



# ETCS Module

## Ultracapacitor Buffer Module

- Innovative in energy storage & Power Electronics
- Custom-made solutions
- Complete solution: storage & Power Electronics
- Design and system integration

### Features

- Integrated DC/DC converter
- Integrated cell balancing
- Long life cycle and life time
- Maintenance free
- High efficiency
- Compact, rugged, fully enclosed and IP54 design
- Certified tests for rolling stock
- Lloyd's approval

### Applications

- Board-net stabilization for diesel locomotives with ETCS-system



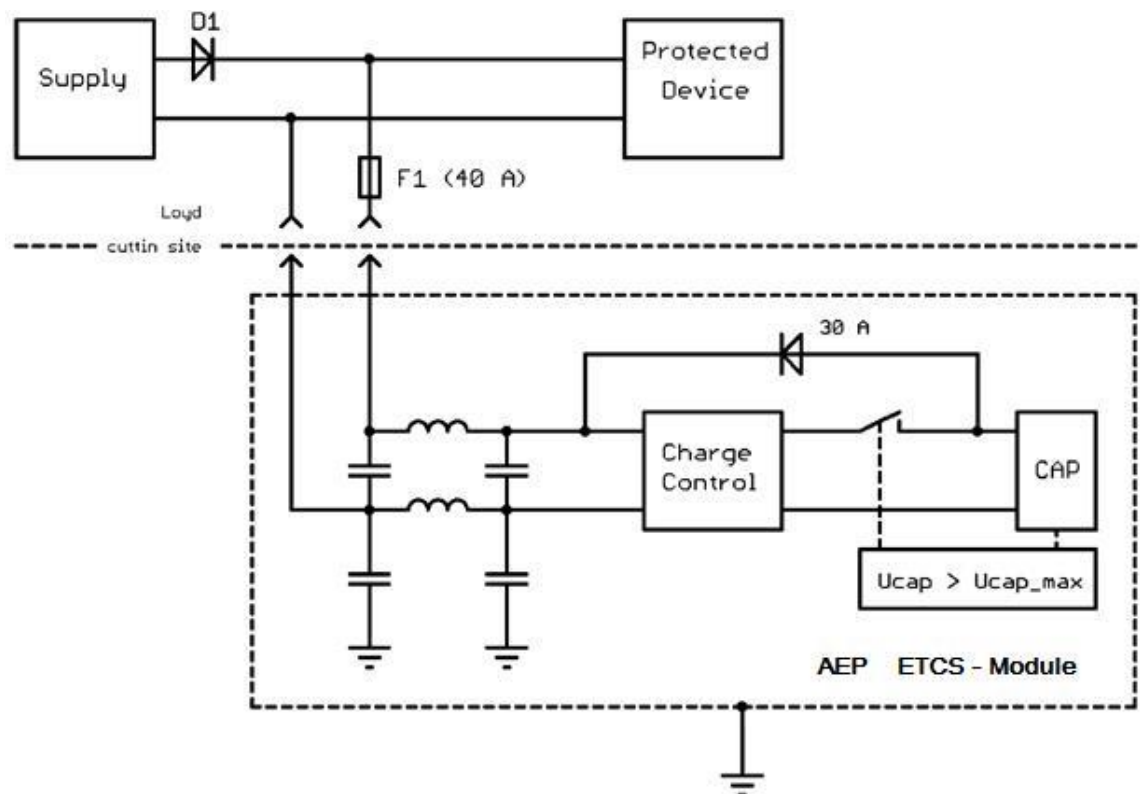
### Mechanical Data

Length x Width x Height  
390 x 280 x 142,5 mm  
Approx. 7 kg

[aephybridpower.com](http://aephybridpower.com)  
[sales@aephybridpower.com](mailto:sales@aephybridpower.com)  
+31 (0)78 692 2100

## System overview

The start-up of the train's engine creates a voltage drop in the electrical circuits. Safety circuit can be interrupted. The power supply of the protected devices will be supported by ultracapacitors during the start-up.



## Certified Tests

Description / Conditions	
IEC 60077-2	Electronic equipment for rolling stock
DIN EN 50124-1	Insulation coordination
DIN EN 50 121-3-2:2006	Electromagnetic compatibility
DIN EN 50155	Electronic equipment for rolling stock



## Electrical Specifications

Symbol	Parameter	Description	Value	Unit
	System requirements	Safety circuit		
$U_{L\_min}$	Minimal operating voltage		32	V
$t$	Bridging time		10	s
$E$	Required energy		10000	J
$I_{L\_max}$	Maximum load current		31,25	A
	Charge control			
$U_{s\_min}$	Minimal input voltage	By lower voltage, the caps will not be charged	58	V
$U_{s\_max}$	Maximum input voltage		90	V
$U_{A\_min}$	Minimal output voltage		54	V
$U_{A\_max}$	Maximum output voltage		55	V
$I$	Rated load current	+75 / -0%	12	A
$I_{N\_max}$	Maximum charge current	Typical 13A	20	A
$t$	Charge time $0V \Rightarrow U_{A\_max}$	$\pm 30\%$	66,8	s
	Caps			
$N$	Number of caps		24	-
$U_{cap\_re}$	Rated cap voltage		2,29	V
$U_{cap\_max}$	Maximum cap voltage		2,8	V
$C_{re}$	Rated cap capacity		350	F
$C$	Rated system capacity		14,6	F
$C_{min}$	Minimal system capacity		11,7	F
	Tolerance capacity		-0 / +20	%
	Energy balance			
$E_s$	Stored energy		22080	J
	Environment			
IP	Dripping water protection		IP54	
$T_{min}$	Minimal ambient temperature		-20	°C
$T_{max}$	Maximum ambient temperature		50	°C
$T_L$	Maximum storage temperature		70	°C

## Mechanical Data

Parameter	Value	Unit
Weight	Ca. 7	Kg
Width ground plate	280	mm
Length ground plate	390	mm
Height ground plate	10	mm
Width box	252	mm
Length box	345	mm
Total height	142,5	mm

