

# SYKO®

## POWER & HYBRID

# Power Electronics Standard & Customer-specific Power Supplies



system components  
**SYKO®**

suitable for global  
requirements



MIL STD-DEF STAN  
AECTP-VG-RTCA/DO

EN-ISO-VDE-IEC  
national/international

# DC/DC converter



## land-based/by sea/subsea/in the air



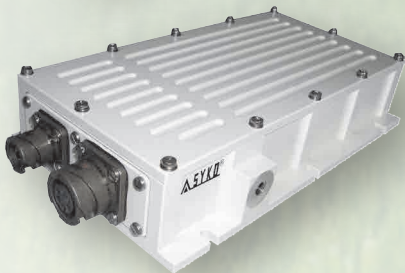
### **MCA.U-80-90 Watt caradapter, galv. isolation**

(9 - 36) V-100 V/50 ms optional 350 ms

active transient absorption

active reverse polarity protection (against re-directed energy flow)

outputs: 12/15/19/24 V



### **GTR.P-100/120 Watt caradapter, galv. isolation**

(9 - 36) V-load dump limited 63 V/300 ms Impedance 1-8 Ohm

active load dump-/transient absorption

active reverse polarity protection (against re-directed energy flow)

outputs: 12/15/19/24 V



### **GTR.V-100/120 Watt caradapter, Regenerator (Patent SYKO)**

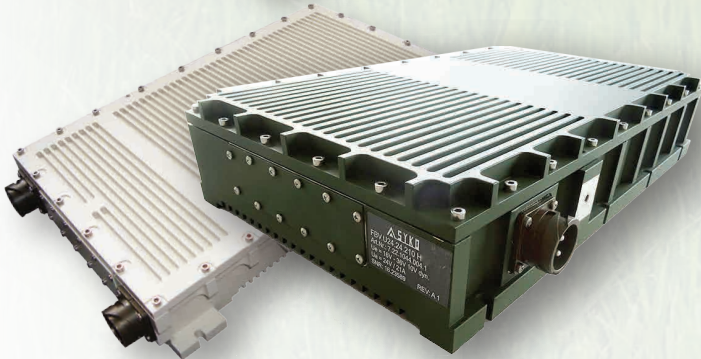
without galv. isolation

(9 - 36) V-50 V/50 ms-70 V/2 ms optional 100 V/50 ms

active transient absorption without current reflection

active reverse polarity protection (against re-directed energy flow)

outputs: 12/15/19/24 V



### **FBV.U-500 Watt fine network regeneration, galv. isolation**

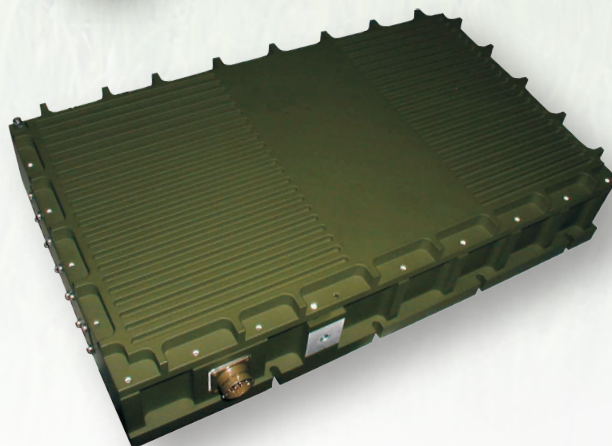
(9 - 36) V-50 V/50 ms-70 V/2 ms

active transient absorption

active reverse polarity protection (against re-directed energy flow)

active hold up time  $\geq 10$  ms (input 0 V)

outputs: 12/15//24/48 V



### **BOS.HR-1000 Watt fine network regeneration Regenerator (Patent SYKO)**

(9 - 36) V-50 V/50 ms-70 V/2 ms

active transient absorption

active reverse polarity protection (against re-directed energy flow)

outputs: 12/15//24/48 V

MIL STD 810 F  
MIL STD 1275  
MIL STD 461/462  
AECTP 500-4

1~ / 2~ 115/230 Vrms  
 3~ 400 Vrms/50/60/400 Hz



## land-based/by sea/subsea/in the air

**DC/AC Rugged battery inverter**  
 for 2~(115)/230 Vrms in field  
 applications IP68

### Model DWR2000/DWR510

EN60950/50178 protection isolation controlling  
 all poles turn off at first fault  
 condition and locking until enabling  
 discharging of capacitors



**Input:** DC (16-36) V  
 DEF STAN 61-5 B  
 VG96916-5/151 V/0 Ohm/350 ms  
 (deactivated >105 V) optional active  
 MIL STD 1275 -E  
 100 V/50 ms-36 V/500 ms (active)

(16-36) VDC  
 50 V/50ms-70 V/2 ms  
 MIL STD 1275 E/DEF Stan

**Output:** 2~ 230Vrms ±1,5% / 50Hz  
 floating potential  
 distortion factor <1,5 %  
 (Option 115 V/60 Hz)

**Power:** 700 + 2500 Watt



- overall efficiency ≥90 %
- active load dump-/ transient input filter
- active reverse polarity protection
- active inrush current limitation
- synthetic sine wave also in no-load, overload, undervoltage conditions
- MIL STD 810G, VG96916, VG95373, MIL STD 461/462, MIL STD 1275



2~ 230 Vrms or  
 3~ 400Vrms incl f/U control  
 ±1,5 %/50 Hz  
 floating potential  
 distortion factor <1,5 %  
 2000 W stat./2500 W dyn.

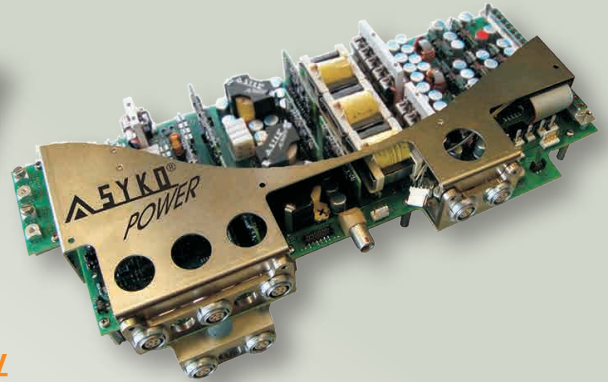
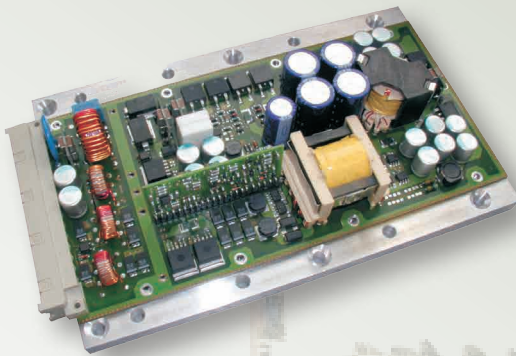


2~ 230Vrms ±1,5 %/50 Hz < OR >  
 floating potential  
 distortion factor <1,5 %  
 (Option 115 V/60 Hz/400 Hz)  
 550 W stat./700 W dyn.



# Summary of essential & main facts

land-based/by sea/subsea/in the air



## selection of topology

### DC voltage

- 6-40 V/100 V-50 ms/151 V-350 ms
- 14 - 154 V/Surge
- range up to >1:20

### DC voltage

- 220 - 1270 V/>2000 V
- 1500 V nominal
- 3000 V nominal
- voltage cascades up to >5000 V/transients >14 kV

### AC input

- 40 - 288 V
- 680 - 3600 V
- sine wave, rectangle, square form

### Multi-voltage

- complete UIC range DC and AC

- buck or boost
- buck/boost low-/high voltage
- regenerator patent
- voltage/current cascading
- synchronous switch
- housekeeper up to >5000 V
- regenerator/buck construction
- 1/2~ sine wave inverter
- 3~ sine wave inverter
- 3~ frequency inverter
- f-constant, f/U control, current control
- cascading of topology
- zero load capability 0-100-0%
- galv. isolated/non-isolated frontend supply
- PIC controlled battery charging
- charging of high caps/balancing
- charging of Lilon batteries
- external AC feed-in converter
- polarity switch
- regenerator field exciter/power units
- electronic transformer
- two/three stage-cascading
- current-/slope resonance

### DC output

- 1 mA - >800 A
- 1 V - >700 V
- constant/variable voltage
- single/multiple
- constant current

### AC-sinus output

- 1/2~ up to >700 VAC
- 3~ up to >700 VAC
- 16,7 Hz up to >440 Hz
- harm. distortion up to <1%

### AC-square form output

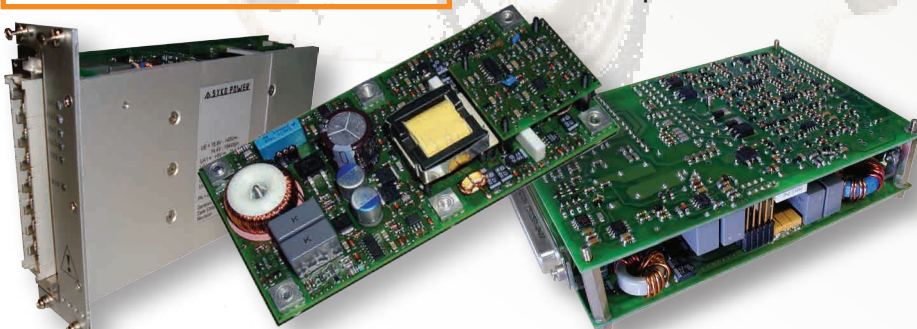
- 100 kHz (24 - 120) Vrms for an external feed in

### Functional outputs

- $V_{ou}=f(x)$
- x=interpretes time/temperature/set point

### Digital COM Data transfer/bus

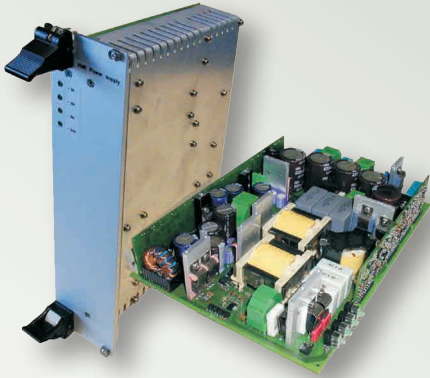
- CAN
- Ethernet (option)



# Generation and support of power grids



## land-based/by sea/subsea/in the air

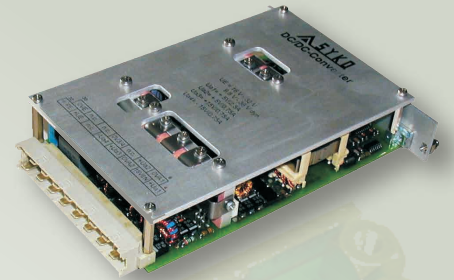


### functional details at a glance

3~ 400/480/600 V/50/60 Hz input  
2~ 230/120 V/50/60 Hz input

DC input currents up to >300 A  
input voltage 4 - >5000 VDC

DC output currents up to 800 A  
output voltage up to >700 VDC



network generating  
intelligent charging

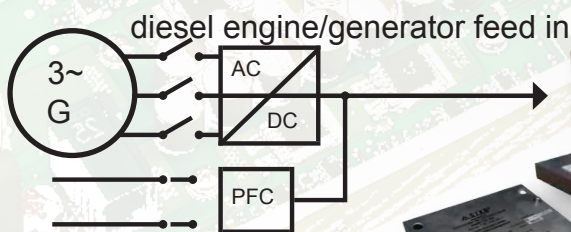
- current sharing (controlled parallel operation up to 4 x 6 kW)
- current splitting
- battery charging/network supply without external diode (active battery current limiting via current transducer)
- temperature/voltage compensation (temperature sensor)
- inrush current limiting (external active input choke ASD 01)

- Zero-load capable 0 A-n x 200 A-0 A (no deviation)
- extreme efficiency over all conditions and parameters as result of best thermal conductance of components incl. considering of reinforced isolation configurations IN/OUT/GROUND

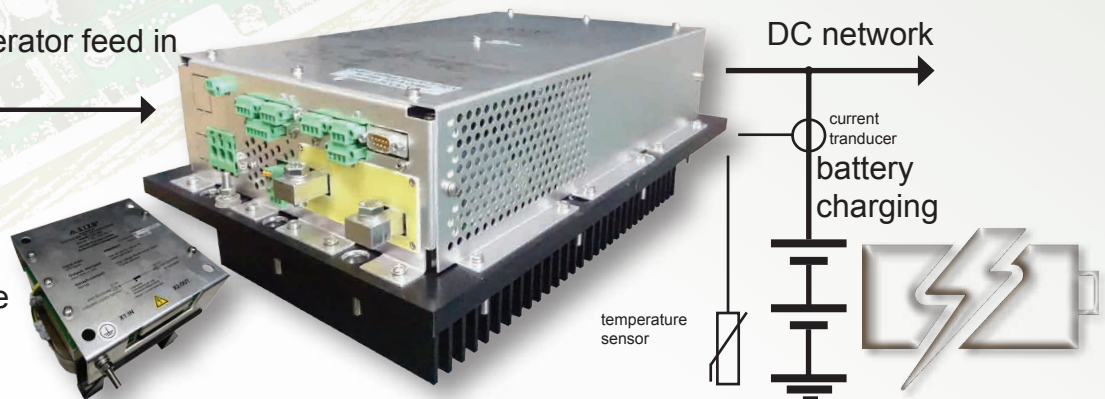
- convection cooled via ribbed heatsink/water cooling requires optional base plate (on request)

- digital controlling of control loops/digital bus for COMs and data transfer (operation time counter/failure memory)

3~ 400 V/50/60 Hz  
3~ 115 V/400 Hz



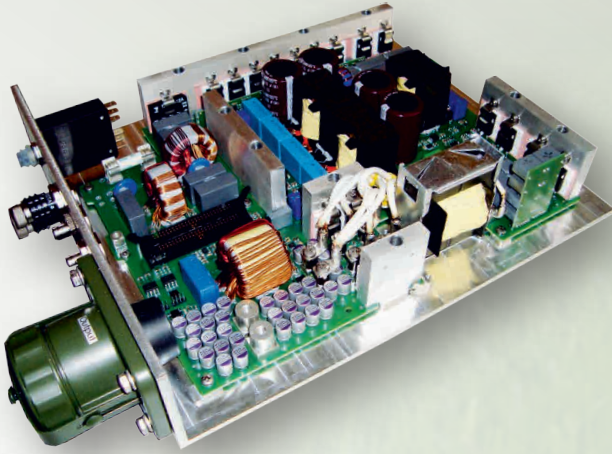
Active Inrush and reverse current limitation  
active limiting



# AC 1 ~ 230 Vrms feed in battery charger



## land-based/by sea/subsea/in the air



### PMW2400-AC/DC 2400 W feed in battery charger

- latest and modern state of the art technology
- primary diode rectifier replaced by an active topology-totem pole- (also integrated in our 2~ inverter models)
- for high input range applications the active PFC stage will be cascaded and operates in an interleaving mode (180°)
- to meet the requirement of charging discharged batteries and capacitors from 0 V is used a 3xcascade principle incl. hold up time
- the aimed efficiency of 94 % will be realized with synchronous semiconductors in the PWM stage and also in a cascaded and active output rectifier
- all energy storages can be intelligent charged incl. temperature compensation acc. IU battery characteristics or fixed output; High-Caps get a balancing and the charging control sets the voltage onto an intermediate end charging voltage. after that balacing period will be charged to the maximum voltage.

### NSE.V-Dead battery start up unit- engine start without required external start-up support

independet source/independet load (8-36) V  
intelligent charging current adaptation regarding  
nominal battery voltage  
active inrush current limitation (intermediate link)  
individual charging out of monocells, dead battery (over time)  
incl. automatically change-over 14/28 V



SYKO is offering a large product range as standard/catalogue line-up. But furthermore SYKO's true strength is also in modification according handed-over specifications individually under respect of the system requirements. Which can be for example optical applications, navigation, stabilisation, supply of digital network-crosspoints and control/monitoring displays, demagnatisation of ship bodies, GPS, communication/on-board, encryption, zero visibility systems, speed regulation, IED detection a.s.o.

Our knowledge results in over years of rugged designing and the right choice of capable topologies.



## land-based/by sea/subsea/in the air

### SYKOs understanding of Defence requirements

#### DC onboard network capabilities 24 V:

DEF STAN 61-5 Part 6 Issue 6	DET01.B....DET03.B DIT01.B....DIT07.B DIT08.B optional
VG96916-5/DIN ISO 16750-2	151 V/0 Ohm/350 ms (deactivated >105 V)
MIL STD 1275 -E	100 V/50 ms-36 V/500 ms (active)

#### EMC:

AECTP 500-4 NCE02/05 NCS02/07/12 NRE01/02 NRS01 NSR02	tab. 501-7 Land EMC
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#### Temperature:

MIL STD 810 -G	-40/70°C      tempor. +85°C (@ 500 W) -46°C optional
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#### Schock/Vibration:

MIL STD 810 -G	Vibration MIL STD 810-G Met. 514.6, Procedure I, Cat. 4, Fig 514.6 C-3  Mechanical shock MIL STD 810-G, Met. 516.6, Procedure I, Tab. 516.6-I Bandwidth 10-20.000 Hz Peak Acceleration 40g, Cross-over Frequency 45 Hz 10 Schocks pro Achse in 3 Achsen
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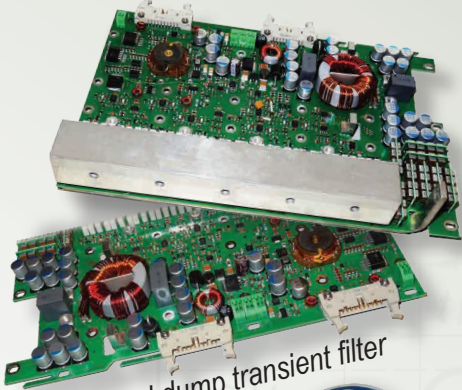
#### Protection/safety/persons against electrical hazards:

EN50178	electrical equipment
EN61557-7:2007	IT-isolation monitoring

NEW equipment  
Land based  
by sea/subsea  
in the air



NEW - DC/DC onboard network regenerator  
(9 - 40) V/151 V-350 ms  $\implies$  24 V/2...3 kW



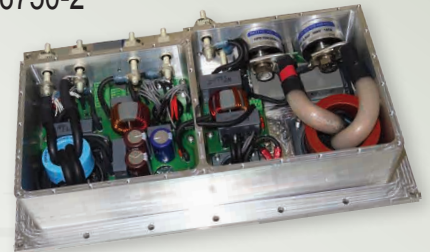
Active load dump transient filter



DC power card incl. heatsink



PIC controller/frontend chamber



Active transient and load dump filter 2/3 kW - 150 A  
incl. Active reverse directed polarity protection

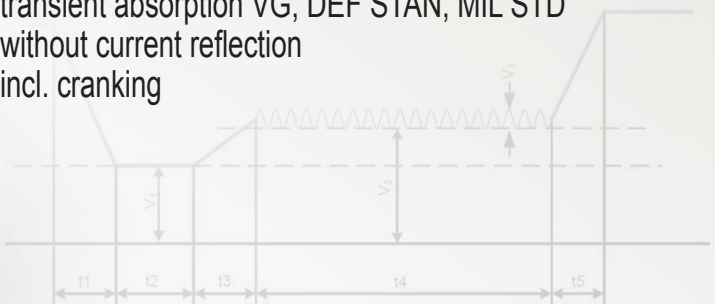
central transient kill in highly contaminated onboard DC networks  
active absorption without any current reflexion in onboard battery direction  
pass through voltage (9 - 40)V  
electrical device protection against symmetrical and asymmetrical disturbances  
 $\pm 250$  V  
MIL STD 1275  
VG 96916 T5 incl. DIN ISO 16750-2  
DEF STAN



Housing in an individual coloring  
optional available

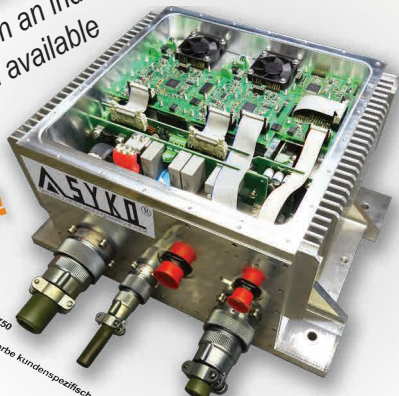
Onboard DC network stabilize regenerator 2500 W  
Fine DC network generating to 24 or 28 V constant  
without galvanic isolation

(18 - 36) V dyn. (10 - 40) V, active load dump and transient absorption VG, DEF STAN, MIL STD  
without current reflection  
incl. cranking



active reverse polarity protection (against re-directed current flow)  
EMC noise suppression conducted/radiated acc. level 2  
IP degree 68 incl. EMC resistant gasket  
integration in armoured/tactical vehicles-shock/vibration resistant acc. heavy shaking profile

NEW!  
INNOVATION!



REG-3750  
Gehäusefarbe kundenspezifisch

issued date April 2018-www source of pictures