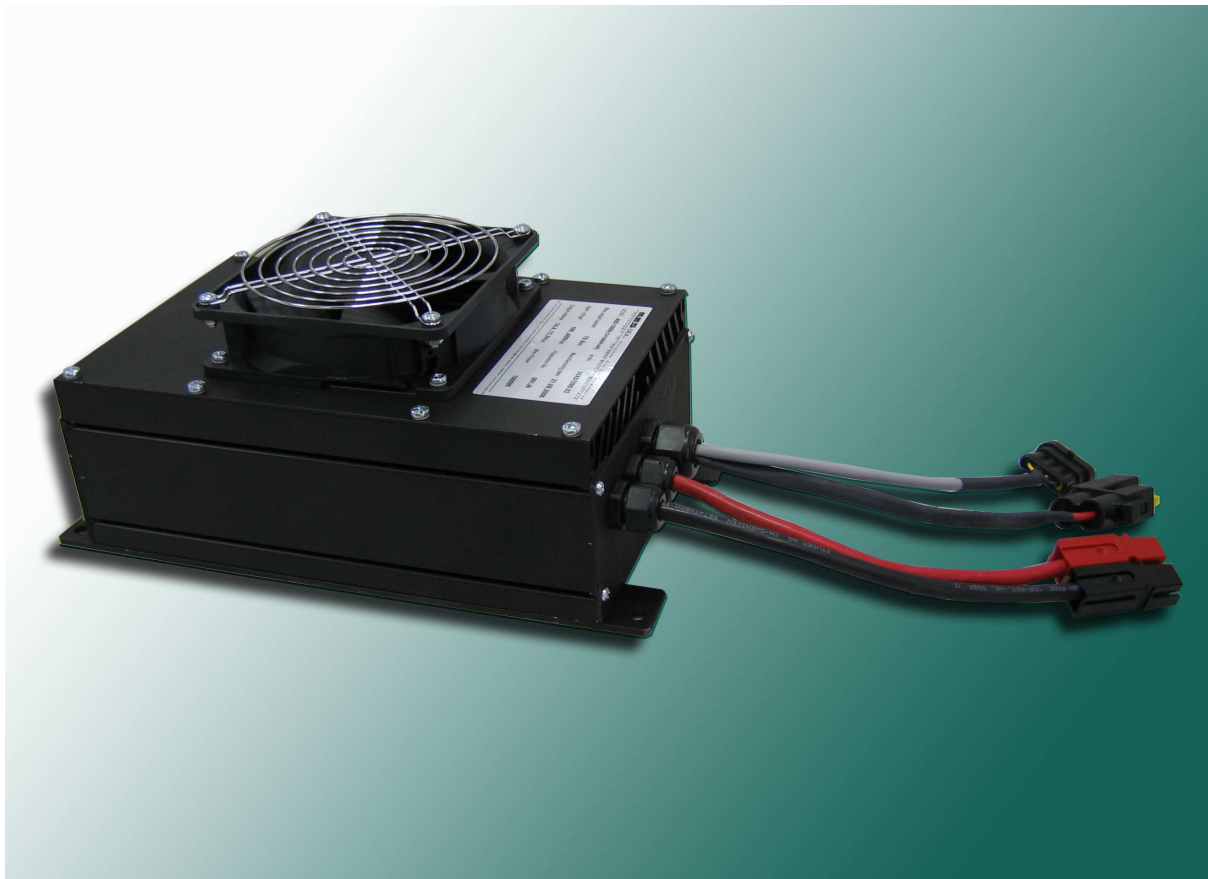


**DC – DC CONVERTER
1000W
100 - 400V_{DC} Input / 12V_{DC} Output
air cooling**

Code prod. : 30x57090.02

Sept, 29th 2006



MES DEA s.a. - Service -

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Change record:

Changes to the document:

Version	Date	Chapter	Description	Name	Signature
1.0	22-09-2003	All	Preliminary		P.M.
1.0rev		All	Preliminary		P.M.
1.2	11-03-2005	All	General review	DC1/12/100-400a	P.M.
1.3	29-09-2006	All	General review	DC1/12/100-400a	P.M.



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1 Introduction:

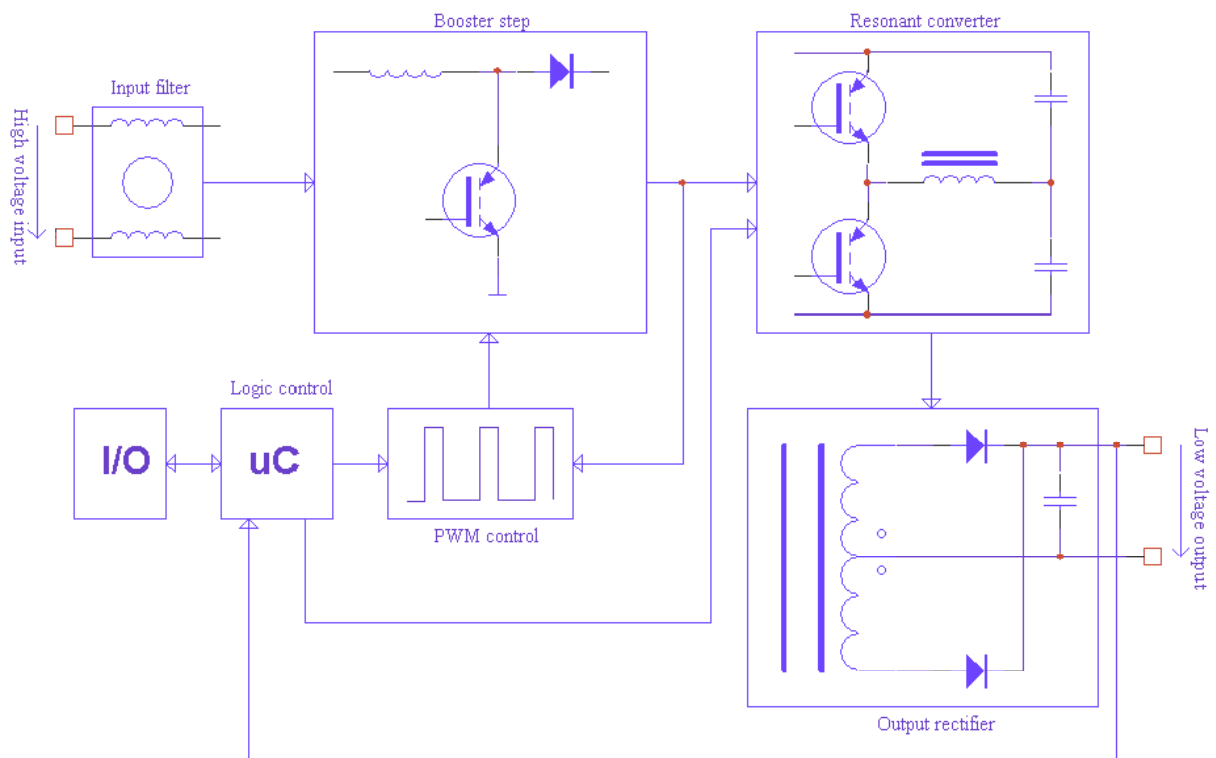
Electric vehicles normally use low voltage service batteries (12, 24, 48VDC) to supply the board instrumentations. The easier system to charge and aid the board battery is to connect in parallel a power supply with an appropriate output voltage. The biggest power source on the electric vehicles are normally the traction batteries with an higher voltage, so we have to reduce the higher DC voltage to a lower one. This is the MES-DEA DC/DC converter object.

This product has a good power output and a large input voltage range and it's proper for electric cars or medium size vehicles. The output voltage is set to charge 12V batteries. The circuit design gives an high efficiency (higher than 90%) and a logical control ensures a safety use. This control checks the input voltage, the output current and the temperature to protect the converter; a short circuit protection is also implemented on the control card.

The converter has an input enable to turn it on and off when desired and an output fault control. The input enable, the output fault, the high voltage input and the low voltage output have a galvanic insulation.

Converter block diagram:

The following draw shows the converter electrical blocks.



2 Technical ratings:

Warning!

Hazardous voltages are accessible on the printed circuit boards. In case of damages or technical operations, please disconnect the DC-DC and call MES-DEA. DON'T OPEN THE COVER, only authorized personnel can operate on the converter.

Parts	1000W converter
Working input voltage range	From 100VDC to 400 VDC *1
Min. input voltage for full power output	190V *1
Output voltage (with 50Ω charge)	14.5VDC
Output voltage (full power)@ $U_{in}>190VDC$	~13.3VDC
Max. rms DC input current	6A
Max. continuous DC output current	70A *2
Inrush current	100A @ $U_{in}=400V$; 40A @ $U_{in}=200V$
U_{OUT} ripple rms @ 70A _{Output current} (resistive load)	640mV rms
Internal input fuses	1x16A FF / 600V
External output fuses	80A FF for semiconductor protection *3
Output impedance (off-mode)	>500kΩ
Control interface	Enable control input, Fault control out
Reverse polarity protection	No
Cooling system	Fan-Air cooling
Over-temperature protection	Yes *4
Efficiency @ full power	>90%
Possible parallel connection only if specified on order	Maximally 2 DC/DC elements
Electrical insulation guaranteed	See point *5
Connectors kit included	
Weight	4kg
Max. encumbrance (l x w x h) [mm]	294x155x137

Notes:

- *1: the converter can supply full-power with an input voltage above 190VDC; if the input voltage goes under 190VDC, the converter can supply a limited power and the output voltage decreases (due to internal input impedance). If the input voltage rises above 400VDC or descends under 100Vdc the converter turns itself off, when the input voltage will return in the admit window it tries to restart after few seconds.
- With an external 50Ω output load, the output voltage is adjusted to 14.5V; when the input voltage at full power is above 190V, the output voltage normally decreases at ~13.3V.

- *2: the converter could sink an over-current from 70A to 75A for 60 sec (in these cases the signal output blinks) or an over-current peak > 75A for 200msec, after these time conditions it turns itself off 5 sec. Then, it tries to restart a second time. If the overcharge persists, it turns itself off (5 sec) again and it continues periodically to do this procedure; in this situation it's possible to reset the converter by switching OFF and ON the ENABLE signal.
If an output short-circuit happens, the converter turns itself off 1 min and then it tries to restart again until the ENABLE signal is ON. During the 1 min off-time the FAULT output is active; it's possible to reset the converter by taking off the high voltage input.
- *3: **External fuses must be mounted 1.5m maximum far away from the converter, to protect it and the board battery against short circuits! (we recommend a "80A semiconductor fuse" for each DC/DC output). Not respecting these indications, a fire is possible.**
- *4: The FAN is electronically controlled, the internal logic turns it on and off when necessary (with signal ENABLE ON).
An over-temperature condition turns the converter off. It will restart when the temperature will become again between the internal threshold. **For a good operation, the ambient temperature must not exceed 50°C and it needs ~30mm air distance over the fan and enough space around to clear out hot air from the radiator. In these conditions the converter can work continually.**
- *5: The converter passes an electrical insulation test and the following condition are guaranteed:
test between HV_input and chassis: $I_{\text{test measured}} < 10\text{mA} @ U_{\text{test}} = 2100\text{V}_{\text{rms}}$
test between LV_output and chassis: $I_{\text{test measured}} < 10\text{mA} @ U_{\text{test}} = 500\text{V}_{\text{rms}}$
test between HV_input and LV_output: $I_{\text{test measured}} < 10\text{mA} @ U_{\text{test}} = 2100\text{V}_{\text{rms}}$
- *6: The power output becomes active 1sec after the ENABLE presence.

Warranty:

This product has **2 year-old warranty**. In case of special contracts the warranty duration can be modified.

3 Connections and installation notes:

Warning: please disconnect high voltage sources before connecting the converter and watch out to the cables polarity, a reversal connection can break some internal parts.

The following table shows the cables reference.

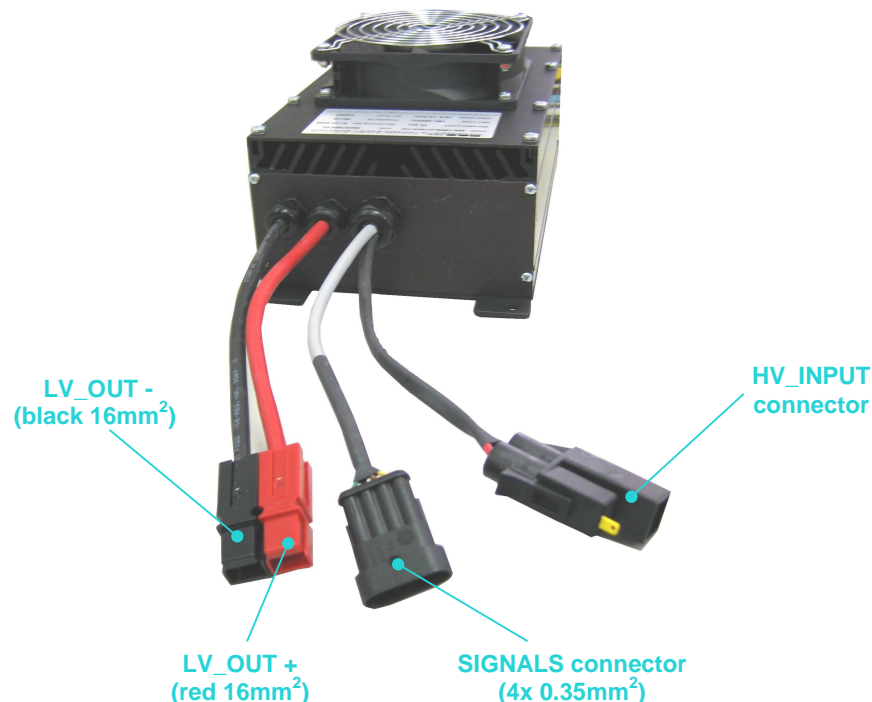
Connection	Color	Connector type (user side)	Section
HV_INPUT +	RED	Housing: FCI type DCSHHPE02BKSV contact male: 60170261 female: 60070261 cable insulation type: 024995A	2x2.5mm ²
HV_INPUT -	BLACK		
LV_OUTPUT+	RED	ANDERSON 5916 G7 PP75, contact: 5900-BK PP75	16mm ²
LV_OUTPUT -	BLACK	ANDERSON 5916 G4 PP75, contact: 5900-BK PP75	16mm ²
Enable+ pin2	BROWN	SIGNAL CONNECTOR: Housing: TYCO electronics superseal 1.5, 282088-1 contact type: 183025-1 cable insulation type: 281934-2	4x0.35mm ²
Enable- pin1	YELLOW		
Fault collector pin4	GREEN		
Fault emitter pin3	WHITE		

The connectors ensure a good electrical and mechanical contact to prevent overheating or electrical arcs.

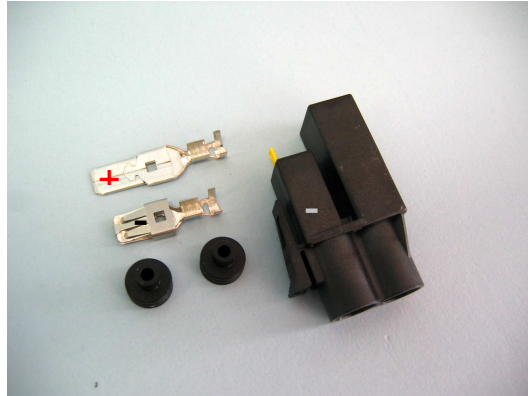
Power Cables should be short and with a suitable section to minimize voltage drop and resistive heating. **+12Voutput** and **0Voutput** should be nearby wired along the same path to minimize emissions.

The converter has an high output standby resistance (>500kΩ) so it can be always directly connected to the low voltage battery, without risk to discharge it.

The following picture shows the I/O connections:



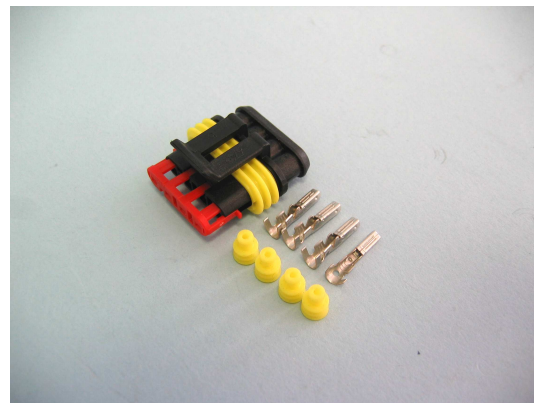
User side connectors parts:



High Voltage input connector housing with male, female contact and cable insulation. We advise to use a 2.5mm² cable and an appropriate crimping tool.



Low Voltage output connector housing and 16mm² contact. We recommend to use a 16mm² cable and an appropriate crimping tool.



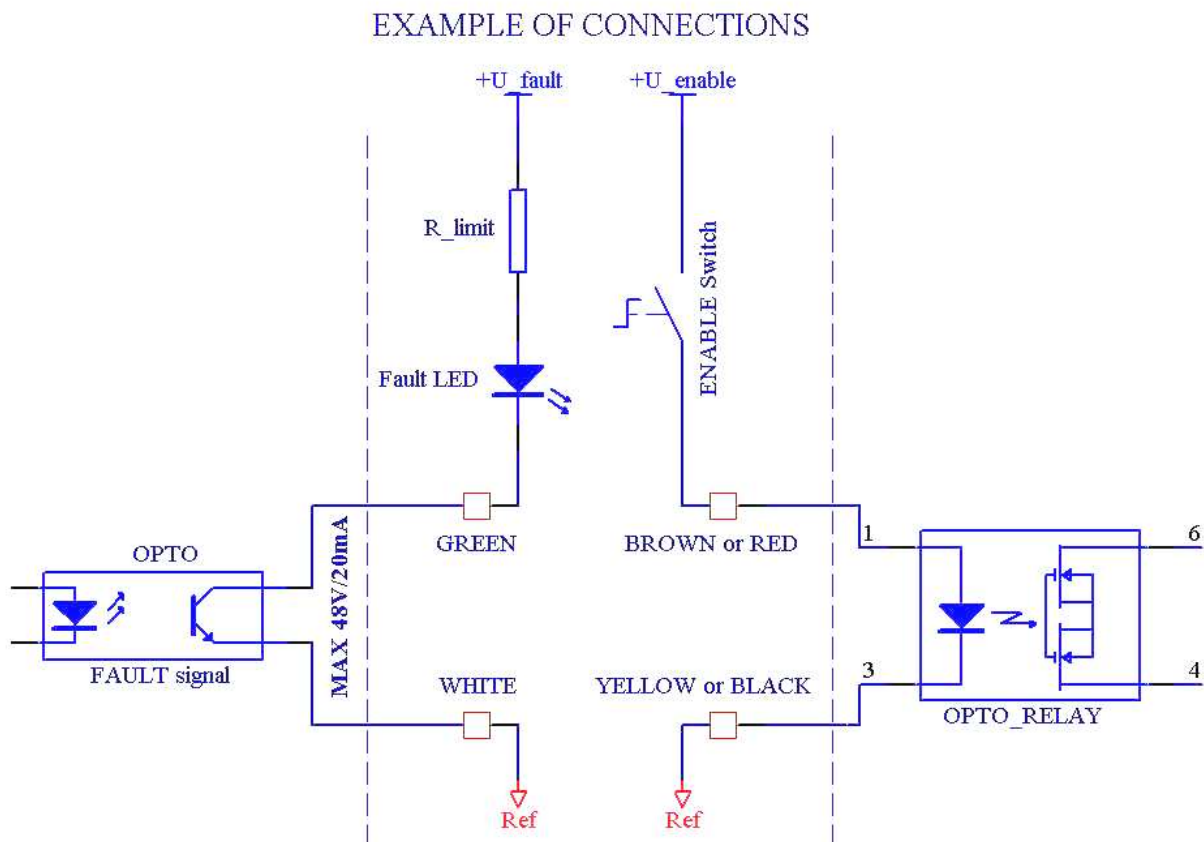
Signals connectors housing with female contacts and cable insulation. It needs a 0.3-0.5mm² section cables. Crimping tool: please contact TYCO Electronics.

PIN number	1	2	3	4
Description	Enable-	Enable+	Fault emitter	Fault collector
Color reference	yellow	brown	white	green

Enable signal and fault notes:

- The ENABLE SIGNAL level (high active input), must be between 8V_{DC} and 30V_{DC}; it's possible to apply the enable signal directly to the signals connector on pin2 (enable+) and pin3 (enable-). The maximum enable current @ 30V is 9mA. The input is insulated in comparison to others electrical potentials.
- The FAULT output has an "open collector" configuration. In right condition, the output has an high impedance state. If a fault happens, the open collector output changes (view page 5- 6) and goes in saturation state. The maximum rating values are: $U_{\text{fault,max}} = 48V_{\text{DC}}$ $I_{\text{fault,max}} = 20\text{mA}$.

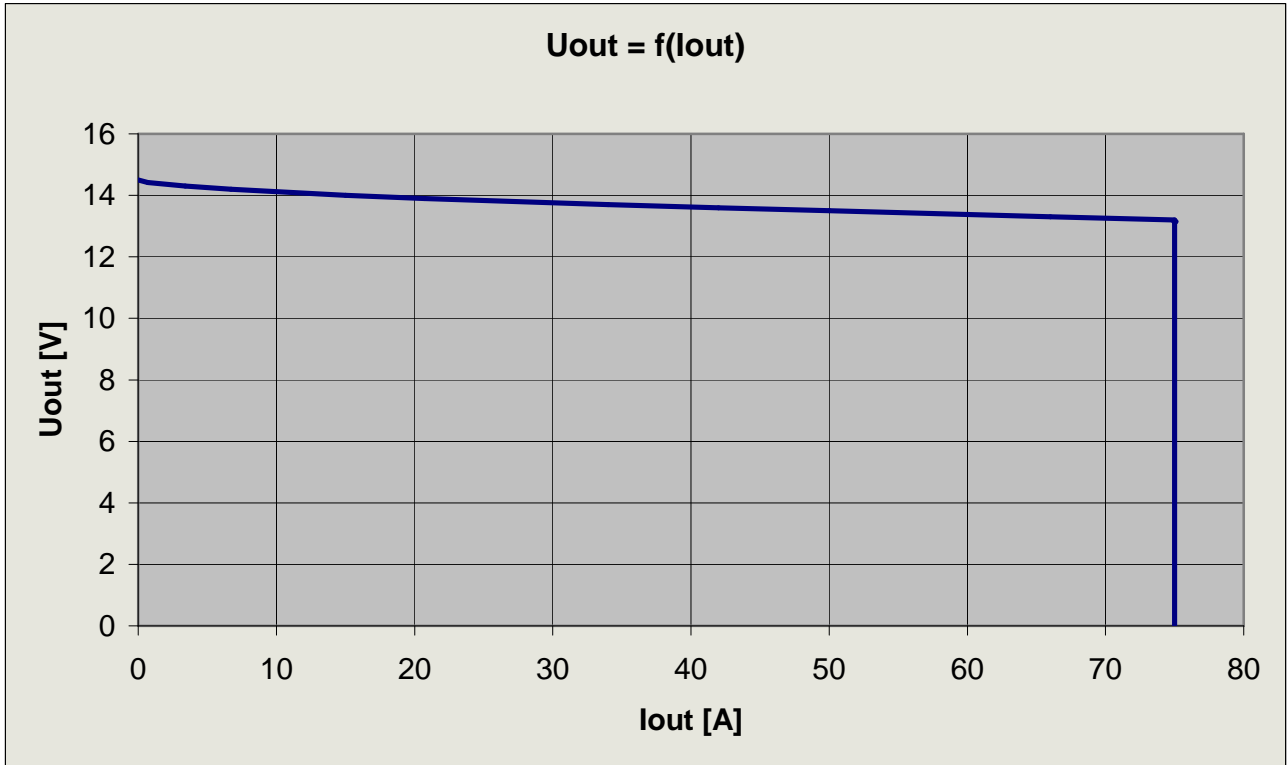
The draw above shows a signals connection example.

**Mounting notes:**

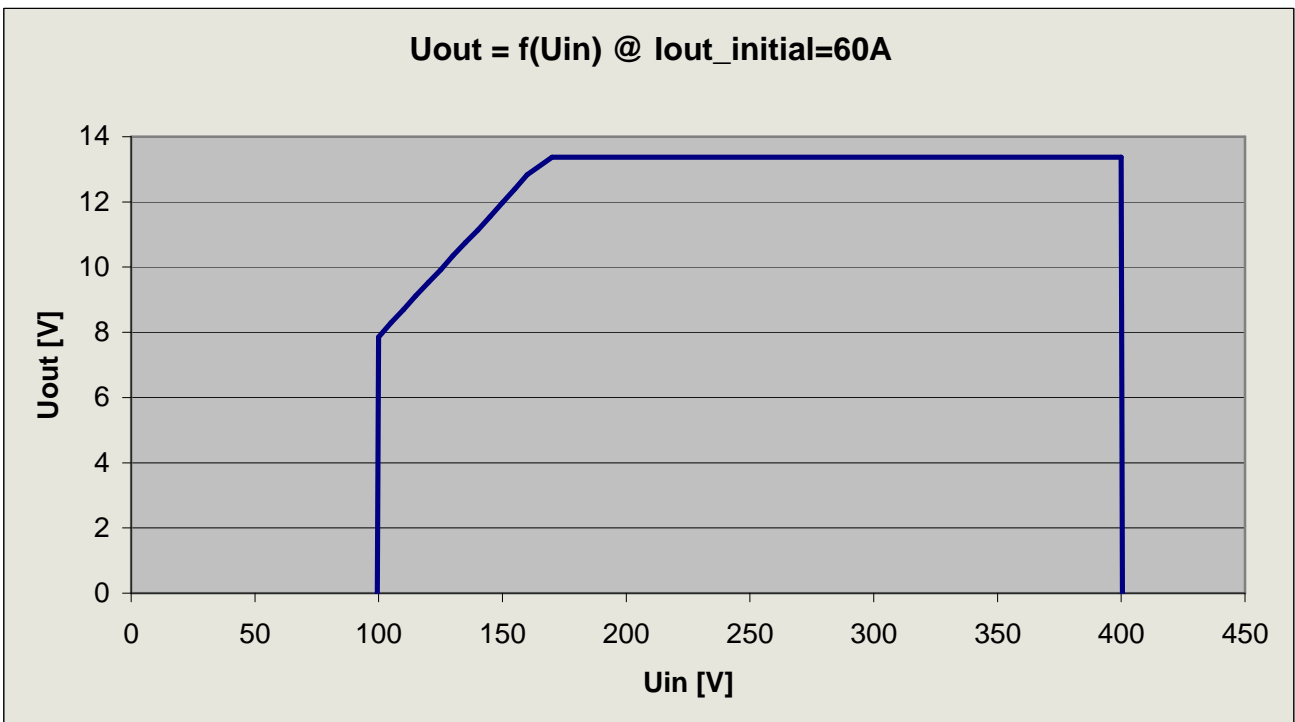
- The converter must be mounted far of water sources.
- The ambient temperature does not exceed 50°C.
- **WARNING**, fixing screws must not penetrate the box, please use the special eyelets to fix the converter (hole dimension for screws M6).

4 Characteristics and diagrams:

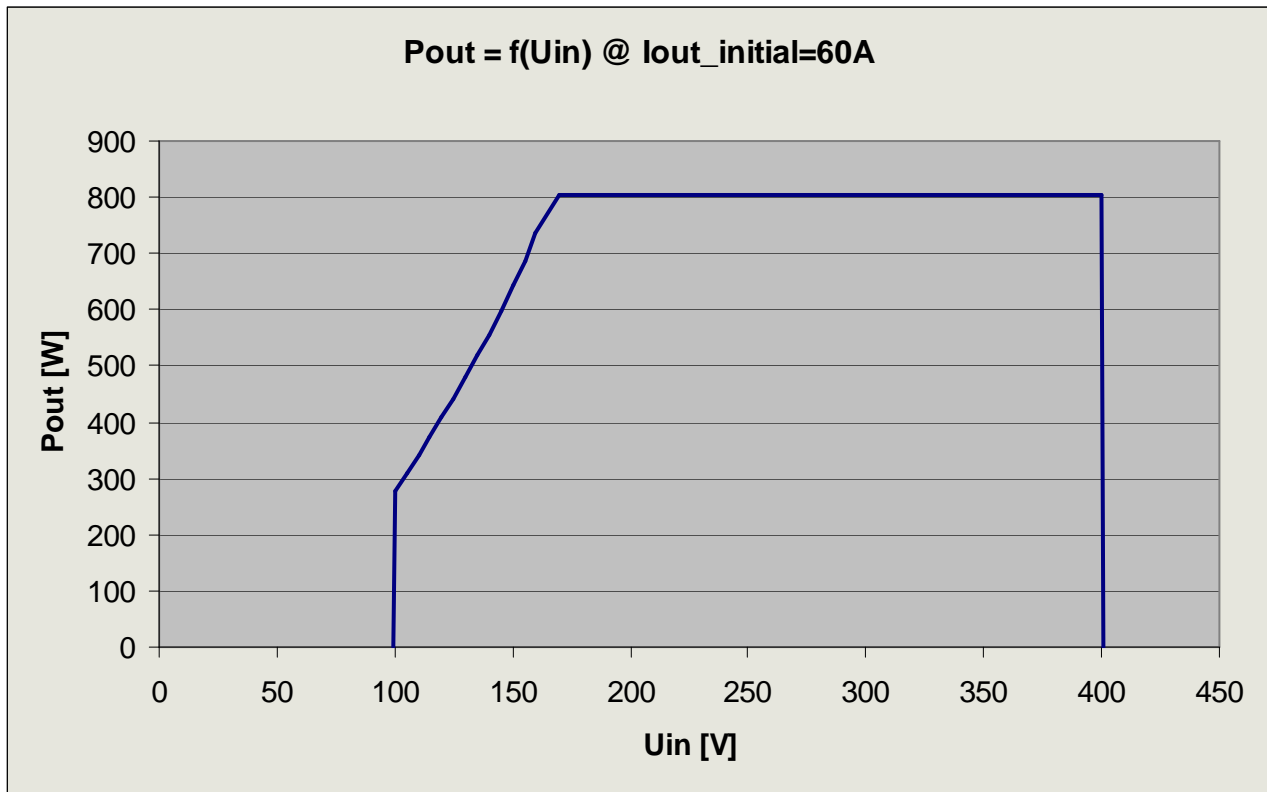
The following diagrams describe the single module converter characteristics.



Output linearity

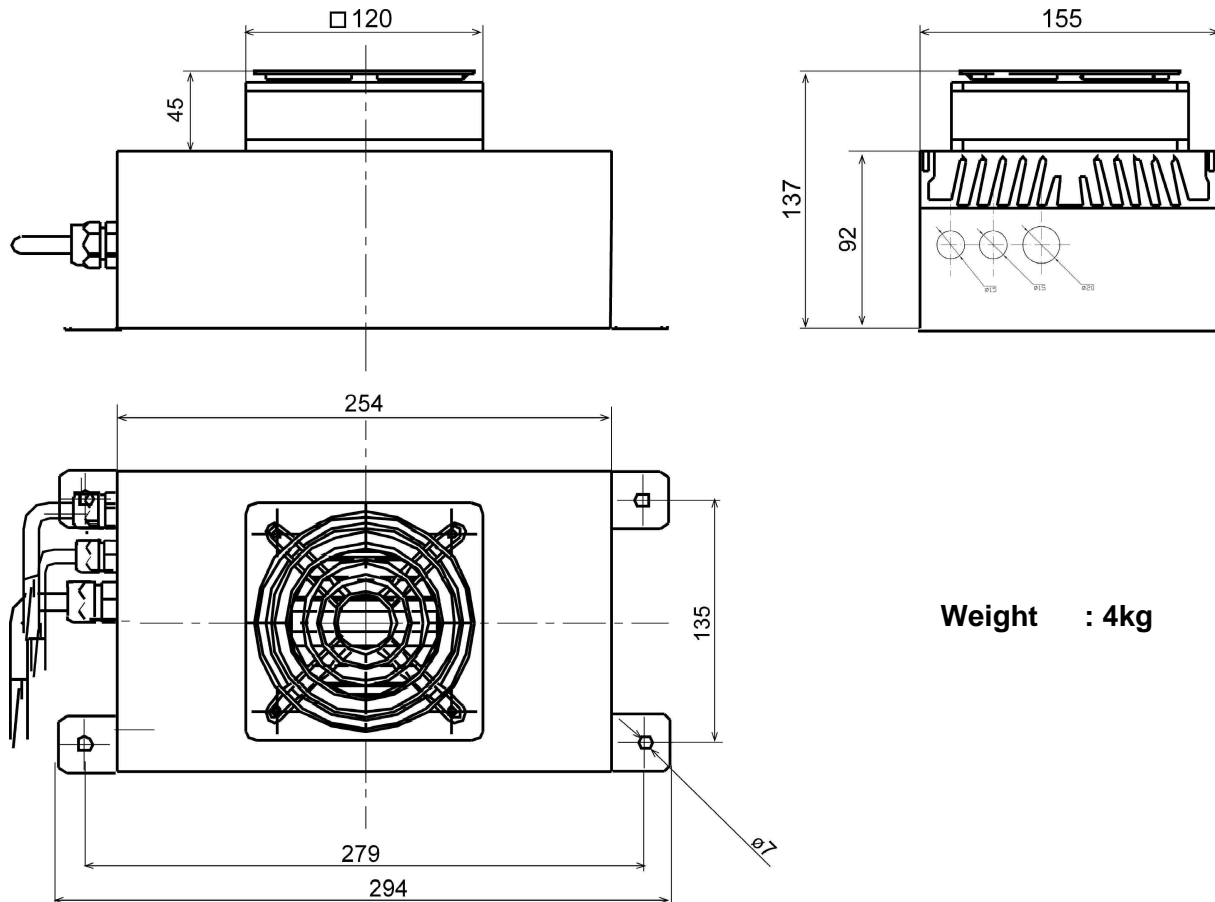


Characteristic with 60A output load



Characteristic with 60A output load

5 Mechanical drawings:



DC/DC 1kW air cooling (external encumbrance)

6 Purchasing order information:

Please indicate the following order code:

MES-DEA cod: 30x57090.02 type: DCDC-1K/12/100-400/A

Normally the converter is delivery with all the connectors parts mounted and a mounting kit for the vehicle side.

If necessary, please specify if you don't want them on order or contact us.

For other information, please contact MES-DEA.

7 Maintenance and services:

The DC/DC converter does not require regular maintenance.
In case of fault, it's highly recommended to send the damaged unit together with a fault description and operating conditions to:

MES-DEA S.A.
attn. **M. Pauletto**
Via Laveggio, 15
CH – 6855 Stabio (TI)
Switzerland
Tel. +41 91 641 53 08
Fax +41 91 641 53 33
eMail vel@mes.ch