



Freely programmable power distribution module for racing purpose

Installation / user manual 1.5

General properties:

- Massive, CNC –milled aluminium enclosure
- 2 CAN interface
- 26 overcurrent protected outputs (8 x 25A, 10 x 15A, 8 x 2,5A)
- +30 outputs for electronic isolator (Battery Isolator)
- 5V output for MembranePanel
- Integrated RF receiver in order to control on steering wheel
- Flash memory. 100000 erase/reprogram loop
- User software, continuously developed, free firmware, simple electric wiring



The PowerModule is the simplest way in order to divide the electric energy in racing cars. It supports to leave the messy wirings. The PowerModule can be easily replace the relay and fuse table. Furthermore, it supports more additional diagnostic functions. 26 different consumers can be safely switched with support of 18 high current (15-25A) and 8 low current (2,5 A) outputs.

The PowerModul can receive input states from the following 3 main source:

- primary from other modules via CAN bus, like ECU or MembranePanel.
- 8 digital inputs (PinInput)
- Wireless Steering Modul

These inputs can be switched in freely logic with the support of further 16 VirtualInputs

Other manufacturer's products (e.g. ECU) can be connected to the AS Moto devices at the same time via the two independent CAN busses. The CAN

busses support the logging of the error messages and the high current channel-currents.

The programming possibility makes available not only setting the maximum and minimum channel currents, but switch on the consumers with high peak switch on current in SoftStart (PWM steepness can set) mode. This programming possibility makes achievable an increased current limit for 3 seconds.

The PowerModule makes available to switch off or put on smaller voltage the less important channels. (e.g. at starting the engine)

Do not use the PowerModule for controlling critical safety systems of the car (e.g. brake system, ABS, servo steering wheel). We do not take the responsibility for the direct or indirect failures, damages which could be resulted in case of use the PowerModule for controlling of safety critical systems.

2. Technical data:

Electrical:	Min.:	Typical:	Max.:	Unit:
Power supply:	6.5	14	20	V
Current consumption (PCM + MembranePanel):		100		mA
Current consumption standby (PCM + MembranePanel):		40		mA
Current consumption, no CAN data* (PCM + MembranePanel):		25		mA
Total maximum output current:	-	-	120	A
Voltage range of analogue inputs (without remaining damages):	-20	0,1-4,9	20	V
Mechanical:	Min.:	Norm.:	Max.:	Unit:
Width:		160		mm
Depth: (without connectors)		180		mm
Height:		45		mm
Weight:				g
Terms of use:	Min.:	Norm.:	Max.:	Unit:
Operating temperature:	-40	-	70	°C
Storage temperature:	-40	-	90	°C

* No communication on both CAN bus, all of HP output are switched off.

3. Wiring diagrams:

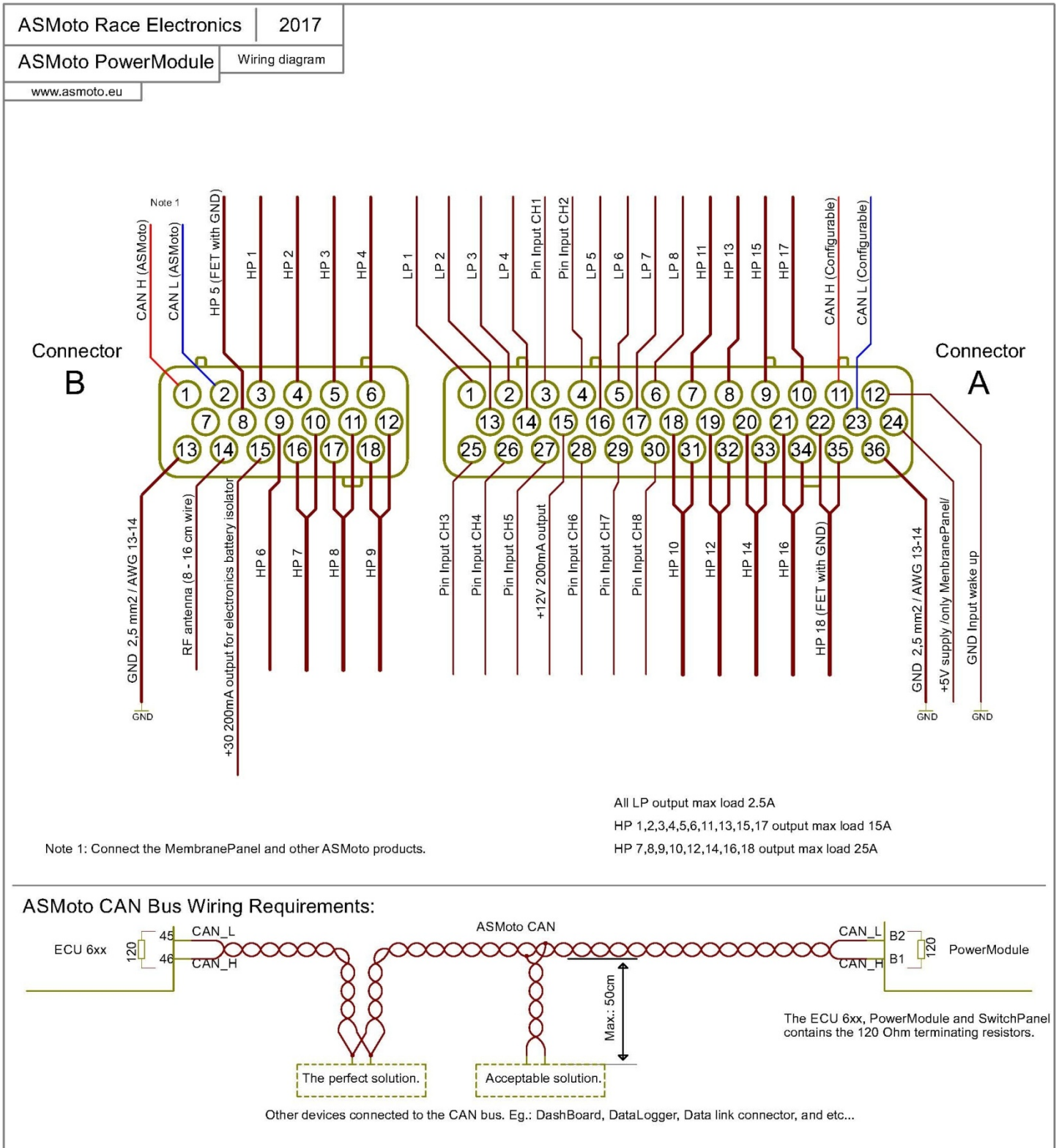
3.1. PowerModule pinout:

Connector B:

Pin:	Name/function:	Description:
B1	CAN H /ASMoto/	CAN Bus High
B2	CAN L /ASMoto/	CAN Bus Low
B3	HP1	max 15A output
B4	HP2	max 15A output
B5	HP3	max 15A output
B6	HP4	max 15A output
B7	...	
B8	HP5 FET with GND	max 15A output
B9	HP6	max 15A output
B10	HP7	max 25A output
B16		
B11	HP8	max 25A output
B17		
B12	HP9	max 25A output
B18		
B13	GND	
B14	RF antenna	
B15	+30	200mA output for electronics battery isolator
B16	See B10	
B17	See B11	
B18	See B12	

Connector A:

Pin:	Name/function:	Description:
A1	LP1	max 2.5A output
A2	LP3	max 2.5A output
A3	PinInput CH1	
A4	PinInput CH2	
A5	LP6	max 2.5A output
A6	LP8	max 2.5A output
A7	HP11	max 15A output
A8	HP13	max 15A output
A9	HP15	max 15A output
A10	HP17	max 15A output
A11	CAN H	CAN Bus High
A10	HP7	max 25A output
A12	GND input... wake up	Input
A13	LP2	max 2.5A output
A14	LP4	max 2.5A output
A15	+12V out	max 200mA
A16	LP5	max 2.5A output
A17	LP7	max 2.5A output
A18	HP10	max 25A output
A31		
A19	HP12	max 25A output
A32		
A20	HP14	max 25A output
A33		
A21	HP16	max 25A output
A34		
A22	HP18	max 25A output
A35		
A23	CAN L	CAN Bus Low
A24	+5V supply /only membrane panel/	Power (300mA)
A25	PinInput CH3	
A26	PinInput CH4	
A27	PinInput CH5	
A28	PinInput CH6	
A29	PinInput CH7	
A30	PinInput CH8	
A31	See HP10	
A32	See HP12	
A33	See HP14	
A34	See HP16	
A35	See HP18	
A36	GND	



3.10 Figure. (The printable figure with higher resolution can be found on the www.asmoto.eu homepage under the downloads)

4. Outputs:

All of the outputs can be freely renamed (maximum 16 characters from the letters and numbers of the English ABC), the output state is visible in real time on the Overview tab.

4.1. High current outputs: /HP1 – HP18/

The following parameters can be individually defined for all high current outputs (total 18 pcs):

OutputType:	SoftStart: The ramp up steepness can be set at switch on the HP outputs (linear ramp up with 400Hz PWM, 0.25/0.5/1/2/3 second steps can be chosen in order to reach the 100%)
DelaySec:	Delay the switch on the output (0-25.5s)
TimerSec:	For later use, set for 0 for now.
MinAmper:	Lower limit current. Error message will be generated if the output current drops below current value for "MinTime" time range. (0-25A) (The output remain active regardless of the error message)
MinTime:	The current shall be under the "MinAmper" value for this time range in order to get an error message.
MaxAmper:	High limit current. Error message will be generated and the output is shut down if the output current increases above this value for "PeakSec" time range. (0-25A / 0-15A). The output will be active again, if the corresponding Input is switched off then switched on.
PeakSec:	The output current can exceed the "MaxAmper" for this time range. (0-3s) (If it remains below 60A)

Error counters are belonging to each high current outputs, which increases by 1 if the low and high limit current is reached. Furthermore, the status (On, Off, Error), the current, the error counter of each high current outputs are visible in real time in AREM. In case of heat blow (T > 150°C) the outputs are switched off, then they switched on automatically. This event does not increase the error counter, but the output current decreases significantly. Therefore, setting the MinAmper in proper way it can be registered.

The high current outputs are switched off in less than 5 ms, if the output current exceeds the 60A or in case of short circuit less than 0.5ms. (Iout > 90A). All of the 18 high current outputs have the same level switch, but the high current outputs with 25A are connected to 2 pins.

The PowerModule is able to pull the HP5 and HP18 outputs into the GND in switched off state. This function can be activated in the OutputType column by choosing the Off_GND. (e.g. it can be necessary if the windshield wiper shall stop fast)

In case of continuous high load, the high current outputs can be connected in parallel. (In this case HP5 and HP10 the Off_GND shall be switched off)

4.2. Low current outputs: /LP1 – LP8/

The 8 low current channels are arranged in 2 groups. From 1 to 4 and 5 to 8. The maximum continuously current consumption is 8A for each groups, but the continuously current consumption is 2.5 A for one channel.

The following parameters can be given for all low current channels (total 8 pcs):

DelaySec:	Delay the switch on of the output. (0-25.5s)
TimerSec:	For later use, set it for 0 for now.

The sum of the current consumption of the total low current outputs and the own current consumption of the PowerModule is visible in the All LP current column.

4.3. Output Flashing / Low battery:

4 different type of blinking, shut down in case of low voltage, and in example: shut down during starting can be assigned for any output. Ignition: see section 5.1.

4.4. MembranePanel LEDs:

3 LEDs belongs to all of the buttons (11 or 14 buttons) of the MembranePanel. The backlight, the green and the red. They can be connected for all of the three separated outputs. Therefore, they feedback the status of the output. The red LED can be set as error indicator not as output status indicator. Therefore, the LED blinks if the connected output has an error.

4.5. CAN Outputs:

In case of ASMoto ECU and DashBoard, the CAN outputs can be controlled directly, without additional wires. Among others, the following items can be switched on from the inputs of the PowerModule via CAN: ALS, LaunchControl, TC, MAP select in the ECU, button inputs (PageSelect, LapTime) in the DashBoard.

5. Inputs:

All of the inputs can be freely renamed (maximum 16 characters from the letters and numbers of the English ABC), the states are visible in real time in the AREM. The background color of the current active input changes for green.

5.1. Ignition:

An input shall be identified as an ignition switch in order to function properly. (On the Output Flashing / Low battery tab). When the input switches off, the PowerLatch sequence is started in few seconds:

- 1.: The PowerModule saves the changes into the Flash memory. If the configuration was modified, (Write to PCM) the red LED lights in red at the bottom area of the AREM which is switched off after the savings.
- 2.: the MembranePanel is going to sleep mode and getting completely dark. (It wakes up by pressing any button, if no further button press is coming, it is going to sleep again)
- 3.: if all of the HP (high current) outputs are switched off and there is no communication on any CAN bus, the PowerModule is going to sleep as well, reducing the power consumption. Any CAN bus activity, MembranePanel button press, or PinInput changes wakes up the PowerModule.

5.2. PinInput 1 - 8:

Different buttons, switches can be connected to the 8 available digital inputs on the PowerModule. These can work in Momentary or Toggle mode. It can be chosen that the input is in active mode in Pin GND or in Positive state. It can be also chosen that pull-up or pull-down resistance shall be on the Pin.

5.3. Wireless (RfInput) 1 - 8:

WirelessSteeringModule (further only WSM) can be assigned to the PowerModule. 8 buttons can be freely configured, similar to PinInputs.

All WSMs are manufactured with unique ID and serial number. With support of these can be the WSM and the PowerModule matched. Only one WSM can be taught for one PowerModule.

6.3.1: Training:

- If ignition is on (Ignition LED lights in green on the top area of the AREM): Press the Programming button under the Input / Pin and Rf input tab.
- Press the WSM 3rd button within 5 seconds. Then, the serial number of the WSM is displayed in the HW/SW/SerialN textbox. If the serial number matches with



the number which is written in the back side of the WSM, than the teaching was successful.

- Switch off the ignition. Then, the PowerModule saves the WSM serial number.

6.3.2: WSM Battery voltage:

The voltage level of the CR2032 button cell is visible at each WSM button press.

5.4. MembranePanel (MPInput) 1 - 32:



MembranePanel with 11 or 14 buttons can be ordered to the PowerModule, therefore up to 32 input can be managed.

Unlike the other inputs, the buttons are assigned to the inputs, in order to perform multiple function with one button press.

Backlight is available on all of the buttons. The state of the outputs and the possible error can be indicated with one green and one red LED.

5.5. CAN:

The PowerModule has two independent CAN busses.

The ASMoto CAN bus can be used only for communication with ASMoto devices. E.g. the MembranePanel, DashBoard, ECU, and the diagnostic tool is connected, which is used for programming the modules. Different devices cannot be connected.

The Configurable CAN is a freely configurable CAN, with several optional speed. It makes easier to connect products from other manufacturers (e.g. ECU).

The CAN speed and CAN mode can be chosen at the bottom of the CAN Outputs tab.

Communication between the two CAN busses is possible. It can be chosen in the CAN2 mode drop down list that the messages of one CAN should be visible on the other CAN bus as well (back and forth). There is a constraint in order to avoid the random data collision, only the messages with ExtendedID can be forwarded into the ASMoto CAN.

5.6. CANInput 1 - 16:

The CAN input watches the messages received on both CAN busses. The CAN bus, which send the messages shall be not distinguished. Switch on the given CAN channel (On event) and switch off (Off event) can be performed in different circumstances.

- It can be chosen, that the watched message has Extended ID, what is the ID. The ID can be given in hexadecimal number system.
- Data bytes shows, what byte is in our interest among the 8 bytes of the package. Furthermore, if we are interested for a 2 bytes data, than it shows which is the L (lower) and H (higher) byte.

- The relation or the connection can be chosen. What kind of relationship shall be watched between the value in the right field and the received bytes from the CAN.
 - o = equals
 - o > in case of greater On event, the CANInput will active, if the received bytes on the CAN are greater than the value in the right field
 - o < less
 - o & bitwise AND connection. One bit can be masked from one byte. If this is equals with the value in the right field (0 or 1), than the CAN input is active (in case of On event)
 - o !& bitwise NOT-AND. One bit can be masked from one byte, and if it is not equal to the value in the right field (0 or 1), than the CAN input is active (in case of On event).
 - o In case of NOT On event, the CanInput will be active, if the received bytes on the CAN are not equal to the value in the right field.

- No CAN data: If the message with the given ID does not arrive within Delay time, then the output:
 - o Hold: remains on the previous state
 - o On: switches on
 - o Off: switches off

5.7. VirtuallInput 1 - 16:

All of the inputs can be merged, delayed, and logically connected with other inputs. The created new inputs in this way are the VirtuallInputs.

6. Operation:

6.1. Overview:

The connection pins of the HP and LP outputs are visible in two tables. Names, state of the switch on/off, output current, error counter.

The current state of the outputs marks the background color of the first two columns, which can be the basic light grey, green, or red, and the status of the checkbox (On/Off) of the third column.

7. Firmware update:

7.1. Firmware update:

We are continuously developing the software of the PowerModule. We put new functions, we repair the possible errors. Therefore, update for the newer version is worth. During update, all of the outputs are switched of. If the communication is interrupted, the procedure shall be started again. The update takes up to 3 minutes.

Further information: www.asmoto.eu / info@asmoto.eu

Author: ASMoto Team

If you find grammar, style, professional, logical, or other different type of error, or the wording is not clear, please write to us on the info@asmoto.eu e-mail address.

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