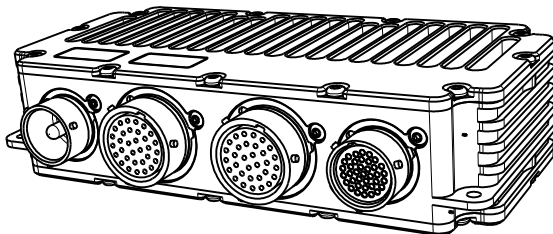# Power Control Module (Hyllus)

Introduction

Hyllus is a Power Control Module which completely replaces the conventional race car power junction box, which is built up of circuit breakers and relays.

The unit simplifies overall wiring harness design and allows changes to circuit capacity without loom or switch box modification, giving improved reliability and functionality compared to normal hardwired power junction boxes.

The unit consists of up to 64 separate output channels. These channels may be used in parallel to supply sufficient current to various loads.

Twenty two switch inputs are provided to enable outputs to be directly controlled from switches or other logic level signals. The mapping of switches to outputs is controlled by software and there are no hardware connections between switches and outputs. Switching can also be done via the CAN bus from ECUs, chassis controllers or devices such as membrane panels.

Connection to the unit is via four AutoSport connectors arranged as one communication and ground, one power in and two power outs.

Output channels

Each output channel is identical (with the exception of the wiper channels) providing a high side protected FET and current measurement.

Protection is provided in three stages:

■ Software over-current detection to mimic the action of a circuit breaker;
■ ProFET Thermal shutdown when junction temperature reaches 175°C;
■ ProFET short circuit protection shuts down output in extreme conditions.

Windscreen wiper motor channels

There are two channels on each output board that are dedicated to driving slow windscreen wiper motors. These channels have an electronic switch to ground to provide braking, and a means to prevent current flowing back from the slow winding during fast running. A single low side protected FET provides the low side switch. As this will only conduct during the slowing of the wiper motor the average power dissipation in this device is insignificant. Software ensures that the both the low and high side switches aren't enabled at the same time.

When the wipers are operating at the fast speed the slow speed motor winding will generate a voltage potential above that of the battery due to the high speed of rotation. It is therefore necessary to prevent current flowing back through the high side switch parasitic diode.

If un-checked this would cause both excessive power dissipation in the switch and cause a breaking effect to the motor preventing full speed operation. Two channels per output connector have this feature.

Power Supply protection

The unit is protected against reverse battery connection and all inputs and outputs are protected against short-circuit to either battery positive or ground.

Load Dump

Due to the inability of alternators to react to rapid changes in current demand, accidental or otherwise, disconnection of the car's battery can result in a large positive voltage transient. The Power Control Module contains a varistor capable of clamping such transients to a level that other systems on the car can be expected to survive.

Communications

CAN: The primary method for in-car communications is using CAN. The interface is provided by the CPUs on the CAN module with a software selectable termination resistor.

RS232: An RS232 port is provided for debug communications, code and setup loading.

USB: A USB connection is included for connection to a PC.

Programmable Current Limits

Each channel or group of channels is able to have a trip limit set via the programming software or sent to it over the CAN bus. Each channel has a corresponding trip time which the current has to exceed before it trips. The tripped channel can be auto-reset or can be rest via an external switch (wire or CAN). The unit has a hardware limit for each channel to protect it from physical damage.

Current Monitoring and Diagnostics

The unit has the ability to monitor the current on all the channels or channel groups to an accuracy of 0.1A.

The monitored currents can then be transmitted on the CAN bus and recorded by the car's data logger or displayed on a dash board. If a channel is tripped this can then be flagged as an alarm on the dash board. The system also has a serial port which allows a further level of diagnostics for engineers.

Dimensions

ASHD214-1PN **Output 1 AS218-32SA** **Output 2 AS218-32SN** **Control AS214-35SN**
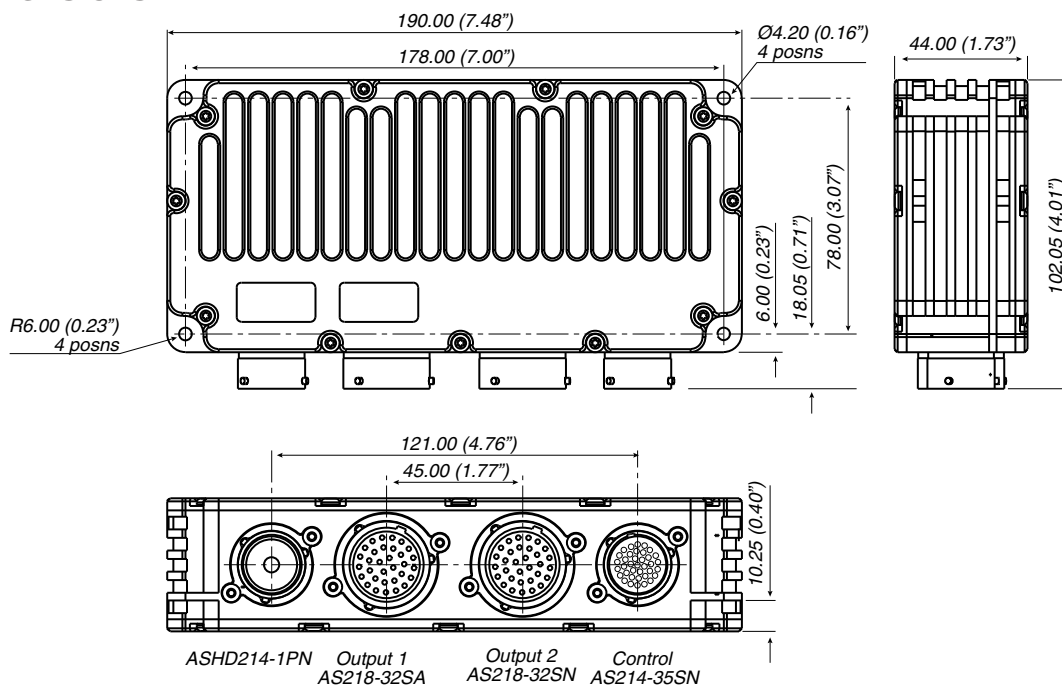
Dimensions in millimetres and (inches)

Specifications

Description	Value
Supply voltage	12V nominal system
Operating temperature range	−25°C to +75°C
Weight	750 grams
Environmental	IP67
Output channels	
Continuous output current	7.5A max.
Current measurement	0A to 20A
Hardware current limit (for instantaneous current limit)	45A to 110A
Load inductance	8mH at max. load of 7.5A
Windscreen wiper channels	
Continuous output current (source)	7.5A max.
Continuous output current (sink)	3A max.
Current measurement	0A to 20A
Hardware current limit (sink)	12A to 24A (typically 18A)
Load dump clamping	40V at 20A 50 Joules max.

Description	Value
Maximum box load	125A continuous current (no time limit) 150A for 3 hour max. duration 200A for 2 minutes

Ordering information

Product	Part number
Hyllus Kit	30A-610020
Hyllus Kit comprises:	
Power Control Module (Hyllus)	01A-610000
Anti Vibration Mounting Kit 4xM/F	13A-610021
Cap MIL AS9-14 A/Sport (Qty 2)	09C-94ZZ
Cap MIL AS9-18 A/Sport (Qty 2)	09C-96ZZ
Power Control Module (Hyllus) Product Information Sheet	29A-071580

Connector information

Connector J1 – Power In Single pin heavy duty: ASHD2-14-1PN

Connector J2 – Output 1: AS2-18-32SA

Pin	Function	Comment	Pin	Function	Comment
A	OUT 11	HSD	T	OUT 12	HSD
B	OUT 2	HSD	U	OUT 13	HSD
C	OUT 1	HSD	V	OUT 6	HSD
D	OUT 3	HSD	W	OUT 5	HSD
E	OUT 4	HSD	X	OUT 8	HSD
F	OUT 18	HSD with Reverse Protection	Y	OUT 22	HSD
G	OUT 17	HSD With Reverse Protection + LSD	Z	OUT 21	HSD
H	OUT 19	HSD	a	OUT 24	HSD
J	OUT 20	HSD	b	OUT 29	HSD
K	OUT 25	HSD	c	OUT 31	HSD
L	OUT 26	HSD	d	OUT 14	HSD
M	OUT 27	HSD	e	OUT 16	HSD
N	OUT 28	HSD	f	OUT 15	HSD
P	OUT 32	HSD	g	OUT 7	HSD
R	OUT 10	HSD	h	OUT 23	HSD
S	OUT 9	HSD	j	OUT 30	HSD

Connector J3 – Output 2: AS2-18-32SN

Pin	Function	Comment	Pin	Function	Comment
A	OUT 46	HSD	T	OUT 41	HSD
B	OUT 39	HSD	U	OUT 44	HSD
C	OUT 37	HSD	V	OUT 40	HSD
D	OUT 36	HSD	W	OUT 34	HSD
E	OUT 35	HSD	X	OUT 33	HSD
F	OUT 51	HSD	Y	OUT 55	HSD
G	OUT 49	HSD	Z	OUT 56	HSD
H	OUT 52	HSD	a	OUT 53	HSD
J	OUT 50	HSD	b	OUT 63	HSD
K	OUT 59	HSD	c	OUT 64	HSD
L	OUT 60	HSD	d	OUT 45	HSD
M	OUT 58	HSD	e	OUT 42	HSD
N	OUT 57	HSD	f	OUT 43	HSD
P	OUT 61	HSD	g	OUT 38	HSD
R	OUT 47	HSD with Reverse Protection	h	OUT 54	HSD
S	OUT 48	HSD with Reverse Protection + LSD	j	OUT 62	HSD

Connector J4 – Control: AS2-14-35SN

Pin	Function	Comment	Pin	Function	Comment
1	Switch 16	Switch to GND	20	VBATT	Fused VBATT
2	VBATT	Fused VBATT	21	CAN-H	CAN Bus High
3	RS232TX	Debug Tx to PC	22	GND	Ground
4	RS232RX	Debug Rx from PC	23	USB-VBUS	USB Supply (detect USB Bus)
5	CAN-L	CAN Bus Low	24	GND	Ground
6	GND	Ground	25	Switch 14	Switch to GND
7	USB-D-	USB Data +ve	26	Switch 12	Switch to GND
8	USB-D+	USB Data -ve	27	Switch 10	Switch to GND
9	GND	Ground	28	Switch 4	Switch to GND / VBATT
10	Switch 22	Switch to GND	29	Switch 2	Switch to GND / VBATT
11	Switch 15	Switch to GND	30	Switch 6	Switch to GND / VBATT
12	Switch 13	Switch to GND	31	Switch 18	Switch to GND
13	Switch 11	Switch to GND	32	GND	Ground
14	Switch 9	Switch to GND	33	GND	Ground
15	Switch 3	Switch to GND / VBATT	34	Switch 21	Switch to GND
16	Switch 1	Switch to GND / VBATT	35	Switch 20	Switch to GND
17	Switch 7	Switch to GND / VBATT	36	Switch 8	Switch to GND / VBATT
18	Switch 5	Switch to GND / VBATT	37	Switch 19	Switch to GND
19	Switch 17	Switch to GND			

Declaration of Conformity

We, the undersigned,

Pi Research
Brookfield Motorsports Centre,
Cottenham,
Cambridgeshire, CB4 8PS
United Kingdom

Certify and declare under our sole responsibility that the following equipment:

Hyllus – part number 01A-610000

A power control module for use only in motorsport applications

Conforms to the following EC directives including applicable amendments:

EMC Directive 89/336/EEC, 72/245/EEC (last amended 2004/104/EC)

The following standards have been applied:

2004/104/EC

Cottenham, 15 October 2007