- **Topology for load step from no-load**
- **Chassis mounting**
- **Wide input voltage range**
- **Turn-on current limitation**
- **EMC / disturbances EN50121-3-2 / 55011.A**
- **Fire protection EN5510 / EN45545**
- **Safety EN60950 -SELV-**
- **Ambient conditions EN60068-2-6**
- **Shock/vibration EN 61373**
- **Input / output filter**
- **Synchronous rectification[1)]**

for
• Railway
• Vehicles
• Instrumentation

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# *Series HC16.U/B*

## *NEW with zero-load capability*

### Main points:

### Output:

- Regulation Σ ($U_{in}$+$I_{out}$+$T_U$)±3% double-out[2)]
- Max. unsymmetrical load (160/40)%
- Regulation Σ($U_{in}$+$I_{out}$+$T_U$)<±1% single-out[2)]
- Accuracy absolute ±1%
- Ripple (over $T_U$): <20 $mV_{pp}$
- Spikes <50 $mV_{pp}$ (T 1:1/50MHz)
- Response time ΔI=100% <10 ms
- Constant current limitation < 1,2 $I_{o\,max}$
- Output spike filter (C - $L^2$ - C)
- No-load, over load, short circuit proof
- 100%-load step / zero load capable
- Easy for parallel operation[2)]
- Reset UA=Okay-Signal (UA=>95%)

### Input:

- Burst/Surge EN61000-4-4/5
- No-load current < 10mA (with Inhibit)
- On-Off-application (inhibit) surge proof, up to Uimax (see principle diagram)
- On-Off switch hysteresis at under voltage and delayed restart
- Input filter acc. to EN 55011.A
- Low input capacity
- Emergency fuse 5 x 20mm internal
- Option: long term transient proof
  50V-50ms / 70V-2ms

### In general:

- No electrolytic capacitors in chopping circuits
- LED for Uout = OK
- Connector DIN 41612, 15 pin, style H (option Screw terminal)
- Buck regulator / push-pull-topology
- Clock frequency 60 kHz/80kHz
- Isolation test voltage 1500$V_{AC}$ 1 min
- Isolation coordination EN50124
  Air/creepage distances Inp.-Outp.: >2,8mm
- Ambient temperature -25°C / +70°C
  Option: -40°C / +85°C EN50155 TX
- Derating 1,2%/°C > 60°C
- Over temperature turn-off >110°C
- Limit temperature on KK-✱ 95°C
- MTBF SN29500/40°C: >2,7 mio h
- Shock/vibration acc EN61373,
  Category 1, class B, any mounting position
- Weight approx. 0,9kg
- CE-conformity for railway applications

| Uin | Pout | Uout | | Iout | Iout | Model |
|---|---|---|---|---|---|---|
| V | W | V | | A | A | number |
| | | | | static | dyn. 10s | |
| **16,8 - 34** | 100/150 | 5,1 | (S) | 20,0 | 30,0 | HC16·U24·05·200/300 |
| 14,4 dyn. = 85% Uout | 150/240 | 12 | (S) | 12,5 | 19,8 | HC16·U24·12·125/198 |
| | 150/240 | 15 | (S) | 10,0 | 16,0 | HC16·U24·15·100/160 |
| Option: | 150/225 | 24 | (D) | 6,3 | 9,4 | HC16·U24·24·063/094 |
| long term tarnsients | 150/225 | 48 | (D) | 3,1 | 4,7 | HC16·U24·48·031/047 |
| 50V/10ms 70V/2ms | 150/225 | ±12 | (D) | ±6,3 | ±9,4 | HC16·B24·12·063/094 |
| | 150/225 | ±24 | (D) | ±3,1 | ±4,7 | HC16·B24·24·031/047 |
| **16,8 - 52** | 140/220 | 12 | (S) | 11,7 | 18,0 | HC16·U30·12·117/180 |
| 14,4 dyn. = 85% Uout | 140/220 | 15 | (S) | 9,3 | 14,7 | HC16·U30·15·093/147 |
| surge proof | 140/210 | 24 | (D) | 5,8 | 8,8 | HC16·U30·24·058/088 |
| sym. 1kV / 42Ω bzw. | 140/210 | 48 | (D) | 2,9 | 4,4 | HC16·U30·48·029/044 |
| unsym. 2kV / 42Ω | 140/210 | 110 | (D) | 1,3 | 1,9 | HC16·U30·110·013/019 |
| | 140/210 | ±12 | (D) | ±5,8 | ±8,8 | HC16·B30·12·058/088 |
| | 140/210 | ±24 | (D) | ±2,9 | ±4,4 | HC16·B30·24·029/044 |
| **22 - 68** | 160/240 | 12 | (S) | 13,3 | 20,0 | HC16·U50·12·133/200 |
| 19 dyn. = 85% Uout | 160/240 | 15 | (S) | 10,7 | 16,0 | HC16·U50·15·107/160 |
| 110V/10ms | 160/240 | 24 | (D) | 6,6 | 10,0 | HC16·U50·24·066/100 |
| | 160/240 | 48 | (D) | 3,3 | 5,0 | HC16·U50·48·033/050 |
| | 160/240 | 110 | (D) | 1,45 | 2,2 | HC16·U50·110·014/022 |
| | 160/240 | ±12 | (D) | ±6,6 | ±10,0 | HC16·B50·12·066/100 |
| | 160/240 | ±24 | (D) | ±3,3 | ±5,0 | HC16·B50·24·033/050 |
| **42 - 154** | 160/240 | 12 | (S) | 13,3 | 20,0 | HC16·U80·12·133/200 |
| surge proof | 160/240 | 15 | (S) | 10,7 | 16,0 | HC16·U80·15·107/160 |
| sym. 1kV / 42Ω bzw. | 160/240 | 24 | (D) | 6,6 | 10,0 | HC16·U80·24·066/100 |
| unsym. 2kV / 42Ω | 160/240 | 48 | (D) | 3,3 | 5,0 | HC16·U80·48·033/050 |
| | 160/240 | 110 | (D) | 1,45 | 2,2 | HC16·U80·110·014/022 |
| | 160/240 | ±12 | (D) | ±6,6 | ±10,0 | HC16·B80·12·066/100 |
| | 160/240 | ±24 | (D) | ±3,3 | ±5,0 | HC16·B80·24·033/050 |

| | | |
|---|---|---|
| Version H | -40°C up to +85°C | additional charge |
| HC16.XX.XX.XXX.A DIN rail mounting with housing | | additional charge |
| Modification costs of possible changes above values: | | on request |
| Option: 72V-battery with Uin: (43 - 102)V | | on request |

(D) with rectifying diode / (S) with Synchronous rectifying[1)]

1) Warning: (Synchronous switches)
Output sided energy carrier like batteries must be decoupled with diodes.


SYKO Gesellschaft für Leistungselektronik mbH • Phone +49(0)6182/9352-0 • Fax +49(0)6182/9352-15 • www.syko.de • email: info@syko.de

The ***HC16*** series with an output power up to 150 W and a dynamical load steps from zero to 240W is developed for mobile applications and high operational reliability.

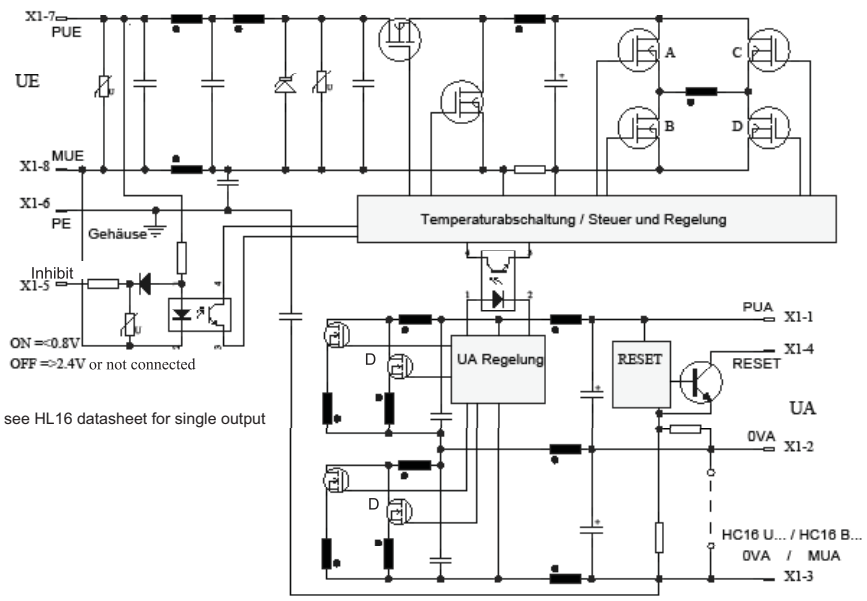
The input works with low input capacity and for the chopping circuit high current capable capacitors are chosen. Wet electrolytic capacitors are not used for the chopping circuit. Input sided surge disturbances are limited to system suitable values.

The clever and mechanically stable build up results an ideal heat connection to the flange heat sink. The ***HC16.C***'s direct chassis mounting is possible with very good heat connection based on the the extended flange heat sink. The converter is equipped with an under voltage switch-off function with amplitude and time hysteresis.The integral switch on current limitation is done with an internal power limitation.

The functionality is secured in the whole operational range up to limit values based on the chosen components, filters, security circuits, dynamical and statically current limitation, over voltage protection and over temperature protection.

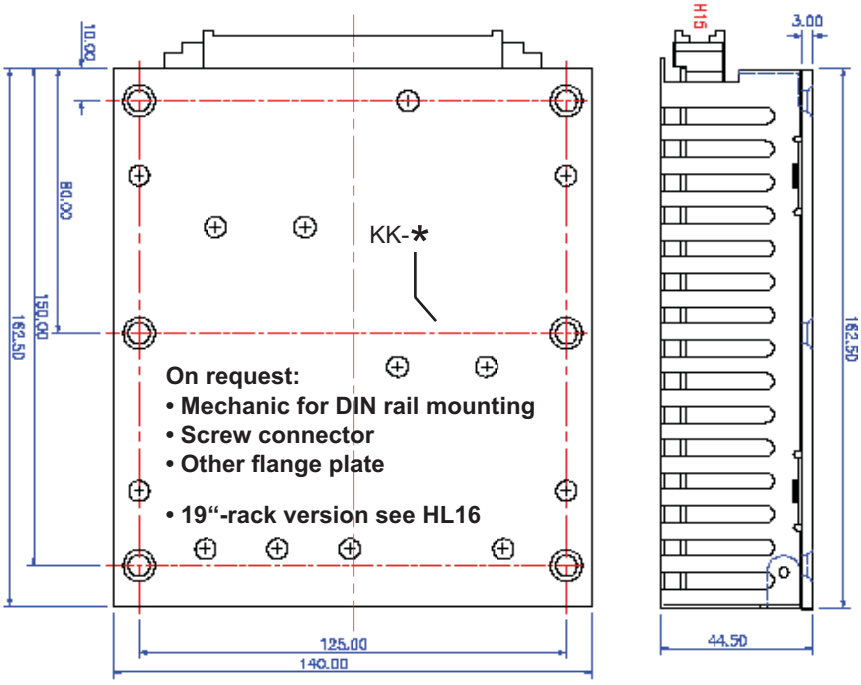
**1)**
For output voltages up to 15V including, the diode „D" is replaced by a synchronous rectifier to result higher efficiencies. The parallel operation without an external decoupling diode is not allowed.

**2)**
For output voltages higher than 12V and an amplitude stability of ±2,5% = f(Uin/Iout/TU) the control loop's feed back with optical couplers is not necessary. This results a limited parallel operation and redundancy. The double output version is regulated to ±Uout. The tracking is max. ±3% at unsymmetrical loads.

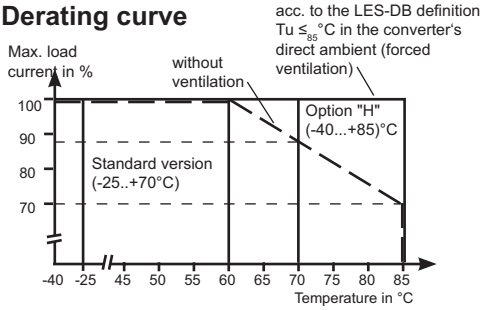


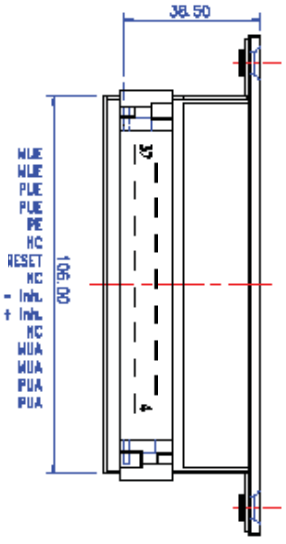

see HL16 datasheet for single output

## Mechanics

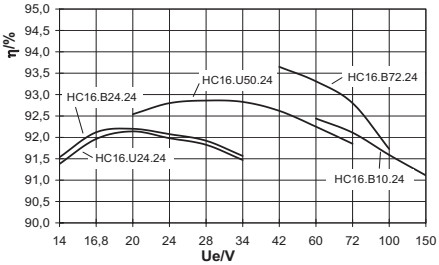



## Derating curve



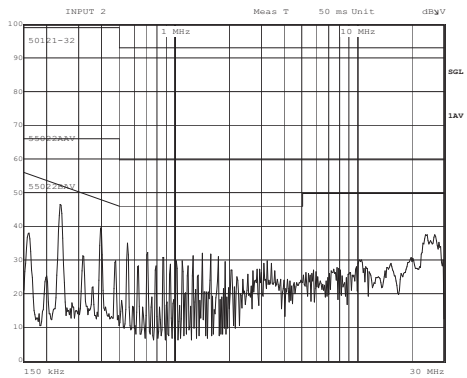




## Efficiency




## Measurement of radio interference

Input conducted (HC 16.U 10.24.070/090)

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