HP8440 Power Box

The Intelligent Power Distribution Module

Installation and User Guide for PCM Version 9.02



1 Introduction

The Power Control Module is an innovative, intelligent and programmable module that replaces relays and circuit breakers, simplifies wiring harnesses and provides diagnostic capabilities. The PCM is ultra-compact (197 x 107 x 46 mm including the Autosport connectors) and lightweight (only 710 grams), providing an effective and inspired alternative to conventional relays, circuit breakers, fuses and wires that can so often be a tangle of complexity and untidiness around a typical racing car's power junction box.

The PCM exchanges data with other modules in the car primarily via CAN. It can be controlled entirely by CAN or by combining any of the 32 CAN channels and additional 11 digital input switches. By using CAN channels to activate inputs in the PCM as few as two wires could control the switching of the system's 34 outputs.

Its CAN communication is highly user-defined, allowing an optimum integration with other modules in the car - for example the engine management system, our switch panel, CAN expansion modules, dashboard (to display error messages and status) and data logging system. 20 virtual input channels based on any combination of conventional inputs, CAN channels or outputs are also available, used to create logic links.

18 high power channels are available, each offering maximum peak current in excess of 35-65 amps and individual adjustable peak current time of up to 10 seconds.

<u>Please note that the current draw per channel is limited by the connector - not by the driver stages.</u> Each driver stage can handle in excess of 35-65 amps continuously.

We have rated the individual channel's current draw in relation to the connector manufacturer's specifications.

Additionally, 16 low power channels are available for secondary power supply.

Channel names, types of activation (latching or momentary, pulse, low or high frequency pulse width modulation), switch configuration and current trip values (in 0.1 amp steps) are user-configurable.

In its basic configuration the PCM is programmed to shut down overloaded channels. It is, however, possible to override this function and to program the module to reset automatically a number of times within a programmable time interval.

A manual reset function of all overloaded channels is also available.

The current draw status (in steps of 0.1 Amp) for the module and diagnostics for each channel can be logged and controlled via CAN. In addition, the power consumption of each high power channel can be monitored and exported via CAN to the vehicle's data logging system.

The PCM's programmability enables not only channel cut at specific currents, but also, for example, high initial peak current draw followed by a decrease to a lower, steady threshold level. So, something like an assisted gearshift compressor with a high startup current can be catered for without simply fitting a high rated fuse or circuit breaker.

The PCM's intelligence also enables the user to deactivate non-essential channels in the case of low battery voltage and it has a dedicated engine start feature.

Please note that the PCM is not intended to be used to control safety-critical systems on a vehicle, such as ABS braking, power steering, etc.

HP ELECTRONIK. Shall not be responsible for any incidental or consequential damages or injuries that may occur if the unit is used to control these, or similar, safety-critical systems.

2 Hardware

The PCM enclosure is CNC machined to the highest standards.

The two parts of the casing are sealed by an O-ring, located in a recess in the lower half. A lip in the upper casing presses on the O-ring and assures a water tight sealing. O-rings are also used around each of the four connectors and the tapped holes for the connector mountings are not drilled through the casing.

Connector 1 is a Deutsch Ltd. Autosport Heavy Duty single pin connector, type ASHD0 14-1 PN. This is a specially developed connector, designed to conduct very high currents with very low losses and to withstand very high temperatures.

The mating connector on the wiring loom must be ASHD614-1SN-C35.

Connector 2 is a Deutsch Autosport Ltd. connector, type AS0 14-97 SN. This connector has four size AWG 16 socket contacts and eight size AWG 20 socket contacts.

Deutsch Ltd. rates the AWG 16 contacts at 20 Amps and the AWG 20 contacts at 7.5 Amps. The PCM uses each of the AWG 16 contacts for a single output driver. Four of the AWG 20 contacts are connected as two pairs, each pair connected to one output driver. In this way some channels can be rated at 15 Amps.

The mating connector on the wiring loom must be AS614-97PN – (Red Ring).

Connector 3 is a Deutsch Autosport Ltd. connector, type AS0 14-97 SA. It has a different keyway as used in connector 2, preventing incorrectly connections.

This connector has four size AWG 16 socket contacts and eight size AWG 20 socket contacts. Deutsch Ltd. rates the AWG 16 contacts at 20 Amps and the AWG 20 contacts at 7.5 Amps. The PCM uses each of the AWG 16 contacts for a single output driver. Four of the AWG 20 contacts are connected as two pairs, each pair connected to one output driver. In this way some channels can be rated at 15 Amps.

Two contacts (pin F and pin H) are Power Ground connections and must be connected to earth. The mating connector on the wiring loom must be AS614-97PA – (Yellow Ring).

Connector 4 is a Deutsch Ltd. Autosport connector, type AS0 14-35 SN. This connector has 37 size AWG 22 contacts and is used for the low power output channels, for the conventional input switches, and for USB and CAN communication.

Deutsch Ltd. rates the AWG 22 contacts at 5 Amps.

The mating connector on the wiring loom must be AS614-35 PN.

Regarding Tools for the connectors – please download the Technical Brochure from Deutsch – It can be found on <u>www.hpelec.dk</u>. Download section.

Please note, the current values written in this manual is based on our and our clients experience of the current draw in practical, we have much higher load on cables and connectors than the technical brochure advices, without any problems at all. It is of course important that loom and connectors is kept in good conditions to be able to make higher current draw.

3 Software installation

The software can be installed either from a software CD, provided with the PCM or downloaded from our web site – <u>www.hpelec.dk</u>

3.1 Software installing from a CD

Ask us for a CD Rom – Normally all files is to find on our website

3.2 Software installation from web-download

It is possible to download the PCM software from our web site. Go to <u>www.hpelec.dk</u> Please select the Download tab.

When you have downloaded the PCM software, open the folder where you saved the file and double click on the installation file.

PC Software and Firmware Releases

For feature updates, please visit the site to get the latest information.

3.3 Connection to system

Communication with the PCM is established using a conventional USB cable. No dongle or interface Is required.

HP ELECTRONIK or your wiring loom manufacturer can provide you with the cable suitable for your installation and selected connectors.

First time you plug your cable in, Windows will install some drivers. Wait until you see that drivers are installed. After this, click CONNECTION in the main menu, click the proposed USB connection in the communication window and then click OK.

This procedure is done for each new PCM you connect to and for each USB port used. Once installed, the definitions are stored on your PC and used next time you connect to a particular PCM.

The software opens in the GENERAL section.

If you disconnect from the system, communication will be re-established when you plug the cable in again.

4 Main Menu

The software main menu has 4 sections:

4.1 File

You can open an existing configuration file by clicking on FILE and then select OPEN.

🗾 Åbn		X	
<u>S</u> øg i:	J Firmware	▼ ← E 🍟 II▼	
Navn	*	Ændringsdato	Ту
<u>a</u> h2.0	CFG	30-01-2014 18:16	С
-	III		۲
<u>Fi</u> lnavn:	<mark>52</mark>	Abn]
Filtype:	config files (*.cfg)	- Annuller	

Files are located in this folder: c:\program files\HPELEC\powerbox

You can save a configuration file on your PC by clicking on FILE, then SAVE. Now select the folder where you want to save the file (by default c:\program files\HPELEC\powerbox), type a file name and click OK.

You can read the PCM configuration file by clicking on READ or by pressing F8.



You can send a new configuration from your laptop to the PCM by clicking on UPLOAD or by pressing F9.

You can discard all changes and revert to the PCM default configuration file by clicking on DEFAULT SETTINGS.

4.2 Connection

Click here to establish a link between your PC and the PCM.

When connected, the PCM configuration file is loaded and displays the PCM status in real time in the General tab.

The PCM's configuration file will be loaded automatically when you establish communication.

🗾 USB	
FT232R US	SBUART
Cancel	

4.3 Tools - Firmware

Use this option only when you want to update the PCM firmware.

If no connection to the PCM is established, a warning message will appear.

Connect to the PCM.

A window called FIRMWARE opens. If the correct firmware file name is not displayed in the "File to Download" window, click the button on the right of this window.

Browse for the correct file.

When the selected firmware is displayed, click "Program".

Switch the PCM OFF, then ON to send the firmware.

Once the firmware is sent, reset the module by switching power off for some seconds and then switch it on again.

Firmware		
File to download		
Progress		
	Program	Exit

4.4 Tools - FIA

The Power Control Module is homologated by FIA for use in touring cars. This section is for use by FIA scrutineers to verify the legality of the PCM firmware.



4.5 Help

Click HELP, then ABOUT to see the PC software version in use and to see which firmware is currently loaded into the PCM.

About HP8440 Powerbox									
Service and configuration tool									
Development, HP Electronik A/S www.hpelec.dk									
PC version : 9.02 Created: Dec 15 2013 Powerbox version: PCM ver 9.02									
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5 General

Connecting to the PCM when it is switched ON, the software reads the configuration file from the PCM and displays data in the General tab in real time.

The left section displays an overview of configured input channels and the status of the output channels. When a switch is ON, the window displays ON in a green window for each switch.

The center section shows the status of the high power channels. If a channel is switched ON, the button color changes to green and displays ON. The window to the right of the button displays the current draw for each channel in real time if switched ON. The system checks for overload and short circuitry. Color coding is used to show the individual channel status:



Powerbox Tool - [No Name]		-			
File Connection Tools Help					
General Diagnostic Inputs CAN I	Inputs Virtual Inputs	CAN Export Outputs FI	ash Low Battery Start B	utton Low Current Socket info	
CAN Inputs	High Power Chan	inels		Mode	
Off 1: CAN Flash	On 4.0 A	1: High Beam Left	(Con. 3, Yellow ring, Pin C)	C Auto	 Manuel test
Off 2: CAN Dir L	0#			Low Power Channels	
Off 3: CAN Dir R		2: Extra (Servo)	(Con. 2, Red ring, Pin L)		
Off 4: CAN Servo	On 0.0 A	3: Window UP	(Con. 2, Red ring, Pin H)	On 19: Indicator LF	(Con. 4, Red ring, Pin 1)
Off 5: CAN Fuel	On 0.2 A	4: Fuel LP2	(Con. 2, Red ring, Pin F)	On 20: Indicator RF	(Con. 4, Red ring, Pin 2)
Off 6: CAN Pit				On 21: AMB	(Con. 4, Red ring, Pin 3)
Off 7: CAN MOVE	UN U.UA	5: Fuel LP1	(Con. 2, Red ring, Pin D)	On 22: VBAT Key	(Con. 4, Red ring, Pin 4)
Off 8: CAN MAP SW	On 5.3 A	6: Fuel HP	(Con. 2, Red ring, Pin A,B)	On 23: VBAT Dir	(Con. 4, Red ring, Pin 5)
Off 9: CAN DONT KNOW	On 3.9 A	7: Low Beam Left	(Con. 3, Yellow ring, Pin L)	Off 24: Indicator LR	(Con. 4, Red ring, Pin 6)
On 10: CAN TPS			· · · · ·	Off 25: Indicator RR	(Con. 4, Red ring, Pin 7)
Off 11: CAN 11	011 3.9A	8: Low Beam Right	(Con. 3, Yellow ring, Pin A)	Off 26: Fog rear	(Con. 4, Red ring, Pin 8)
Off 12: CAN 12	On 0.0 A	9: IGN Coils+INJ+L	(Con. 2, Red ring, Pin G)	On 27: Video	(Con. 4, Red ring, Pin 9)
Off 13: CAN 13	Off	10: Stoplight L+R	(Con. 2, Red ring, Pin E)	On 28: CAN 12V+	(Con. 4, Red ring, Pin 10)
Off 14: CAN 14				On 29: DASH	(Con. 4, Red ring, Pin 11)
Off 15: CAN 15		11: +15 IGN ECU	(Con. 2, Red ring, Pin C)	Off 30: DCT Logger	(Con. 4, Red ring, Pin 12)
Off 16: CAN 16	Off	12: High Beam Right	(Con. 3, Yellow ring, Pin G)	Off 31: Intercom	(Con. 4, Red ring, Pin 13)
Off 17: CAN 17	Off	13: Servo	(Con. 2, Red ring, Pin M)	On 32: 2D	(Con. 4, Red ring, Pin 14)
Off 18: CAN 18	0#			On 33: AIM Power + GPS	(Con. 4, Red ring, Pin 15)
Off 19: CAN 19		14: Rearlight L+R	(Con. 2, Red ring, Pin J,K)	On 34: Extra 2	(Con. 4, Red ring, Pin 16)
Off 20: CAN 20	Off	15: Windscreen Heat	(Con. 3, Yellow ring, Pin D,E)		
Off 21: CAN 21	Off	16: Alternator MAG	(Con. 3, Yellow ring, Pin B)	Pin Input	(Car 4 Part for Pin 19)
Off 22: AN 22	0#			Off a: SW1 ignition	(Con. 4, Red ring, Pin 19)
Off 23: CAN 23		17: Wiper HS	(Con. 3, Yellow ring, Pin M)	Off 2: SW2 Start	(Con. 4, Red ring, Pin 20)
Off 24: CAN 24	fail OVERLOAD	18: Starter Relay	(Con. 3, Yellow ring, $Pin\;J,K$)	Off at OWA FLAGU	(Con. 4, Red ring, Pin 21)
Off 25: CAN 25	Status			Off 5: OWE Winor	(Con. 4, Red ring, Pin 22.)
Off 26: CAN 26				Off 6: OWS Sereen	(Con. 4, Red ring, Pin 23)
Off 27: CAN 27	Total Cur	rent Used : 40.0 Å	A	Off 7: OW7 Occur	(Con. 4, Red ring, Pin 24)
Off 28: CAN 28	Inp	ut Voltage : 10.6 \	/	Off 0: OW/O Alternator	(Con. 4, Red ring, Pin 25)
Off 29: CAN 29	Powersta	age Temp. : 10 °C	:	Off or OWO Final	(Con. 4, Red ring, Pin 20)
Off 30: CAN 30		Errors : 2		Off 10: OW10 Light	(Con. 4, Red ring, Pin 27)
Off 31: CAN 31					(Con. 4, Red ring, Pin 28)
Off 32: CAN 32				11: SW11 Fuel Out	(Con. 4, Red ring, Pin 29)
USB CONNECTED					

- The channel status button and current draw window color is green for active, non-faulty channels.
- The channel status button and current draw window color changes to yellow if the system has detected an error since the last reset of the diagnostics.
- The channel status button and current draw window color is red if a fault is detected and still present. The button will display FAIL and the window displays for example SHORT.

The right section shows the status of the low power channels.

- The channel status button color is green for active, non-faulty channels.
- The channel status button color is red if a fault is detected and still present. The button will display FAIL.

The "Auto" setting displays status of the system switches. Switching to "Manual" overrides external or CAN switches. Manual mode allows togging channels on/off using the button to the left of the channel name window.

If you disconnect from one PCM and then re-connect to another module, the screen is cleared automatically and re-loaded once connection is established to the next PCM.

The Status window in the lower right corner of the General tab displays vital PCM information in real time:

- Total current draw
- Battery voltage
- Actual temperature of the driver stages
- Number of recorded errors

A status bar with 3 green LED's is located in the upper right-hand corner of the screen and displays the PCM's connection status.



6 Diagnostic

Click the Diagnostic tab to see the channels status, fault code and max recorded current.

Diagnostic Inputs	CAN Inputs Virtual In	puts CAN Export	Outputs Flash Low I	Battery Start Button	Low Current Socket info	
igh power channels					Low power channels	
Channel Name	Error Count Short Circuit	Error Count Trip Level	Trip Level Current Draw	Error Count Low Current	Channel Name	Error Count Short Circuit
1: High Beam Left	0	0	0	0	19: Indicator LF	0
2: Extra (Servo)	0	0	0	0	20: Indicator RF	0
3: Window UP	0	0	0	0	21: AMB	0
4: Fuel LP2	0	0	0	0	22: VBAT Key	0
5: Fuel LP1	0	0	0	0	23: VBAT Dir	0
5: Fuel HP	0	0	0	0	24: Indicator LR	0
7: Low Beam Left	0	0	0	0	25: Indicator RR	0
8: Low Beam Right	0	0	0	0	26: Fog rear	0
9: IGN Coils+INJ+L	0	0	0	0	27: Video	0
10: Stoplight L+R	0	0	0	0	28: CAN 12V+	0
11: +15 IGN ECU	0	0	0	0	29: DASH	0
12: High Beam Right	0	0	0	0	30: DCT Logger	0
13: Servo	0	0	0	0	31: Intercom	0
14: Rearlight L+R	0	0	0	0	32: 2D	0
15: Windscreen Heat	0	0	0	0	33: AIM Power + GPS	0
16: Alternator MAG	0	0	0	0	34: Extra 2	0
17: Wiper HS	0	0	0	0		
18: Starter Relay	0	0	0	0		

The diagnostic screen is divided into two windows, one for the high power channels and one for the low power channels.

- The first column in the high power window displays the channel name.
- Second column, "Error Count Short Circuit", displays the number of times the channel has been short circuited to ground.
- Third column, "Error Count Trip Level", displays the number of times the current draw has exceeded the trip level entered for that particular channel. The error count is activated AFTER the set peak time has expired.
- Fourth column, "Trip Level Current Draw", displays the maximum current drawn from the failing channel just before the channel shuts down.
- Fifth column, "Error Count Low Current", displays how many time the current draw for specific channels has dropped below the normal level.
- The first column in the low power window displays the channel name.
- Second column, "GND Short", displays the number of times the channel has been short circuited to ground.

After a fault has been detected and corrected, the diagnostic circuitry can be reset by clicking the button "Reset Log".

7 Inputs

The Power Control Module has 11 inputs from conventional switches and 32 inputs via CAN. Additionally, 20 virtual channels can be created, combining any input and output channels to generate logic switching conditions.

Flashing outputs are defined in a separate section.

<u>F</u> ile	<u>C</u> onnection	<u>T</u> ools	<u>H</u> elp									
Gene	ral Diagnostic	Inputs	CAN Inputs	Virtual Inputs	CAN Export	Outpu	ts Flash Low Batter	y Start Button	Low	Current Socket	info	
Inpu	t						Inputs		Virt	ual Inputs		
	Name		Mode			1	CAN Flash	_				
1	SW1 Ignition		Latching	•		2	CAN Dir L	-	1	VIR Engine Run		
2	SW2 Start		Latching	-		3	CAN Dir R		2	VIR Servo		
3	Brakeswitch		Latching	-		4	CAN Servo		3	VIR Fuel LP		
4	SW4 FLASH		Latching	•		5	CAN Fuel		4	VIR Fuel HP		
5	SW5 Wiper		Latching	•		6	CAN Pit		5	VIR Light		
6	SW6 Screen		Latching	•		7	CAN MOVE		6	VIR Charge		
7	SW7 Servo		Latching	•		8	CAN MAP SW		7	VIR FUELSCRUT		
8	SW8 Alternator		Latching	-		9	CAN DONT KNOW		8	VIR PIT		
9	SW9 Fuel		Latching	•		10	CAN TPS		9	VIR OVERTAKE		
10	SW10 Light		Latching	•		11	CAN 11		10	VIR MAN SERVO		
11	SW11 Fuel Out		Latching	•		12	CAN 12		11	VIRTUAL 11		
						13	CAN 13		12	VIRTUAL 12		
						14	CAN 14		13	VIRTUAL 13		
						15	CAN 15		14	VIRTUAL 14		
						16	CAN 18		15	VIRTUAL 15		
						17	CAN 17		16	VIRTUAL 16		
						18	CAN 18		17	VIRTUAL 17		
						19	CAN 19		18	VIRTUAL 18		
Edit	Box name					20	CAN 20		19	VIRTUAL 19		
						21	CAN 21		20	VIRTUAL 20		
						22	AN 22					
						23	CAN 23					
						24	CAN 24					
						25	CAN 25	_				
						26	CAN 26					
						27	CAN 27					
						28	CAN 28					
						29	CAN 29					
						30	CAN 30					
						31	CAN 31	_	De	fault settings	Read	

The conventional inputs are digital channels. The standard configuration of the PCM only accepts connections switching to ground (except Switch #1 which has to switch to battery voltage to activate), either to enable or to disable a channel.

These inputs can be controlled by either manual external switches or by programmable outputs from the engine management system and data logging modules.

The intention with the PCM is to simplify the wiring installation as much as possible. If you use the digital switches, you have to connect up to 11 signal wires to the module. But if you choose to control the PCM via CAN, you can control all functions, using only a 2-wire data bus. HP ELECTRONIK can supply A/D-to-CAN converter modules, which converts 4 analogue inputs to CAN channels.

You can name all available input switches in this section, conventional switches, CAN and virtual channels.

Click on the switch window and type the name you want to assign to each individual switch.

Please note that switch #1 is fixed and must provide + 12 volts.

You can define the functionality of each conventional input switch.

- In **Latching** mode the channel is ON only when the switch is connected to ground.
- In **Momentary** mode the channel switches ON when the switch briefly connects to ground. Pressing the switch again, making a brief contact to ground, switches the channel OFF.

The trigger signal from either type of switch must be present in excess of 20 msec to be recognized as a valid trigger signal.

Switch	Connector 4	Pin
1	14-35 red	19
2	14-35 red	20
3	14-35 red	21
4	14-35 red	22
5	14-35 red	23
6	14-35 red	24
7	14-35 red	25
8	14-35 red	26
9	14-35 red	27
10	14-35 red	28
11	14-35 red	29

Pin Configuration Conventional Input Switches

In Edit Box Name you can label the actual Power Control Module, for example "Car 1".

3 buttons are available in the lower right hand corner of the screen:

- Default settings Load the default setting from the Power control Module.
- Read Load the configuration file from the PCM (hotkey **F8**).
- Upload Send the current configuration file to the PCM (hotkey F9).

8 CAN Inputs

The PCM CAN bus is configured according to the 2.0B protocol, using 11 bit identifiers and Motorola or Intel data format. The CAN line is NOT terminated.

8.1 General

There are no limitations to the numbers of CAN identifier selected. Each of the 32 available CAN inputs can use a unique identifier. Identifiers do not have to be arrange in special groups. The ID is specified in hex, for example 300, and contains 8 bytes of information.

CAN input Conliguration	ECU RPM
ECURPM	
ECU TPS	- ON parameter
PCM 310	UN parameter
ECU FUEL PRESS	
CAN 5	CAN ID Data
CAN 6	nx 300 Hi Lo 2 3 4 5 6 7 > ▼ 3500
CAN 7	
CAN 8	
CAN 9	
CAN 10	OFF parameter
CAN 11	CANID Date
CAN 12	
CAN 13	n _x 300 Hi Lo 2 3 4 5 6 7 < ▼ 3250
CAN 14	
CAN 15	

The CAN Speed can be selected in the CAN Bit Rate Menu, the box supports 500kBit and 1Mbit Can speed.

CAN bit rate:	1 Mbit	19		J C	an f	uel-									
	500 K	bit/s			Gene	ral	Parar	neter	An	alyse	1				
CAN Inp CAN Flash CAN Dir L CAN Dir R	<mark>4</mark> 1 Mbit	/s	(Î		Calib	ratio	n					Di	-14-	
CAN Servo					V	alue	t(X)			Mult	iplica	ator	Dig	gits	Offset
CAN Fuel CAN Pit CAN MOVE CAN MAP SW CAN DONT K CAN TPS CAN 11 CAN 12 CAN 13 CAN 14	/ NOW			E		0	•	=	•	1.0	0000	0	* 0	+	O
CAN 15															
CAN 16															
CAN 17				_	nabl		Muia								
CAN 18 CAN 10				E	napi	e CA	IN VIE	inp	ut					_	
CAN 13 CAN 20				-	<u>с</u>	AN s	switc	hing	ena	bled	ifin	out is	active	s	W1 Ignition
CAN Monitor															
Enable	Off			•		Cle	ear lo	g		J	Fi	ile log	: Logi	File.txt	
18:08:43.	760>	ID=	300,	Data=	00	00	OF	00	03	EA	03	EA,	CAN	Servo,	CAN Fuel, CAN TPS
18:08:43.	815>	ID=	550,	Data=	00	00	00	00	00	00	00	00,	CAN	Flash,	CAN Dir L, CAN Dir R, CAN MOVE
18:08:43.	858>	ID=	300,	Data=	00	00	OF	00	03	EB	03	EB,	CAN	Servo,	CAN Fuel, CAN TPS
18:08:43.	901>	ID=	550,	Data=	00	00	00	00	00	00	00	00,	CAN	Flash,	CAN Dir L, CAN Dir R, CAN MOVE
18:08:43.	965>	ID=	300,	Data=	00	00	OF	00	03	EA	03	EA,	CAN	Servo,	CAN Fuel, CAN TPS
18:08:43.	993>	ID=	550,	Data=	00	00	00	00	00	00	00	00,	CAN	Flash,	CAN DIT L, CAN DIT R, CAN MOVE
18:08:44.	066>	ID=	300,	Data=	00	00	UF	00	03	EB	03	ЕΒ,	CAN	Servo,	CAN FUEL, CAN TPS
10:00:44.	1525	1D=	200	Data=	00	00	00	00	00	00	00	υυ, թթ	CAN	riasn,	CAN DIF L, CAN DIF R, CAN MOVE
10:00:44.	2145	TD=	550	Data=	00	00	UĽ OC	00	03	60	03	<u>в</u> р, 00	CAN	Flach	CAN DIN L CAN DIN D CAN MOUT
18.08.44	2142	TD=	300,	Data=	00	00	00	00	00	EV	00	πΔ,	CAN	Serve	CAN FUEL CAN DIT K, CAN MOVE
18:08:44	295>	TD=	550	Data=	00	00	002	00	00	00	00	00	CAN	Flash	CAN Dir L. CAN Dir R. CAN MOVE
18:08:44	3685	TD=	304	Data=	00	00	01	F4	00	B1	00	B1	CAN	MAP SW	Sa bit 2, on bit K, on hove
						~~~	~ -		~~		~~				
18:08:44.	396>	ID=	300.	Data=	00	00	OF	00	03	EA	03	EA.	CAN	Servo.	CAN Fuel, CAN TPS
18:08:44. 18:08:44.	396>	ID= ID=	300, 300.	Data= Data=	00	00 00	OF OF	00 00	03 03	EA EA	03 03	EA, E9.	CAN	Servo, Servo.	CAN Fuel, CAN TPS CAN Fuel, CAN TPS

Powerbox Tool - [ No Name ]	
<u>File Connection Tools H</u> elp	
General Diagnostic Inputs CAN Inputs	Virtual Inputs   CAN Export   Outputs   Flash   Low Battery   Start Button   Low Current   Socket info
Scherar Diagnostic Impais	
	CAN Fuel
CAN bit rate: 1 Mbit/s	
	General Parameter Analyse
CAN Input Configuration	
CAN Flash	Calibration
CAN DIFE	
CAN DILR CAN Servo	Value f(x) Multiplicator Digits Offset
CAN Fuel	
CAN Pit	
CAN MOVE	
CAN MAP SW	
CAN DONT KNOW	
CAN TPS	
CAN 11	
CAN 12	
CAN 13	
CAN 14	
CAN 15 CAN 16	
CAN 10	
CAN 18	Enable CAN via Input
CAN 19	Civit Institut
CAN 20	CAN switching enabled if input is active     Switching
-CAN Monitor	
CAN MONITO	
Enable Off	Clear log File log: LogFile.txt
18:08:43.760> ID= 300	, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS
18:08:43.760> ID= 300 18:08:43.815> ID= 550	, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE
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18:08:43.760> ID= 300 18:08:43.815> ID= 550 18:08:43.858> ID= 300 18:08:43.901> ID= 550 18:08:43.965> ID= 300	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS</pre>
18:08:43.760> ID= 300 18:08:43.815> ID= 550 18:08:43.858> ID= 300 18:08:43.901> ID= 550 18:08:43.965> ID= 300 18:08:43.993> ID= 550	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE</pre>
18:08:43.760> ID= 300 18:08:43.815> ID= 550 18:08:43.858> ID= 300 18:08:43.901> ID= 550 18:08:43.965> ID= 300 18:08:43.993> ID= 550 18:08:44.066> ID= 300	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS</pre>
18:08:43.760> ID= 300 18:08:43.815> ID= 550 18:08:43.858> ID= 300 18:08:43.901> ID= 550 18:08:43.965> ID= 300 18:08:43.993> ID= 550 18:08:44.066> ID= 300 18:08:44.094> ID= 550	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE</pre>
18:08:43.760> ID= 300 18:08:43.815> ID= 550 18:08:43.858> ID= 300 18:08:43.901> ID= 550 18:08:43.965> ID= 300 18:08:43.993> ID= 550 18:08:44.066> ID= 300 18:08:44.094> ID= 550 18:08:44.153> ID= 300	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS</pre>
18:08:43.760> ID= 300 18:08:43.815> ID= 550 18:08:43.858> ID= 300 18:08:43.901> ID= 550 18:08:43.965> ID= 300 18:08:44.965> ID= 300 18:08:44.066> ID= 300 18:08:44.094> ID= 550 18:08:44.153> ID= 300 18:08:44.214> ID= 550	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE</pre>
$\begin{array}{c} 18:08:43.760> \mbox{ ID= } 300\\ 18:08:43.815> \mbox{ ID= } 550\\ 18:08:43.858> \mbox{ ID= } 550\\ 18:08:43.901> \mbox{ ID= } 550\\ 18:08:43.965> \mbox{ ID= } 300\\ 18:08:44.965> \mbox{ ID= } 550\\ 18:08:44.066> \mbox{ ID= } 300\\ 18:08:44.094> \mbox{ ID= } 550\\ 18:08:44.153> \mbox{ ID= } 550\\ 18:08:44.214> \mbox{ ID= } 550\\ 18:08:44.266> \mbox{ ID= } 300\\ 18:08:44.266>  ID$	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS</pre>
$\begin{array}{c} 18:08:43.760> \mbox{ ID=} 300\\ 18:08:43.815> \mbox{ ID=} 550\\ 18:08:43.858> \mbox{ ID=} 550\\ 18:08:43.901> \mbox{ ID=} 550\\ 18:08:43.965> \mbox{ ID=} 300\\ 18:08:44.965> \mbox{ ID=} 300\\ 18:08:44.066> \mbox{ ID=} 300\\ 18:08:44.094> \mbox{ ID=} 550\\ 18:08:44.153> \mbox{ ID=} 300\\ 18:08:44.214> \mbox{ ID=} 550\\ 18:08:44.266> \mbox{ ID=} 300\\ 18:08:44.265> \mbox{ ID=} 300\\ 18:08:44.265> \mbox{ ID=} 500\\ 18:08:44.265>  ID=$	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 00 00 00 00 00 00 00 00 CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE</pre>
$\begin{array}{c} 18:08:43.760> \mbox{ ID= } 300\\ 18:08:43.815> \mbox{ ID= } 550\\ 18:08:43.858> \mbox{ ID= } 550\\ 18:08:43.901> \mbox{ ID= } 550\\ 18:08:43.905> \mbox{ ID= } 300\\ 18:08:44.066> \mbox{ ID= } 300\\ 18:08:44.064> \mbox{ ID= } 550\\ 18:08:44.053> \mbox{ ID= } 550\\ 18:08:44.153> \mbox{ ID= } 550\\ 18:08:44.214> \mbox{ ID= } 550\\ 18:08:44.266> \mbox{ ID= } 300\\ 18:08:44.295> \mbox{ ID= } 550\\ 18:08:44.368> \mbox{ ID= } 300\\ 18:08:44.368>  ID$	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 00 00 00 00 00 00 00, CAN Flash, CAN DIR L, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN DIR L, CAN DIR R, CAN MOVE , Data= 00 00 01 F4 00 B1 00 B1, CAN MAP SW </pre>
$\begin{array}{c} 18:08:43,760> \mathrm{ID}{=} 300\\ 18:08:43,815> \mathrm{ID}{=} 550\\ 18:08:43,858> \mathrm{ID}{=} 300\\ 18:08:43,901> \mathrm{ID}{=} 550\\ 18:08:43,903> \mathrm{ID}{=} 550\\ 18:08:43,993> \mathrm{ID}{=} 550\\ 18:08:44,066> \mathrm{ID}{=} 300\\ 18:08:44,094> \mathrm{ID}{=} 550\\ 18:08:44,013> \mathrm{ID}{=} 550\\ 18:08:44,214> \mathrm{ID}{=} 550\\ 18:08:44,266> \mathrm{ID}{=} 300\\ 18:08:44,265> \mathrm{ID}{=} 300\\ 18:08:44,265> \mathrm{ID}{=} 300\\ 18:08:44,368> \mathrm{ID}{=} 30A\\ 18:08:44,368> \mathrm{ID}{=} 30A\\ 18:08:44,366> \mathrm{ID}{=} 30A\\ 18:08:46,366> \mathrm{ID}{=} 30A\\ 18:08:46,366> \mathrm{ID}{=} 30A\\ 18:08:46,366> \mathrm{ID}{=} 30B\\ 18:08:46,366> \mathrm{ID}{=} 30\\ 18:08:46,366> $	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 01 F4 00 B1 00 B1, CAN MAP SW , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS</pre>
$18:08:43.760> ID= 300\\ 18:08:43.815> ID= 550\\ 18:08:43.815> ID= 550\\ 18:08:43.901> ID= 550\\ 18:08:43.901> ID= 550\\ 18:08:43.993> ID= 550\\ 18:08:44.066> ID= 300\\ 18:08:44.066> ID= 300\\ 18:08:44.094> ID= 550\\ 18:08:44.153> ID= 300\\ 18:08:44.214> ID= 550\\ 18:08:44.26> ID= 300\\ 18:08:44.26> ID= 300\\ 18:08:44.368> ID= 300\\ 18:08:44.396> ID= 300\\ 18:08:44.469> ID= 300\\ 18:08:40> ID= 30\\ 18:08:40>$	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS</pre>
$\begin{array}{c} 18:08:43.760> \mathrm{ID}{=} 300\\ 18:08:43.815> \mathrm{ID}{=} 550\\ 18:08:43.858> \mathrm{ID}{=} 300\\ 18:08:43.901> \mathrm{ID}{=} 550\\ 18:08:43.905> \mathrm{ID}{=} 300\\ 18:08:43.905> \mathrm{ID}{=} 300\\ 18:08:44.993> \mathrm{ID}{=} 550\\ 18:08:44.066> \mathrm{ID}{=} 300\\ 18:08:44.064> \mathrm{ID}{=} 300\\ 18:08:44.153> \mathrm{ID}{=} 300\\ 18:08:44.214> \mathrm{ID}{=} 550\\ 18:08:44.26> \mathrm{ID}{=} 300\\ 18:08:44.26> \mathrm{ID}{=} 300\\ 18:08:44.368> \mathrm{ID}{=} 300\\ 18:08:44.368> \mathrm{ID}{=} 300\\ 18:08:44.368> \mathrm{ID}{=} 300\\ 18:08:44.469> \mathrm{ID}{=} 300\\ 18:08:44.469> \mathrm{ID}{=} 300\\ 18:08:44.469> \mathrm{ID}{=} 300\\ 18:08:44.512> \mathrm{ID}{=} 30\\ 18:08:44.512> $	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 01 F4 00 B1 00 B1, CAN MAP SW , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 01 F4 00 B1 00 B1, CAN MAP SW</pre>
$\begin{array}{c} 18:08:43.760> \mathrm{ID}{=} 300\\ 18:08:43.815> \mathrm{ID}{=} 500\\ 18:08:43.858> \mathrm{ID}{=} 300\\ 18:08:43.901> \mathrm{ID}{=} 550\\ 18:08:43.905> \mathrm{ID}{=} 300\\ 18:08:43.905> \mathrm{ID}{=} 300\\ 18:08:44.904> \mathrm{ID}{=} 550\\ 18:08:44.066> \mathrm{ID}{=} 300\\ 18:08:44.064> \mathrm{ID}{=} 300\\ 18:08:44.153> \mathrm{ID}{=} 300\\ 18:08:44.214> \mathrm{ID}{=} 550\\ 18:08:44.26> \mathrm{ID}{=} 300\\ 18:08:44.26> \mathrm{ID}{=} 300\\ 18:08:44.368> \mathrm{ID}{=} 300\\ 18:08:44.368> \mathrm{ID}{=} 300\\ 18:08:44.469> \mathrm{ID}{=} 300\\ 18:08:44.469> \mathrm{ID}{=} 300\\ 18:08:44.512> \mathrm{ID}{=} 300\\ 18:08:44.555> \mathrm{ID}{=} 300\\ 18:08:44.555> \mathrm{ID}{=} 300\\ \end{array}$	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 01 F4 00 B1 00 B1, CAN MAP SW , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA</pre>
$\begin{array}{c} 18:08:43.760> \mathrm{ID}{=} 300\\ 18:08:43.815> \mathrm{ID}{=} 550\\ 18:08:43.815> \mathrm{ID}{=} 550\\ 18:08:43.901> \mathrm{ID}{=} 550\\ 18:08:43.905> \mathrm{ID}{=} 300\\ 18:08:43.905> \mathrm{ID}{=} 300\\ 18:08:44.904> \mathrm{ID}{=} 550\\ 18:08:44.066> \mathrm{ID}{=} 300\\ 18:08:44.064> \mathrm{ID}{=} 300\\ 18:08:44.214> \mathrm{ID}{=} 550\\ 18:08:44.214> \mathrm{ID}{=} 550\\ 18:08:44.26> \mathrm{ID}{=} 300\\ 18:08:44.26> \mathrm{ID}{=} 300\\ 18:08:44.368> \mathrm{ID}{=} 300\\ 18:08:44.368> \mathrm{ID}{=} 300\\ 18:08:44.469> \mathrm{ID}{=} 300\\ 18:08:44.512> \mathrm{ID}{=} 300\\ 18:08:44.555> \mathrm{ID}{=} 300\\ 18:08:44.555> \mathrm{ID}{=} 300\\ 18:08:44.598> \mathrm{ID}{=} 30\\ 18:08:$	<pre>, Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 00 00 00 00 00 00, CAN Flash, CAN Dir L, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN Dir R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN DIR R, CAN MOVE , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EB 03 EB, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 01 F4 00 B1 00 B1, CAN MAP SW , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00 0F 00 03 EA 03 EA, CAN Servo, CAN Fuel, CAN TPS , Data= 00 00</pre>

The Software can show the CAN traffic in the CAN Monitor window, it is possible to select between different filters, this helps to analyze the CAN traffic, a log to file function is also possible.

Refer to the CAN specifications for the modules in use and select the channels desired. Specify the ID for the channel plus the channels position within that particular ID. This position is defined by 1 byte (marked LO) for an 8 bit channel and by 2 bytes (marked HI and LO respectively) for a word.

Click on the numbers on the bar to select the desired channel position. First click on the byte for the LO position, then click on the byte number for the HI position (to the left of the LO byte for Motorola format (MSB, LSB), to the right of the LO byte for Intel format (LSB, MSB)).

Select the preferred trigger conditions.

File Connection Tools Help	
General Diagnostic Inputs CAN Inputs	Virtual Inputs CAN Export Outputs Flash Low Battery Start Button Low Current
CAN Input Configuration	ECU RPM
ECU WAT TMP	General Parameter Analyse
ECU RPM	
ECU FUEL PUMP	ON parameter
ECU PIT LANE	CAN ID Data
CAN 7	N 300 Hi Lo 2 3 4 5 6 7 <b>■ ▼ 2500</b>
CAN 8	
CAN 9	>
CAN 11	OFF parameter <
CAN 12	CAN ID Data
CAN 13	
CAN 14	
CAN 15 CAN 16	
CAN 17	

It is possible to specify the following conditions:

- = activate or deactivate if the channel value is equal to the selected value
- > activate or deactivate if the channel value is greater than the selected value
- activate or deactivate if the channel value is less than the selected value
- & logic "and" bit wise operator addressing individual bits with a selected byte
- !& logic "not" bit wise operator addressing individual bits with a selected byte
- **not** byte condition defining any value but the one selected

# Please note, that all CAN switching is disabled if the time interval between packages on the CAN bus is longer than 2 seconds.

A new feature in the software is the possibility to keep the CAN channel in different states, if the CAN traffic stops. (This can happen because of a broken CAN line).

Please see the No CAN data option in each CAN configuration window:

The features that can be selected is:

No CAN Data: Set off – Switches of the CAN channel

No CAN Data: Set on – Switches on the CAN Channel

No CAN Data: Keep state – Holds the channel on – example light switch, the headlight will not Turn off.

General Parameter	Analyse	
No CAN data:	Set Off 🔹	]
ON parameter	Set Off Set On	
CAN ID	Hold state	
0x 550	0 1	2 <b>Lo</b>

#### 8.2 Bit Wise Operator

Using the built-in bit wise operator it is possible to address each individual bit within a selected byte.

Select the & parameter as the activation parameter and the !& as the de-activation parameter. Address each individual bit within a byte by selecting the corresponding numbers:

Bit 0 is identified by number 1

- Bit 1 is identified by number 2
- Bit 2 is identified by number 4
- Bit 3 is identified by number 8
- Bit 4 is identified by number 16
- Bit 5 is identified by number 32
- Bit 6 is identified by number 64
- Bit 7 is identified by number 128

In section **Enable CAN via Input** you can assign a master switch channel. Tick the box and select one of the 11 conventional input switches. In this configuration, the CAN switching is only active if the selected digital channel is switched ON.

By ticking the ENABLE box in the **CAN Monitor** window, you can use the software as a Can analyzer, monitoring traffic on the CAN bus for the selected incoming ID's.

#### 8.3 Parameter

The PCM can be controlled by an advanced CAN bus using row counters. It is possible to assign any byte as the row counter and then to assign the required byte to control the switching.

Tick the box Row Counter Enable to enable the use of rolling data channels in the CAN bus.

- In Byte Number type the byte number used as row counter.
- In Byte Value type the row count number in which the desired data channel is found.

CAN Input Configuration	General Parameter Analyse
MFI010 MFI03 MFI09 MFI05 DDM	Dimension
GEAR EFI WATER TEMP CAR SPEED CAN 9	Data type © Unsigned © Signed
CAN 10 CAN 11 CAN 12 CAN 13 CAN 14	Row counter     Image: state state state     Image: state </td
Enable CAN via Input	if input is active

Bytes are read as unsigned by default. This means that data is read in bits from 0..255, 0..1023 or 0..65535.

If the data channels use the signed format, tick the box "Signed" in Data Type.

#### 8.4 Analyze

Use this section to scale the raw data input to an engineering unit.

CAN Input Configuration	VATER TEMP
EFIWATER TEMP HIGH FLASH EFI RPM BRAKE SW CAN 5 Pit Limiter PL1 PL2 Pump Prime SW HP 1 Fault CAN 11 CAN 12 CAN 13 CAN 14	Parameter Analyse   Calibration   Value f(x)   Multiplicator   Digits   O   =   0.625   *   0   +   -10

The multiplier is the increase in engineering value per bit and the offset adjusts the channel's value at zero bit.

For example, an EFI ECU transmits a temperature sensor with a range of 160 degrees C as an 8 bit data channel with a range of 256 bits. The multiplier is calculated this way:

Multiplier = (160 / 256) => Multiplier = 0.625

The sensor has a range from -10 degrees to + 150 and the zero offset is therefore -10.

Pin Configuration for CAN Communication:

Name	Connector 4	Pin
CAN H	14-35 red	31
CAN L	14-35 red	33

3 buttons are available in the lower right hand corner of the screen:

- Default settings Load the default setting from the Power control Module.
- Read Load the configuration file from the PCM (hotkey **F8**).
- Upload Send the current configuration file to the PCM (hotkey F9).

## **10** Virtual Inputs

Virtual channels are used to create logic connections.

A logic connection combines two or three channels, creating conditions for switching output channels on.

Up to 15 individual channels can be created.

A virtual channel can include other virtual channels.

al Diagnostic   Inputs   CAN Inp	its Virtual Inputs CAN Export Outputs	Flash Low Battery Start Button Low Cu	rrent	00
	FUEL PUMPS V			
				Ī
RES PUMP V	Delay (sec)	Delay (sec)	Delay [sec]	
VIRTUAL 7	0.0	0.0	0.0	
VIRTUAL 8 STARTER V	1. Con 1.			
VIRTUAL 10				

The strategy for virtual channels follows:

#### (Channel X [AND / OR / NOR] Channel Y) [AND / OR / NOR] Channel Z

The box marked "!" sets the channel selection to **NOT**, meaning the expression is true if the channel is not switched ON.

The selected output channel will be switched on only if the outcome of the combination of channels X and Y is true and then only if the outcome of the combination of the first statement and the third channel is true.

Additionally, each input channel has a delay timer. The channel value has to be true for the time interval entered before the channel condition is evaluated.

Channels X, Y and Z can be analogue switches, CAN channels, other virtual channels or output channels.

# 11 CAN Export

CAN export can be split between 4 CAN identifiers:

### 11.1 CAN Export 1

CAN Export 1 transmit the current draw for each of the 18 high power channels.

Tick the box Enable to transmit this ID. In CAN ID, type the ID number (in hex) you want to assign to this packet.

In Refresh, type the broadcast rate with which you want to export the packet.

The first data byte (byte 0) in the ID is used as the row counter, defining data within byte 7.

Data in bytes 1..6 are broadcast with the transmission rate defined in section Refresh. Each time the packet has been transmitted, a new channel assigned in byte 7 will be sent. So, channels in byte 7 rotate each time a packet has been broadcast.

This means that if you have assigned 20 msec (50Hz) as the broadcast rate, channels in byte 7 are broadcast at 20 msec x 12 = 240 msec intervals (4.2 Hz).

The channel data is divided by 4 before being sent.

Type the number of channels rotating in byte 7 in the **Row Count** window.

#### 11.2 CAN Export 2

CAN Export 2 transmit the output status of all 34 low and high power channels.

Tick the box Enable to transmit this ID. In CAN ID, type the ID number (in hex) you want to assign to this packet.

In Refresh, type the broadcast rate with which you want to export the packet.

If only the channel assigned to bit 0 is ON and other channels are OFF, the byte value is 1. If only the channel assigned to bit 1 is ON and other channels are OFF, the byte value is 2. If only the channel assigned to bit 2 is ON and other channels are OFF, the byte value is 4. If only the channel assigned to bit 3 is ON and other channels are OFF, the byte value is 8.

EnielDio			Channel Output s	itatus, If bit - 1 the	e channel is ON					
AN ID	CAN data									
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
efresh	Data Byte 8	Jaco.	• Frank Crown	- HOKK	• nona	white.	· a.c.	• Inc. Canada		- L
msec		Bit 7	Bit 6	Bit 6	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
	Data Byte 1	DISABLED	▼ DISABLED	<ul> <li>DISABLED</li> </ul>	REAR DIFF FAN	COOLER FAN R	CODLER FAN L	FUEL PUMP 2	FUEL PUMP 1	•
			0.4.6							
		DISABLED	DISABLED	DIS48LED	DISABLED	TO ISABLED	TOISABLED	T DISABLED	T DISABLED	-
	Data Byte 2		_	_	_	_	_	_		-
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
	Data Byte 3	provenue	1000000		- Construction	1		1000000		-
		Bit 7	Bit 6	-						
	Data Byte 4	proveneo	• Dissaces	-						

If only the channel assigned to bit 4 is ON and other channels are OFF, the byte value is 16. If only the channel assigned to bit 5 is ON and other channels are OFF, the byte value is 32. If only the channel assigned to bit 6 is ON and other channels are OFF, the byte value is 64. If only the channel assigned to bit 7 is ON and other channels are OFF, the byte value is 128.

If for example channels assigned to bit 2 and 6 are ON and all other channels are off, the byte value is 68.

The total current consumption is exported in byte 5. Scaling factor is 1 Amp per bit.



## 11.3 CAN Export 3

CAN Export 3 transmit the error status of all 34 low and high power channels.

Tick the box Enable to transmit this ID.

In CAN ID, type the ID number (in hex) you

want to assign to this packet.

In Refresh, type the broadcast rate with which you want to export the packet.

If an error is detected for the channel assigned to bit 0, but no other channels have any errors, the byte value is 1.

If an error is detected for the channel assigned to bit 1, but no other channels have any errors, the byte value is 2.

owerbox Tool - [ S2000 000 AN Export 1 CAN Export 2 CAN Export 3 CAN ID Bx 30F Data Rode 1 FRONT SCREEN V FRONT SCREEN V REAR OIFF FAN V COOLER FAN N VCOOLER FAN L V FRUE PARP 2 V FRONT SCREEN V REAR OIFF FAN V COOLER FAN N VCOOLER FAN L V FRUE PARP 2 V FRUE PARP 1 BR 7 BR 6 BR 5 BR 4 BR 3 BR 2 BR 1 #E LIGHT ♥ [N.C. ♥ [N.C. ♥ [N.BR C. ₩ ] PLMPER LMP ♥ [NHER LMP ♥ ] OUTER LMP ♥ [AUNH BEAK te 2 / _______ Bit 7 Bit 6 Bit 5 Bit 4 Bit 3 Bit 2 ______ □ISANLED ▼[DISANLED ▼[DISANLED ▼]DISANLED ▼]DISANLED ▼]DISANLED Bit 7 Bit 6

If an error is detected for the channel assigned to bit 2, but no other channels have any errors, the byte value is 4.

If an error is detected for the channel assigned to bit 3, but no other channels have any errors, the byte value is 8.

If an error is detected for the channel assigned to bit 4, but no other channels have any errors, the byte value is 16.

If an error is detected for the channel assigned to bit 5, but no other channels have any errors, the byte value is 32.

If an error is detected for the channel assigned to bit 6, but no other channels have any errors, the byte value is 64.

If an error is detected for the channel assigned to bit 7, but no other channels have any errors, the byte value is 128.

If errors are detected for the channels assigned to bit 3 and 7, but no other channels have any errors, the byte value is 136.

The total current consumption is exported in byte 5. Scaling factor is 1 Amp per bit.

#### 11.4 CAN Export 4

CAN Export 4 combines Export 2 and 3 in one CAN identifier.

The first 4 bytes are used to transmit output channels switch status while the last 4 bytes transmits error status of selected output channels.

Tick the box Enable to transmit this ID.

- In byte 0 assign the channel switch status for the MSP switches 9..16.
- In byte 1 assign the channel switch status for the MSP switches 1..8.
- In byte 4 assign the channel error status for the MSP switches 9..16.
- In byte 5 assign the channel error status for the MSP switches 1..8.

#### Pin Configuration for CAN Communication:

Name	Connector 4	Pin
CAN H	14-35 red	31
CAN Ground	14-35 red	32
CAN L	14-35 red	33

# 12 Outputs

File Connection Tools HP Help

The PCM has 18 high power channels and 16 low power channels. Each high power channel allows a maximum peak current in excess of 35-65 amps and individual adjustable peak current time of up to 10 seconds.

Please note that the current draw per channel is limited by the connector - not by the driver stages. Each driver stage can handle in excess of 35-65 amps continuously. We have rated the individual channel's current draw against our own experience. Please also check the connector manufacturer's specifications.

The 16 low power channels are arranged in groups of 4. The maximum continuous current draw for each group is 8 amps, but the maximum continuous current draw for one channel is 2.9 Amps.

Proceed as follows to configure an output channel:

- Re-name the output channel in the section "Name Pin". The position of the channel in connector 2 or 3 is listed.
- Select the input trigger from the drop-down column "**Input Trigger**". Select "DISABLED" if you do not want to use the output or if you only want to use the output with the flash function. When you select a conventional switch, its position in connector 4 is displayed.
- Define switch configuration "Trig By".
   If you want to switch the channel ON by switching to ground, select GND.
   If you want to switch the channel OFF when switching to ground, select OPEN.
- Set the delay for activating the output after switching it on in column "**Delay**".
- **"Timer**" defines a time interval during which the channel is switched ON. When terminated, the channel resets and requires re-activation to switch ON. Set the timer to 0 to disable the timer function.
- Set the trip level for the normal current draw in steps of 0.1 Amp in column "Max.

Input Pin Conn.	Input Trigger	Trig By	Delay [sec]	Timer[sec]	Max. [A]	Peak [sec]	Name Pin	Output Pin Conn.
Con. 4, Red ring, Pin 19	) SW1 Ignition 💌	+12v	- 0.0	CONT.	10.0	2.0	High Beam Left	1 (Con. 3, Yellow ring, Pin C)
irtual input 2 )	VIR Servo 💌	·	- 0.0	CONT.	30.0	3.0	Extra (Servo)	2 (Con. 2, Red ring, Pin L)
on. 4, Red ring, Pin 19	) SW1 Ignition 💌	+12v	- 0.0	CONT.	8.0	2.0	Window UP	3 (Con. 2, Red ring, Pin H)
n. 4, Red ring, Pin 27	) SW9 Fuel 💌	GND	▼ 0.0	0.2	10.0	3.5	Fuel LP2	4 (Con. 2, Red ring, Pin F)
N input 5 )	CAN Fuel 💌	-	→ 0.0	CONT.	10.0	3.0	Fuel LP1	5 (Con. 2, Red ring, Pin D)
l input 5 )	CAN Fuel 👻	-	- 0.0	CONT.	20.0	3.0	Fuel HP	6 (Con. 2, Red ring, Pin A,B)
n. 4, Red ring, Pin 28	) SW10 Light 💌	GND	▼ 0.0	CONT.	10.0	3.0	Low Beam Left	7 (Con. 3, Yellow ring, Pin L)
4, Red ring, Pin 28	) SW10 Light 💌	GND	▼ 0.0	CONT.	10.0	3.0	Low Beam Right	8 (Con. 3, Yellow ring, Pin A)
4, Red ring, Pin 19	) SW1 Ignition 💌	+12v	- 0.0	CONT.	10.0	3.0	IGN Coils+INJ+L	9 (Con. 2, Red ring, Pin G)
4, Red ring, Pin 21	) Brakeswitch 💌	GND	▼ 0.0	CONT.	10.0	3.0	Stoplight L+R	10 (Con. 2, Red ring, Pin E)
4, Red ring, Pin 19	) SW1 Ignition 💌	+12v	→ 0.0	CONT.	10.0	3.0	+15 IGN ECU	11 (Con. 2, Red ring, Pin C)
. 4, Red ring, Pin 28	) SW10 Light 💌	GND	▼ 0.0	CONT.	10.0	3.0	High Beam Right	12 (Con. 3, Yellow ring, Pin G)
l input 4 )	CAN Servo 💌	-	→ 0.0	CONT.	40.0	10.0	Servo	13 (Con. 2, Red ring, Pin M)
4, Red ring, Pin 28	) SW10 Light 💌	GND	▼ 0.0	CONT.	10.0	3.0	Rearlight L+R	14 (Con. 2, Red ring, Pin J,K)
. 4, Red ring, Pin 24	) SW6 Screen 💌	GND	▼ 0.0	CONT.	25.0	3.0	Windscreen Heat	15 (Con. 3, Yellow ring, Pin D,E)
l input 10 )	CAN TPS	-	→ 0.0	CONT.	10.0	3.0	Alternator MAG	16 (Con. 3, Yellow ring, Pin B)
4, Red ring, Pin 23	) SW5 Wiper 💌	GND	▼ 0.0	CONT.	10.0	3.0	Wiper HS	17 (Con. 3, Yellow ring, Pin M)
4, Red ring, Pin 20	) SW2 Start 💌	GND	▼ 0.0	CONT.	0.1	1.0	Starter Relay	18 (Con. 3, Yellow ring, Pin J,K)
input 2 )	CAN Dir L 👻	-	- 0.0	CONT.			Indicator LF	19 (Con. 4, Red ring, Pin 1)
input 3 )	CAN Dir R 👻	-	- 0.0	CONT.			Indicator RF	20 (Con. 4, Red ring, Pin 2)
l input 4 )	CAN Servo 💌	-	→ 0.0	CONT.			AMB	21 (Con. 4, Red ring, Pin 3)
4, Red ring, Pin 19	) SW1 Ignition 💌	+12v	→ 0.0	CONT.			VBAT Key	22 (Con. 4, Red ring, Pin 4)
4, Red ring, Pin 19	) SW1 Ignition 💌	+12v	→ 0.0	CONT.			VBAT Dir	23 (Con. 4, Red ring, Pin 5)
l input 2 )	CAN Dir L	-	→ 0.0	CONT.			Indicator LR	24 (Con. 4, Red ring, Pin 6)
input 3 )	CAN Dir R	-	→ 0.0	CONT.			Indicator RR	25 (Con. 4, Red ring, Pin 7)
4, Red ring, Pin 22	) SW4 FLASH	GND	▼ 0.0	CONT.			Fog rear	26 (Con. 4, Red ring, Pin 8)
input 4)	CAN Servo 💌	-	→ 0.0	CONT.			Video	27 (Con. 4, Red ring, Pin 9)
	+30 💌	+30	→ 0.0	CONT.			CAN 12V+	28 (Con. 4, Red ring, Pin 10)
	+30 💌	+30	- 0.0	CONT.			DASH	29 (Con. 4, Red ring, Pin 11)
al input 2)	VIR Servo 💌	-	- 0.0	CONT.			DCT Logger	30 (Con. 4, Red ring, Pin 12)
ual input 2 )	VIR Servo	-	- 0.0	CONT.			Intercom	31 (Con. 4, Red ring, Pin 13)

• Set the peak time in seconds during which the output channel can draw in excess of 35-65 Amps in column "Peak". This peak time is applied when the channel is switched on and every time the current draw exceeds the trip level set in column "Max".

### 12.1 High Power Channels

The pin configuration and maximum current draws for the high power channels are:

Channel	Max current, Amps	Connector 2	Pin
2	35	14-97 red	L
3	35	14-97 red	Н
4	35	14-97 red	F
5	35	14-97 red	D
6	35	14-97 red	A + B
9	65	14-97 red	G
10	35	14-97 red	E
11	65	14-97 red	С
13	65	14-97 red	М
14	35	14-97 red	J + K

Channel	Max current, Amps	Connector 3	Pin
1	65	14-97 yellow	С
7	65	14-97 yellow	L
8	35	14-97 yellow	A
12	35	14-97 yellow	G
15	35	14-97 yellow	D + E
16	35	14-97 yellow	В
17	65	14-97 yellow	М
18	35	14-97 yellow	J + K

#### 12.2 Low Power Channels

The pin configuration and maximum current draws for the high power channels are:

Channel	Max current, Amps	Connector 4	Pin
1	2.9 a)	14-35 red	1
2	2.9 a)	14-35 red	2
3	2.9 a)	14-35 red	3
4	2.9 a)	14-35 red	4
5	2.9 b)	14-35 red	5
6	2.9 b)	14-35 red	6
7	2.9 b)	14-35 red	7
8	2.9 b)	14-35 red	8
9	2.9 c)	14-35 red	9
10	2.9 c)	14-35 red	10
11	2.9 c)	14-35 red	11
12	2.9 c)	14-35 red	12
13	2.9 d)	14-35 red	13
14	2.9 d)	14-35 red	14
15	2.9 d)	14-35 red	15
16	2.9 d)	14-35 red	16

The current ratings are for continuous current draw. Peak ratings are much higher.

One input channel can control one or more output channels.

Note:

- a) Max 2.9 amps per channel in this group but max 8 amps for the group.
- b) Max 2.9 amps per channel in this group but max 8 amps for the group.
- c) Max 2.9 amps per channel in this group but max 8 amps for the group.
- d) Max 2.9 amps per channel in this group but max 8 amps for the group.

3 buttons are available in the lower right hand corner of the screen:

- Default settings Load the default setting from the Power control Module.
- Read Load the configuration file from the PCM (hotkey **F8**).
- Upload Send the current configuration file to the PCM (hotkey F9).

# 13 Flash Function

You can create up to 5 individual flash functions.

A flash enabled always has the highest switch priority. When activated, the assigned outputs will flash despite their current switch settings. From the window select which of the 5 flash channels you want to configure.

- In "Input Trigger" select which input channel activates the flash function.
- In "Edit Name" you can label the flash channel.
- In "Flash" set the time in msec's you want the channel to flash. For example, select 100 msec and the output channel(s) will be ON for 100 msec's, then OFF for 100 msec's etc.
- In "Duration" set the total activation time for the flash channel. Maximum time is 25 seconds.

If you want the channel to flash as long as the input switch is activated, tick the box "Continues". The flash returns to its OFF position after time-out and when the input switch is switched off.

## 14 Low Battery

The Power Control Module can switch power channels off automatically to preserve battery power.

Set a threshold for low battery voltage in "Low Threshold".

If the battery voltage drops below this voltage the PCM can switch channels off automatically. In the window "Disable Outputs" tick the boxes for the channels you want the PCM to switch off (in case they are switched on) if the battery voltage drops below the low threshold.

The channels will automatically switch on when the battery voltage exceeds the high threshold.

Lew Threadod     High Threadod       □     vat     2.5     vat	000
ECU POWER N.C.	000
WARNING: Be careful not to disable critical safety features.	



3 buttons are available in the lower right hand corner of the screen:

- Default settings Load the default setting from the Power control Module.
  - Read Load the configuration file from the PCM (hotkey **F8**).
- Upload Send the current configuration file to the PCM (hotkey F9).

## 15 Start Button

.

To maximize engine cranking speed and to preserve battery power the PCM can be configured to disabled other outputs whilst the starter motor is powered.

Select the starter switch in "Input Trigger". In the window "Outputs" tick the boxes for the channels you want the PCM to switch off (in case they are switched on) during the activation of the starter switch.

3 buttons are available in the lower right hand corner of the screen:

Outputs			
Buscher Lade     Buscher Lade     Root (Calen L     South Calen L     South Cal			
	Doctors December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December December Decembe	Output           Image:	Update           Image: Second control and the second contot and the second contot and the second contot and th

General Diagnostic Inputs CAN Inputs Virtual Inputs CAN Export Outputs Flash Low Battery Start Button Low Current

Timer[sec] Min. [A]

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

• Default settings Load the default setting from the Power control Module.

File Connection Tools Help

Low Current diagnostic setup High Power Channels

1 BUMPER LAMP

3 LIFT PUMP L 4 WASHER

5 LIFT PUMP R

8 DIP BEAM

9 MAIN BEAM

10 WIPER SLOW

11 FUEL PUMP 2

12 FUEL PUMP 1

13 FRONT SCREEN R

14 COOLER FAN R

16 REAR DIFF FAN

17 OUTER LAMP

18 BLOWER

15 WIPER FAST

6 COOLER FAN L 7 INNER LAMP

2 FRONT SCREEN L

- Read Load the configuration file from the PCM.
- Upload Send the current configuration file to the PCM.

## 16 Low Current

The PCM can detect failing and faulty components in the car and automatically warn the driver.

When the output driver is active, the PCM measures the current draw of each driver. If the current consumption drops below a minimum threshold for a predefined time, the system will set a flag in the diagnostics.

## 17 Additional Features

# 17.1 Warning Light

The PCM is equipped with a warning light for error detection. The driver output is found in connector 4, pin 18. If a fault is detected, the channel switches 12 volts ON.

#### 17.2 Output Reset

You can reset all output channels in error status by briefly connecting the warning light signal, pin 18 in connector 4, to ground.

This does not influence other channels but those in error status.

### 17.3 Socket info

<b>Z</b>				Powerbox Tool		↔	- 🗆 🗙
File Connection	<u>T</u> ools <u>H</u> elp						
General Diagnostic	General Diagnostic   nputs   CAN Inputs   Vintual Inputs   CAN Export   Outputs   Flash   Low Battery   Start Button   Low Current   Socket Info						
USB			CAN		Miscellaneous		
USB signal	USB wire		GND	( Con. 4, Red ring, Pin 30 )	Current sum (0-5V)	( Con. 4, Red ring, Pin 17 )	
+5V	Red	(Con. 4, Red ring, Pin 34)	CAN High	( Con. 4, Red ring, Pin 31 )	Warning Light / Reset	(Con. 4, Red ring, Pin 18)	
Data +	Green	(Con. 4, Red ring, Pin 35)	CAN Low	(Con. 4, Red ring, Pin 33)			
Data -	White	(Con. 4, Red ring, Pin 36)					
GND	Black	(Con. 4, Red ring, Pin 37)					
							1.

This window explains the pin out of the USB, CAN and Miscellaneous functions.

# 17.4 Upgrade the firmware

	Firmwart	-	×	
File to download				
Progress				
	Program		Exit	

This window allows you to put in the newest firmware in the HP8440 Powerbox, If you download the program the new .hex file (File for the controller) is included, please see our website <u>www.hpelec.dk</u> for the newest releases.

# 17.5 Pin Configuration

#### Connector 1 – battery power supply

Mating connector: ASHD614-1SN-C35

#### Connector 2 – high power outputs

Mating connector: AS614-97PN – RED

Pin	Used for	Max Rating (A) *)
A + B		
	Channel 6 High Power	35
С	Channel 11 High Power	65
D	Channel 5 High Power	35
Е	Channel 10 High Power	35
F	Channel 4 High Power	35
G	Channel 9 High Power	65
Н	Channel 3 High Power	35
J+K		
	Channel 14 High Power	35
L	Channel 2 High Power	35
М	Channel 13 High Power	65

### Connector 3 – high power outputs

Mating connector: AS614-97PA - YELLOW

Pin	Used for	Max Rating (A) *)
А	Channel 8 High Power	35
В	Channel 16 High Power	35
С	Channel 1 High Power	65
D + E		
	Channel 15 High Power	35
F	Power Ground	
G	Channel 12 High Power	35
Н	Power Ground	
J+K		
	Channel 18 High Power	35
L	Channel 7 High Power	65
Μ	Channel 17 High Power	65

*) Please note that the current draw per channel is limited by the connector - Each driver stage can handle in excess of 35-65 amps continuously.

We have rated the individual channel's current draw in relation to the connector manufacturer's specifications.

## Connector 4 – low power outputs

Mating connector: AS6 14-35 PN

Pin	In / out	Used for Max Rating (A)		Other
1	Output	Channel 1 Low Power	2.9 each channel, 8 amp / group	
2	Output	Channel 2 Low Power	2.9 each channel, 8 amp / group	
3	Output	Channel 3 Low Power	2.9 each channel, 8 amp / group	
4	Output	Channel 4 Low Power	2.9 each channel, 8 amp / group	
5	Output	Channel 5 Low Power	2.9 each channel, 8 amp / group	
6	Output	Channel 6 Low Power	2.9 each channel, 8 amp / group	
7	Output	Channel 7 Low Power	2.9 each channel, 8 amp / group	
8	Output	Channel 8 Low Power	2.9 each channel, 8 amp / group	
9	Output	Channel 9 Low Power	2.9 each channel, 8 amp / group	
10	Output	Channel 10 Low Power	2.9 each channel, 8 amp / group	
11	Output	Channel 11 Low Power	2.9 each channel, 8 amp / group	
12	Output	Channel 12 Low Power	2.9 each channel, 8 amp / group	
13	Output	Channel 13 Low Power	2.9 each channel, 8 amp / group	
14	Output	Channel 14 Low Power	2.9 each channel, 8 amp / group	
15	Output	Channel 15 Low Power	2.9 each channel, 8 amp / group	
16	Output	Channel 16 Low Power	2.9 each channel, 8 amp / group	
17	Output	VREF		
18	Output	Warning Light / Reset	Connect to ground to reset	
19	Input	Switch 1	Must switch +12 Volts to activate	
20	Input	Switch 2	Must switch to/off ground to activate	
21	Input	Switch 3	Must switch to/off ground to activate	
22	Input	Switch 4	Must switch to/off ground to activate	
23	Input	Switch 5	Must switch to/off ground to activate	
24	Input	Switch 6	Must switch to/off ground to activate	
25	Input	Switch 7	Must switch to/off ground to activate	
26	Input	Switch 8	Must switch to/off ground to activate	
27	Input	Switch 9	Must switch to/off ground to activate	
28	Input	Switch 10	Must switch to/off ground to activate	
29	Input	Switch 11	Must switch to/off ground to activate	
30	GND	GND General	Ground	
31	Comms	CAN H	CAN is NOT terminated	
32	GND	CAN Gnd		
33	Comms	CAN L	CAN is NOT terminated	
34	Comms	USB 5V	Red	USB pin 1
35	Comms	USB dp	Green	USB pin 3
36	Comms	USB dm	White	USB pin 2
37	Comms	USB Gnd	Black	USB pin 4

USB Connector layout:



## 18 Specifications

#### 18.1 Inputs

Number of input switches Number of CAN input channels

18.2 Outputs

All driver stages are thermally protected

#### 18.2.1 High power channels

Number of individual drivers

18

16

3 Amps

8 Amps

32

11 (selectable functions)

*) Please note that the current draw per channel is limited by the connector - not by the driver stages. Each driver stage can handle in excess of 35-65 amps continuously. We have rated the individual channel's current draw in relation to the connector manufacturer's specifications.

Maximum peak current each driver

18.2.2 Low power channels

Number of individual drivers

Maximum continuously current draw per driver Maximum current draw each block of 4 drivers

Maximum peak current per channel

channel Maximum recommended output current

#### 18.3 Temperatures

Maximum operating temperature Typical temperature rise over ambient

#### 18.4 Communication

PC Interface CAN communication

#### 18.5 Power Supply

Supply Voltage

#### 18.6 Dimensions

Length x Width x Height

Weight

35/65 Amps for short periods each

65 Amps for short periods each channel

170 amps continuously > 200 amps peak current

> 100 deg C
 < 5 deg C @ 80 amps; 30 minutes</li>
 < 20 deg C @ 170 amps; 30 minutes</li>

USB 2.0B @ 500Kbit or 1 Mbit/sec (11 bit identifiers) Motorola or Intel format Free definition of identifiers Definition of signed and unsigned bytes Bit wise operator

6.5 to 22 Volt DC

197 x 107 x 46 mm incl. connectors

710 grams