Technical Data Sheet

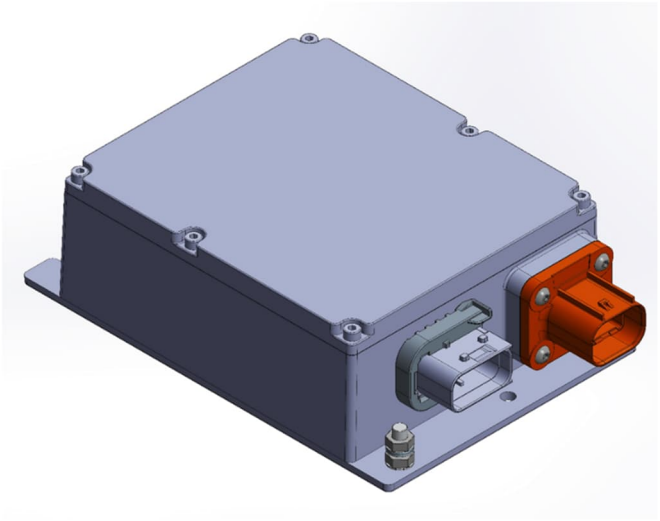
RMOD400-HV-UW / E-Mobility

400W / Ultra-Wide Range

RECOM
DC/DC Converter

FEATURES

- Converter with I/O isolation
- High Input Voltage Range
- 400W rated power
- Parallel Operation without Active Current Sharing
- 200mm x 136.7mm x 64mm compact size
- Base-plate cooling
- IP69K protection



Dimensions 200.0 x 136.7 x 64.0 mm (7.87 x 5.38 x 2.52inch)

APPLICATION



SAFETY & EMC

CE

RoHS² compliant 10 from 10

Reach compliant

- The product follows LVD Directive 2014/35/EU and EMC Directive 2014/30/EU.
- The product is CE compliant. EMC radiation must be evaluated and tested in the complete system since mounting and wiring have a large influence on radiation behaviour.

DESCRIPTION

The RMOD400-HV-UW Series is a high-performance DC/DC converter designed for e-mobility, material handling, and automotive applications. It features robust I/O isolation and supports a wide input voltage range, making it suitable for demanding environments. With a rated power of 400W, this converter enables parallel operation without the need for active current sharing, allowing for scalable power solutions. Its compact dimension facilitate integration into space-constrained systems. The unit operates reliably across a broad temperature range from -40°C to +85°C and supports base-plate cooling for efficient thermal management. Additionally, the RMOD400-HV-UW offers IP6K9K protection, ensuring resistance to dust and high-pressure water ingress, ideal for harsh and challenging environments.

MODELS

Part Number	Input Voltage nom. [VDC]	Input Current Max. [A]	Output Voltage nom. [VDC]	Output Current Max. [A]	Output Power Max [W]
RMOD400-HV-800-14-UW	800	1.5	14	28.5	400
RMOD400-HV-800-28-UW		1.5	28	14.3	
RMOD400-HV-800-48-UW		1.5	48	8.3	

RMOD400-HV-800- -UW

- Series Type
- Nominal Output Power
- Nominal Output Voltage
- Input Voltage

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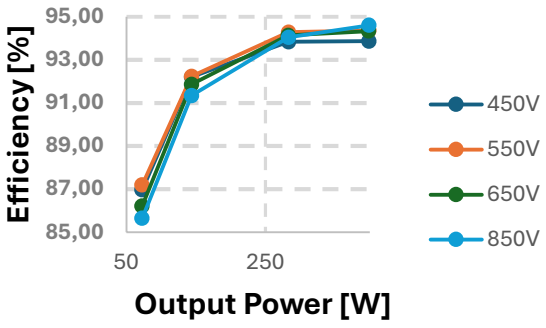
RECOM
DC/DC Converter

BASIC CHARACTERISTICS

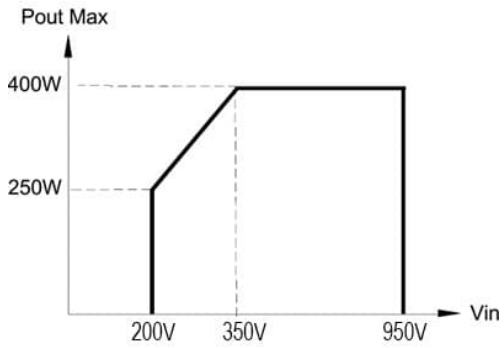
Parameter	Conditions		Min.	Typ.	Max.
INPUT					
Rated Input Voltage				800VDC	
Input Voltage Range			200VDC[1]		950VDC
Efficiency	RMOD400-HV-800-14-UW			TBD	
	RMOD400-HV-800-28-UW - RMOD400-HV-800-48-UW			93.5%	
Inrush Current	Passive Inrush limitation at 950VDC			95A	
OUTPUT					
Rated Output Voltage	RMOD400-HV-800-14-UW @Full Load			14VDC	
	RMOD400-HV-800-28-UW @Full Load			28VDC	
	RMOD400-HV-800-48-UW @Full Load			48VDC	
Output Current	RMOD400-HV-800-14-UW, Vin≥350V				28.5A
	RMOD400-HV-800-28-UW, Vin≥350V				14.3A
	RMOD400-HV-800-48-UW, Vin≥350V				8.3A
Minimum Output Current			0A		
Output Ripple & Noise	Noise BW 20 MHz, with respect output voltage				1% pk-pk
Remote Control ON/OFF	DC/DC Turns on when a Voltage Is Applied on the Inhibit Signal Otherwise Remains OFF		5VDC	24VDC	32VDC
Power Good Signal	Open Collector Pin Active LOW Suitable for an External Pull-Up Resistor				200µA
Power Good Signal Threshold	Positive going threshold	RMOD400-HV-800-14-UW		11VDC	
		RMOD400-HV-800-28-UW		22VDC	
		RMOD400-HV-800-48-UW		38VDC	
	Negative going threshold	RMOD400-HV-800-14-UW		7VDC	
		RMOD400-HV-800-28-UW		17VDC	
		RMOD400-HV-800-48-UW		28VDC	
Output Accuracy	Full Load		-2%		+2%
Line Regulation			-1%		+1%
Load Regulation	Output voltage increases at no load			-5%	
Transient Response	10% - 90% load				10%
	Recovery Time				10ms
Apparition Time	Vin=200V				1s

Note 1: Start-up Voltage= 200VDC; unit shutdown below 180Vac (Undervoltage Lockout)

EFFICIENCY VS OUTPUT POWER (Tamb=25°C)

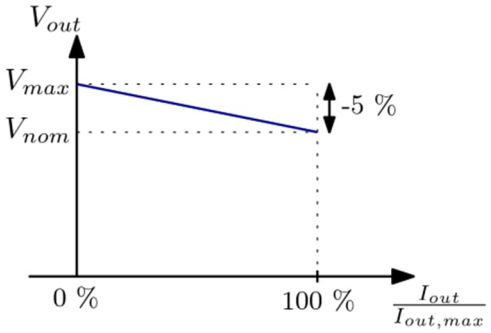


POWER DERATING



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OUTPUT VOLTAGE REGULATION vs CURRENT



ENVIRONMENTAL CONDITIONS

Parameter	Conditions	Min.	Typ.	Max.
Operating Ambient Temperature Range	Base-Plate Temperature Not Exceeding the Max Value	-40°C		+85°C
Base-Plate Temperature	Full Power			+70°C
Cooling	Base Plate			
Storage Temperature Range		-40°C		+85°C
Operating Altitude			2000m	
IP Rating	With mating connector		IP6K9K	
Pollution Degree	Outdoor device		PD4	
Bump	Half Sinusoidal, Exposure Levels 10g, Duration 16ms, 1000 /axis		EN 60068-2-27 (Eb)	
Shock	Half Sinusoidal, Exposure Levels 30g, Duration 11ms, 3 / axis		EN 60068-2-27 (Ea)	
Vibration Sinusoidal	Frequency 5-150Hz, Constant Displacement, 0.4mm, 5Hz – 57Hz Constant Acceleration, 2.5g, 57Hz – 150Hz		EN 60068-2-6 (Fc)	
Damp Heat	Cyclic: Air Temperature 55°C No. of Cycles 2 Test of Cycle Db Variant 1		EN 60068-2-30 (Db)	
Salt Mist	Air temperature 35°C Duration 96h Concentration 5%		EN 60068-2-11 (Ka)	
Low Temperature storage	Temperature: -40°C, Stabilization Time 16h		EN 60068-2-1 (Ab)	

SAFETY AND PROTECTIVE FUNCTIONS

Parameter	Conditions		Min.	Typ.	Max.
Class of Equipment	Connection point to mechanical chassis provided			Not Classified	
Dielectrics withstand voltage 10s EN62477-1	Input vs Output + Chassis			1500 VAC	
	Output – Chassis			600 VDC	
Isolation Resistance	Input vs Output + Chassis at 1000VDC		300MΩ		
	Output vs Input + Chassis at 500VDC		300MΩ		
Isolation Grade	Input – Output			Reinforced	
	Input – Chassis			Basic [3]	
	Output – Chassis			Basic	
HVIL Function	Passive High Voltage Interlock, Safety Feature for Low-Voltage Loop			Present, see pinout	
Internal Input Fuse				None [2]	
Short Circuit Protection (SCP)	Short Circuit Latch Off the Output Voltage. Latch Condition can be Cleared by Inhibit Signal or Input voltage reset				
Input Reverse Polarity Protection	Nondestructive			Protected	
Overvoltage Protection (OVP)	Latch Off the Output Voltage, Vin Shutdown is Necessary to Reset the Latch	RMOD400-HV-800-14-UW			18.0VDC
		RMOD400-HV-800-28-UW			36.4VDC
		RMOD400-HV-800-48-UW			62.4VDC
Overcurrent Protection (OCP)	Vin≥350V		1.1 Inom		1.3 Inom
Input overvoltage					1000VDC
Overtemperature Protection (OTP)	Internal Threshold by NTC, Auto Restart After Cool Down (Base Plate Temperature) Worst case Vin=350V			75°C	
Undervoltage Lockout				180VDC	

Note [2]: No integrated fuse. A fuse must be provided externally by the customer application in accordance with maximum input parameters.

Note [3]: Use an external ground fault protection circuit externally to the device, which monitors the insulation resistance to chassis. The supplementary protection needs to be operated immediately after fault of basic insulation.

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CERTIFICATIONS	
Compliance	**Standard / Criterion**
RoHS + RoHS2 Restriction of the use of certain hazardous substances in electrical and electronic equipment	RoHS 2011/65/EU + AM2015/863/EU
Reach Regulation	EC 1907/2006
CE conformity	CE

CERTIFICATIONS		
Safety		
Compliance	**Parameter**	**Standard / Criterion**
Safety	Safety requirements for electronic power converter systems and equipment - Part 1: General	IEC / EN62477-1

CERTIFICATIONS		
EMC Compliance		
Compliance	**Parameter**	**Standard / Criterion**
Electromagnetic compatibility	Broadband electromagnetic interference 30-75 MHz; 62- 52 dBµV/m 75-400 MHz; 52-63 dBµV/m 0,4-1 GHz; 63 dBµV/m	ECE-R10, Rev.6, Part 6.5
	Narrowband electromagnetic interference 30-75 MHz; 52-42 dBµV/m 75-400 MHz; 42-53 dBµV/m 0,4-1 GHz; 53 dBµV/ m	ECE-R10, Rev.6, Part 6.6
	Conducted disturbances limits, only input port 0.15-0.5 MHz; 79 dBµV/m (QP) 0.5-30 MHz; 73 dBµV/m (QP)	ECE-R10, Rev.6, Part 7.13
	Immunity of ESAs to electromagnetic radiation	ECE-R10, Rev.6, Part 6.8
Road vehicles - Electrical Disturbances from Conduction and Coupling	Immunity of ESAs to transient disturbances conducted along 24 V supply lines Transients test pulse 1, test pulse 2a/b, test pulse 3a/b	ECE-R10 Part 6.9 ISO 7637-3

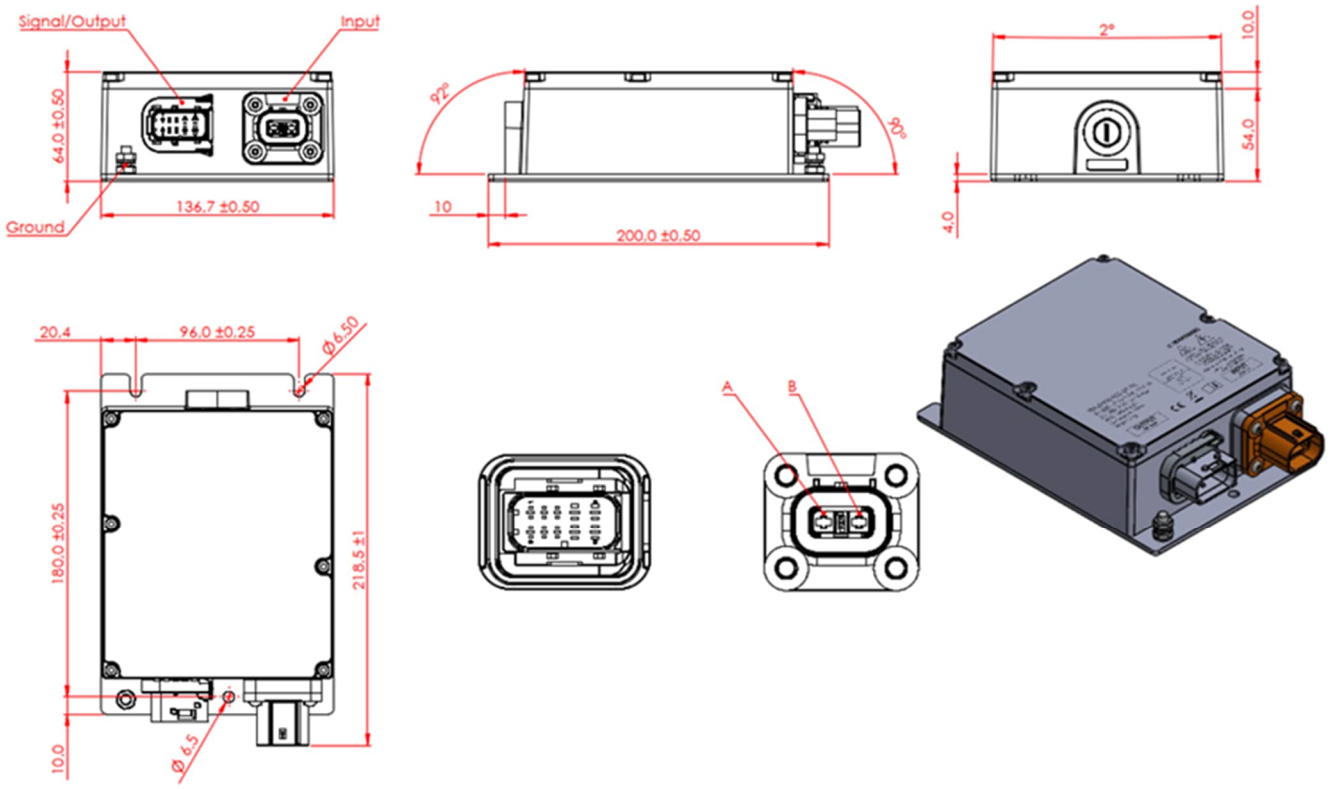
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DC/DC Converter

MECHANICAL DATA

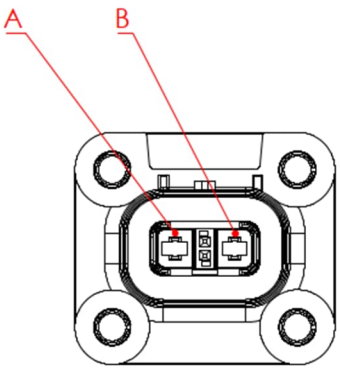
Parameter	Conditions	Min.	Typ.	Max.
Weight			1.75kg 3.86lib	
Case	Aluminum Alloy (Die-Cast), UV-Resistant Powder Coated (RAL-7001)			
IP Protection Class	With Mating Connector		IP6K9K	
Height			200.0mm 7.87inch	
Width			136.7mm 5.38inch	
Length			64.0mm 2.52inch	

DIMENSIONS



INPUT CONNECTOR: TYCO ELECTRONICS 2310540-2 Key B (ALL VERSIONS)

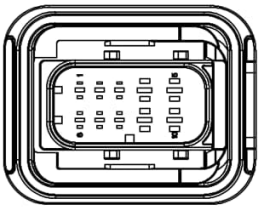
Pin No.	Configuration	Function
A	HV+	Positive High Voltage DC Input
B	HV-	Negative High Voltage DC Input



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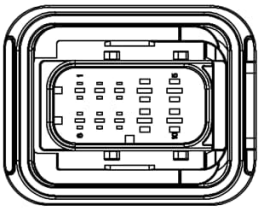
OUTPUT CONNECTOR: TYCO ELECTRONICS 2-1564518-1 Key B, Grey (RMOD400-HV-800-14-UW)		
Pin NO.	**Configuration**	**Function**
1	HVIL_IN[5]	High Voltage Interlock
2	+24 Inhibit (24IN)	Remote Control ON/OFF
3	Power Good (PG)	Power Good Signal, Active Low
4	OUT+	OUT+
5	OUT-	OUT-
6	HVIL_OUT[5]	High Voltage Interlock
7	Signal Ground (SG)	Low Power Ground, Useful for Control Signal
8		Not Connected
9	OUT+	Positive Output Voltage
10	OUT-	Power Ground

Note [5]: HVIL_IN (PIN 1) and HVIL_OUT (PIN 6) will short when input HV connector is plugged in



OUTPUT CONNECTOR: TYCO ELECTRONICS 2-1564518-1 Key B, Grey (RMOD400-HV-800-28-UW - RMOD400-HV-800-48-UW)		
Pin NO.	**Configuration**	**Function**
1	HVIL_IN[5]	High Voltage Interlock
2	+24 Inhibit (24IN)	Remote Control ON/OFF
3	Power Good (PG)	Power Good Signal, Active Low
4		Not Connected
5		Not Connected
6	HVIL_OUT[5]	High Voltage Interlock
7	Signal Ground (SG)	Low Power Ground, Useful for Control Signal
8		Not Connected
9	OUT+	Positive Output Voltage
10	OUT-	Power Ground

Note [5]: HVIL_IN (PIN 1) and HVIL_OUT (PIN 6) will short when input HV connector is plugged in



DIMENSIONS AND INSTALLATION INFORMATION

For product installation, observe the following requirements:

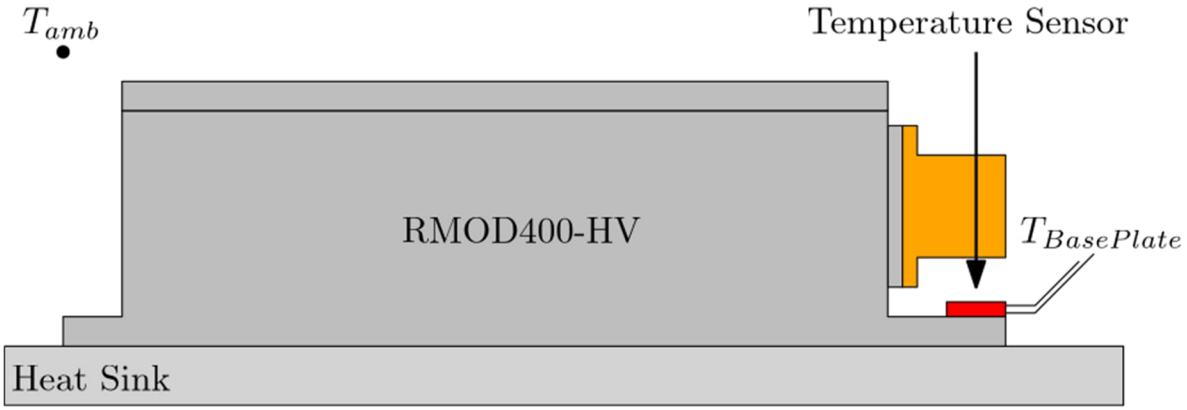
- Install the product in a secure location out of reach of users to prevent accidental contact with high-voltage parts or burns from hot surfaces.
- Install the product in a dry area protected from splashing water, dirt, and impact.
- The product's sealing is ensured only if all wires are fully assembled and connected to sealed units on both ends. Any unconnected cable or wire must be sealed separately.

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- Secure all cables near the device with strain relief elements (not included).
- Allow enough slack in the cables and route them away from sharp edges.
- Ensure the mounting arrangement securely holds the device and minimizes vibration.
- Ensure the enclosure is adequately ventilated to prevent heat buildup.

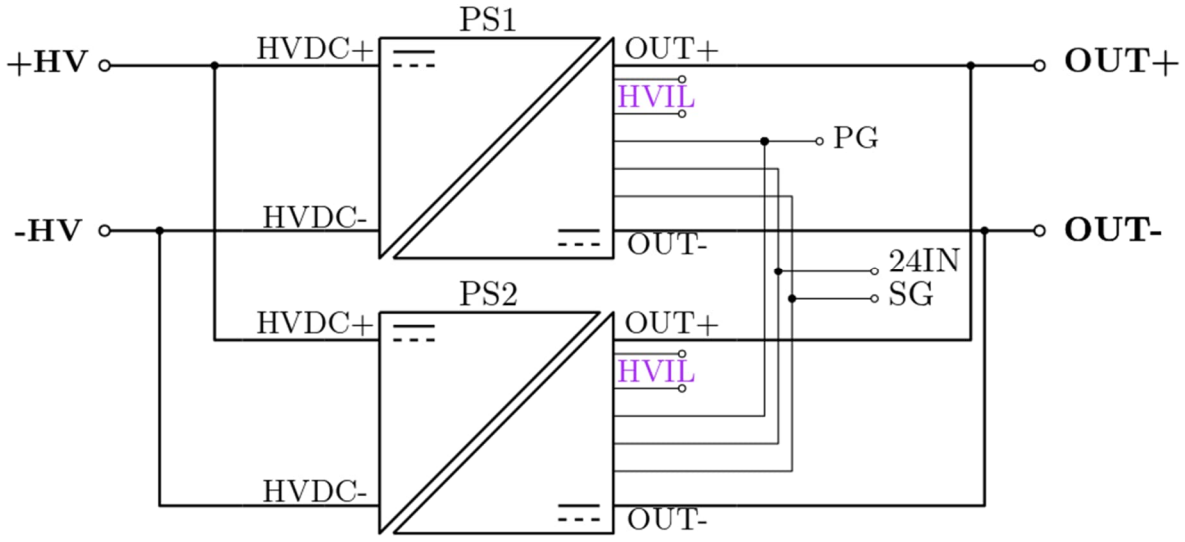
BASEPLATE TEMPERATURE CONTROL

- The base plate temperature (TBasePlate) can be controlled through a temperature sensor connected as reported here



PARALLEL OPERATION

- Here is an example of two parallel connected units:



- HVIL contacts can be serialized to have a unique HVIL.

WARRANTY AND GUARANTEE

The warranty corresponds to the regulations in our currently valid general terms and conditions.

INSTRUCTIONS REGARDING DISPOSAL

A basic requirement for the re-use and recycling of used electronic devices is the correct disposal. With the implementation of the electric and electronic device regulation, electronic devices may no longer be disposed of along with ordinary household waste but must be separately collected and recorded by a specialist service.
Disposal through a specialist service significantly helps to avoid dangers to people and nature. Therefore, in the case of disposal, we recommend contacting a recognized specialist disposal service.

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.

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