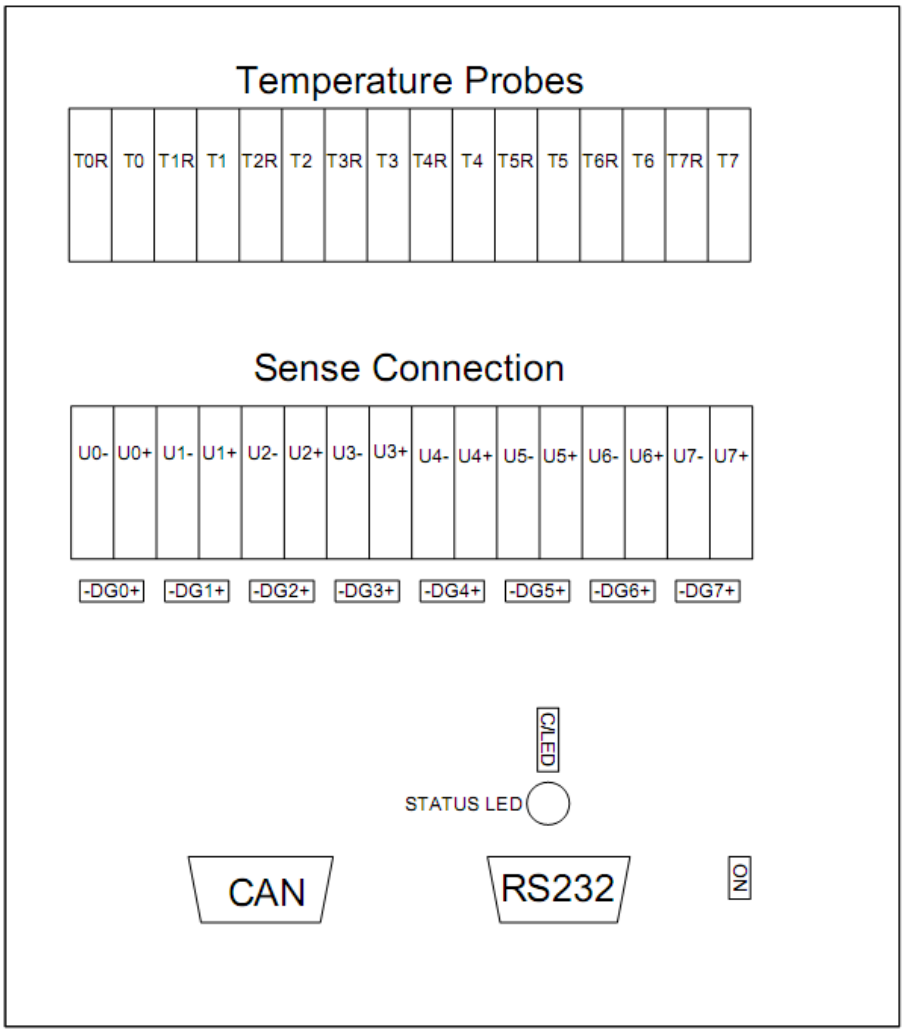


Figure 5.2: Sense Connection Connectors

5.1 Temperature Probes

Up to 8 temperature probes (Silicon sensor KTY81-110) may be connected to the T0/T0R ... T7/T7R terminals).

5.2 Sense Connection

The sense lines (terminal U0+/U0- ... U7+/U7-) must be connected to the power output lines at the load for propper regulation.

The sense difference amplifiers of all power modules are connected to a common auxiliary power supply. This amplifiers have a specific measurement range (input common mode), and it must be satisfied that all sense voltages remain inside this common mode operating range.

To achive this either the positive or negative sense line of each channel must be connected to the digital ground (DG).

This connection can be made by setting a jumper at the 3-pin jumper posts DG0...DG7:

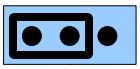
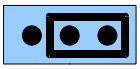
-DG+	
	Negative sense line connected to digital ground.
	Positive sense line connected to digital ground.

Table 5: Sense Connection Jumper Settings

5.3 Status LED

The green STATUS LED displays the status of the power supply.

- OFF Power is off
- ON Power is on
- BLINKING Any Failure

The status line of the power supply is shared with the serial (RS232) communication. The functionallity is selected with the C/LED jumper:

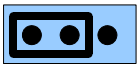
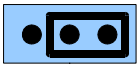
C/LED	
	RS232 communication active, LED unused
	LED active, no RS232 communication possible

Table 6: Status LED Jumper Settings

5.4 ON Jumper

It is possible to switch the power supply on without remote control.

The power on line of the power supply is shared with the serial (RS232) communication. The functionallity is selected with the ON jumper:

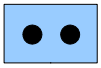
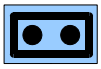
ON	
	RS232 communication active
	POWER ON, no RS232 communication

Table 7: ON Jumper Settings

5.5 RS232

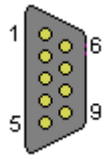
DSUB9 female	Pin	Signal	Comment
	1	NC	reserved
	6	NC	reserved
	2	TXD	TXD output of the power supply
	7	NC	reserved
	3	RXD	RXD input of the power supply
	8	NC	reserved
	4	NC	reserved
	9	NC	reserved
	5	GND	GND

Table 8: Bin RS232 Connector Pin Assignment

5.6 CAN

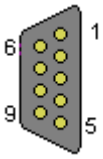
DSUB9 male	Pin	Signal	Comment
	1	NC	reserved
	6	NC	reserved
	2	CAN-L	CAN-bus LOW signal
	7	CAN-H	CAN-bus HIGH signal
	3	CAN-GND	CAN-bus GND
	8	NC	reserved
	4	NC	reserved
	9	NC	reserved
	5	NC	reserved

Table 9: Bin CAN Connector Pin Assignment

6 Output Register (Optional)

This is a special option designed for the CERN CMS experiment.

In addition of the elements of the standard sense connection board this circuit provides 32 quasi-floating digital outputs, which can be set via CAN-bus.

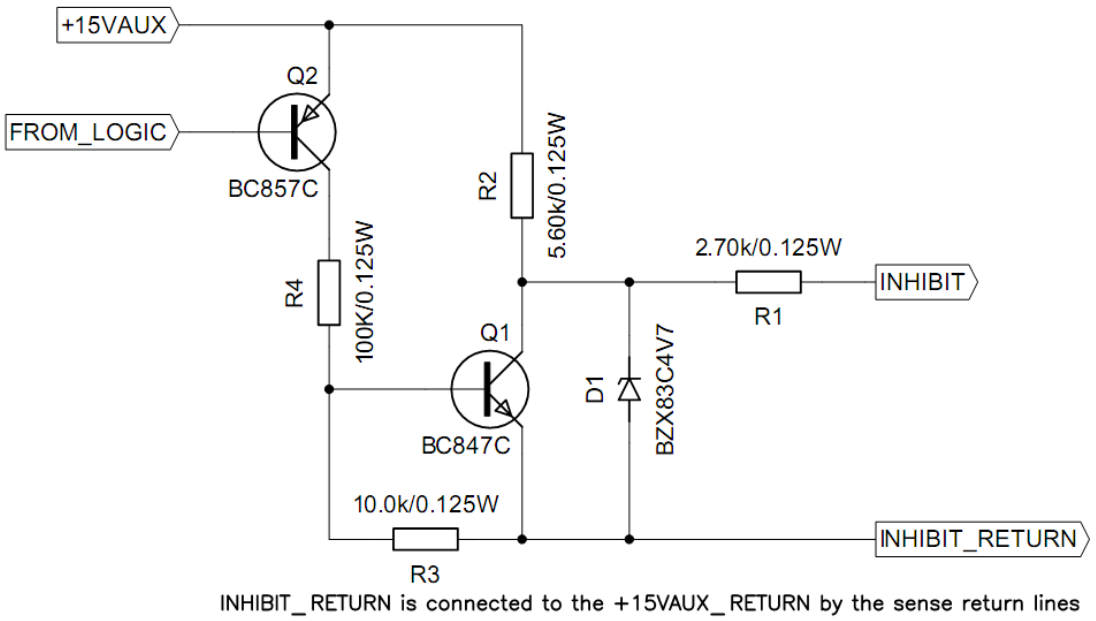


Figure 6.1: Output Register Schematic (one of 32)

The +15VAUX_RETURN of the auxiliary power supply is connected to the digital ground (DG) inside of the power supply.

For the functionallity of this circuit it is essential to connect the sense lines with the digital ground, too (see 5.2 Sense Connection on page 12).

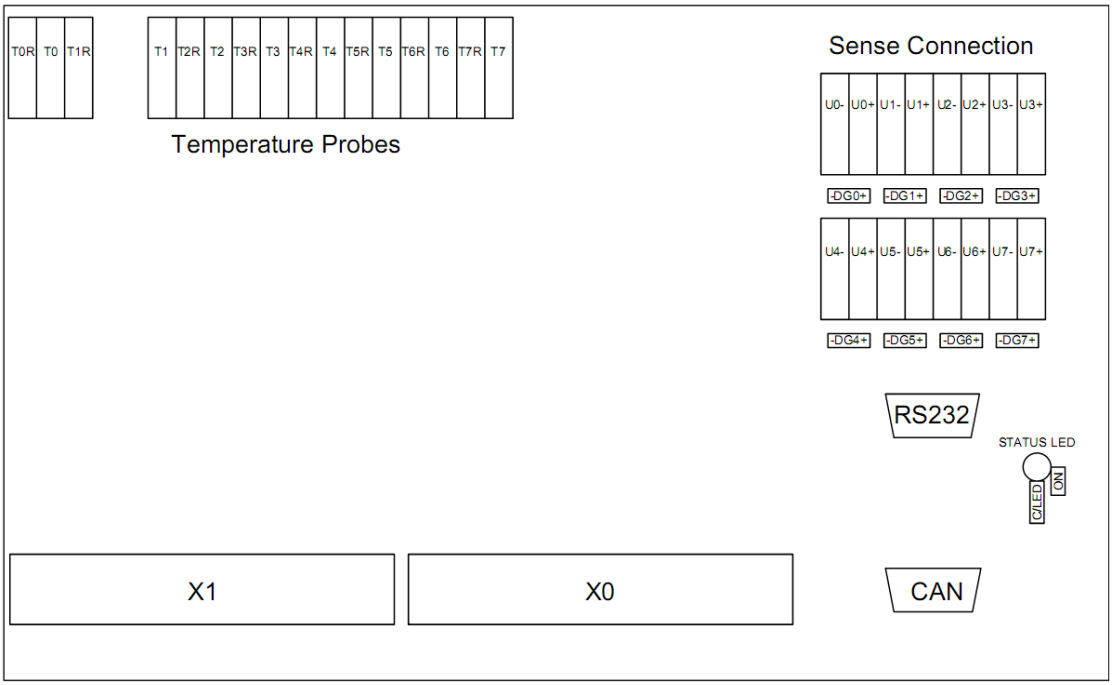


Figure 6.2: Output Register Connectors

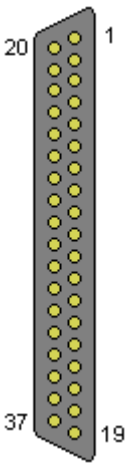
DSUB37 male	Pin	X1	X0	Comment
	1	INHIBIT 16	INHIBIT 0	
	20	INHIBIT RETURN 16	INHIBIT RETURN 0	
	2	INHIBIT 17	INHIBIT 1	
	21	INHIBIT RETURN 17	INHIBIT RETURN 1	
	3	INHIBIT 18	INHIBIT 2	
	22	INHIBIT RETURN 18	INHIBIT RETURN 2	
	4	INHIBIT 19	INHIBIT 3	
	23	INHIBIT RETURN 19	INHIBIT RETURN 3	
	5	INHIBIT 20	INHIBIT 4	
	24	INHIBIT RETURN 20	INHIBIT RETURN 4	
	6	INHIBIT 21	INHIBIT 5	
	25	INHIBIT RETURN 21	INHIBIT RETURN 5	
	7	INHIBIT 22	INHIBIT 6	
	26	INHIBIT RETURN 22	INHIBIT RETURN 6	
	8	INHIBIT 23	INHIBIT 7	
	27	INHIBIT RETURN 23	INHIBIT RETURN 7	
	9	INHIBIT 24	INHIBIT 8	
	28	INHIBIT RETURN 24	INHIBIT RETURN 8	
	10	INHIBIT 25	INHIBIT 9	
	29	INHIBIT RETURN 25	INHIBIT RETURN 9	
	11	INHIBIT 26	INHIBIT 10	
	30	INHIBIT RETURN 26	INHIBIT RETURN 10	
	12	INHIBIT 27	INHIBIT 11	
	31	INHIBIT RETURN 27	INHIBIT RETURN 11	
	13	INHIBIT 28	INHIBIT 12	
	32	INHIBIT RETURN 28	INHIBIT RETURN 12	
	14	INHIBIT 29	INHIBIT 13	
	33	INHIBIT RETURN 29	INHIBIT RETURN 13	
	15	INHIBIT 30	INHIBIT 14	
	34	INHIBIT RETURN 30	INHIBIT RETURN 14	
	16	INHIBIT 31	INHIBIT 15	
	35	INHIBIT RETURN 31	INHIBIT RETURN 15	
	17	NC	NC	reserved
	36	NC	NC	reserved
	18	NC	NC	reserved
	37	NC	NC	reserved
	19	NC	NC	reserved

Table 10: Inhibit Connector Pin Assignment

7 Power Box Data Sheet

3U box with max. 6 power modules.

Input:

Rated Input Voltage:	385 V DC +/- 10 V	
Rated Input Current:	11 A	
Output Insulation (SELF)	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 0.1%: 0.5 ms	(50 % - 75 % load change)
	MDC/M 5-16V, 7-24V	1%: 0.0 ms 0.1%: 1.0 ms	(50 % - 75 % load change)
	MDC/M 30-60V	1%: 0.5 ms 0.1%: 1.0 ms	(50 % - 75 % load change)
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, U_{drop} < 2 V:	MDC 2-7V, 2-8V	10%: <15 ms 1%: <25 ms	(50 % - 75 % load change)
	Other	10%: <15 ms 1%: < 33 ms	(50 % - 75 % load change)

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:	min. +/-10V		
Noise and ripple:	Voltage < 8 V	< 10 mV_{PP}	(0.5 m wire, 0–20 MHz)
	Voltage > 8 V	< 15 mV_{PP}	
		< 3 mV_{PP}	(10 m wire, 0-300 MHz)
		< 1.5 mV_{RMS}	
Conditions at the load:	Parallel (X) 330µF and 1µF ceramic, 100nF HF- conducting to case (Y) each line		

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:	Programmable via CAN bus.
Status control / DC Off (trip off):	Processed in external Remote Controller. Tripping global, group- or channel wise programmable (after overload, overheat , overvoltage, undervoltage)
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:	
Forced Air, 30°C entrance:	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
	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. 18 power contacts with M6/M8 threated bolts and sense terminals at rear side.	

8 Primary Rectifier Data Sheet

Mains Input

AC Input: power fact. >0,98	**CE**	100- 240VAC / 16A +/-10% (20A peak), 47-63Hz,
Inrush current: (cold unit)		limited by soft start-circuit to 110% of nominal current
Input protection:		Circuit breaker with 20A thermal overload protection (16 A at maximum operating temperature) included.
Power Output: converter		385 V DC +/- 5V, matched for MARATON DC/DC
230VAC input		continuously 9A, 3500W nominal (4,4kW peak) @
Regulation:		Load (10-90%) 1% deviation Mains (10-90%) 1% deviation
Output ripple: frequency)		Load (10-90%) 1-10V_{ss} 94-126Hz (double mains
RF rejection:		EN 55 022 Class B, Input and Output
Output protection overload:		current limiting for booster circuits, 90°C cut off temperature
Dimensions:		4U x 14 PU width acc. to IEC 60297, 450 mm deep
Weight:		4,7 kg
Module connectors:		2mm pin / socket diameter. max. ratings: 25A up to 50°C, 500V. 2,2kV test
voltage 50Hz		PE / Ground pins outfitted as leading pin

EMC Compatibility /RFI Rejection **Separate Input and Output**

EMC Filter

EMA	**EN 61 000-6-3:2001**	**[RF emission]**
	EN 55 022:1998 + Corr:2001 + A1:2000 Class B	conducted noise
	EN 55 022:1998+ Corr:2001 + A1:2000 Class B	radiated noise
	EN 61 000-3-2:2001	harmonics
	EN 61 000-3-3:1995 +Corr:1997 +A1:2001	flicker
EMB	**EN 61 000-6-2:2001**	**[immunity]**
	EN 61 000-4-6:1996 + A1:2001	injected HF currents
	EN 61 000-4-3:1996 + A1:1998 + A2:2001	radiated HF fields incl. 900MHz
	EN 61 000-4-4:1995 + A1:2001	Burst
	EN 61 000-4-5:1995 + A1:2001	Surge
	EN 61 000-4-11:1994 + A1:2000	voltage variations
	EN 61 000-4-2:1995 + A1:1998 + A2:2001	ESD

Operation temperature:		0....50°C without derating, storage: -30°C … + 85°C
Efficiency:		better than 95 %
M T B F	electronics:	40°C ambient: ca. 100 000 h
	integrated fan:	40°C ambient: ca. 65 000 h, 25° ambient >85000h

9 Appendix A: Ordering Information

9.1 Power Box

The power boxes can be classified into four categories, which define the most significant part of the ordering number:

With magnetic screening (120 mT external field):

	Standard	Output Register Option
Air Cooled	**0M01.**xxxx	**0M01.**xxxxR
Water Cooled	**0M02.**xxxx	**0M02.**xxxxR

Without magnetic screening:

	Standard	Output Register Option
Water Cooled	**0M05.**xxxx	**0M05.**xxxxR

The right side of the ordering number is not descriptive, it is randomly assigned to the requested module & options configuration. Up to six power modules may be used inside of one power box.

The following modules are possible:

Module Type	Channels per Module	Optimal Voltage Range	Peak Output Current	Continuous Output Power
MDC	2	2V ... 7V/8V	2*55A	2*300W
MDC	2	5/7V ... 15/16V	2*22A	2*300W
MDC	2	9V	2*30A	2*270W
MDC	2	7V ... 24 V	2*11.5A	2*250W
MDC	2	30V ... 60V	2*6.6A	2*300W

The MDC 7V and MDC 9V are available with the special “maximum voltage ensured” option.
With this option the modules are designed in a way that even in the worst case (All electronic regulation and protection fails and the PWM generates it's maximum duty cycle) the output voltage does not rise. Please contact WIENER for more details.

All power modules can be ordered with different sense regulation characteristics:

- Fast — Fastest regulation, but may be instable if connected to cables longer than 1 m.
- Moderate — This is the standard configuration for cable length up to 30 m
- Slow — This is used for much longer cables

Available Power Bins:

	Ordering Number
Power Bin (MARA) 3U	0B15.1200
Power Bin (MARA) 6U, for two power boxes	0B14.2400

9.2 Primary Rectifier

	Ordering Number
Primary Rectifier Module (PFC)	0PFC.0001
Power Bin for 6 PFC Modules	0B07.0001

10 Appendix A: Recommended Cable Specification

10.1 400V DC Cabling (Primary Rectifier ↔ MAraTON)

The cable selections are based on max. 10V voltage drop at the cable, at max. current of 10A (total cable resistance ≤ 1 Ω)

maximum length	number of wires / cross section	LAPP part no.[1] not halogen-free	LAPP part no.[2] halogen-free
40 m	2 x 1.5 mm²	1135 902 2X1,5	0035 067 2X1,5
65 m	2 x 2.5 mm²	1135 402 2X2,5	
80 m	4 x 1.5 mm² (2 wires in parallel)	1135 904 4X2,5	0035 070 4G1,5 (standard cable only with gn/ye color)
105 m	2 x 4 mm²	1135 502 2X4,0	
130 m	4 x 2.5 mm² (2 wires in parallel)	1135 404 4G2,5 (standard cable only available with gn/ye color)	0035 090 4G2,5 (standard cable only available with gn/ye color)
160 m	2 x 6 mm²	1135 602 2X6,0	

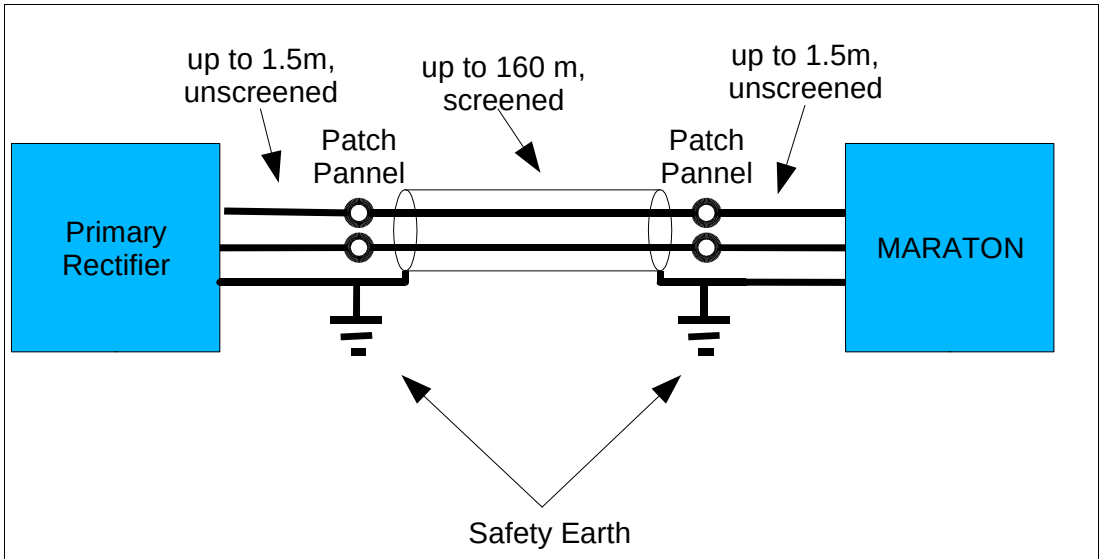


Figure 10.1: HV DC Wiring

1 ÖLFLEX® CLASSIC 110 CY, U0/U: 300/500 V, Datasheet: http://www.lappkabel.de/webkatalog/katalog.cfm?cmd=show_produkt_details&produkt_id=10016

2 ÖLFLEX® CLASSIC 110 CH, U0/U: 300/500 V, Datasheet: http://www.lappkabel.de/webkatalog/katalog.cfm?cmd=show_produkt_details&produkt_id=10035