SCHAEFER

DC / DC Converter System

K732

Documentation	Draw. No. :
Manual C 4575K-U002	5 Pages
Dimensions outline drawing	74 K732 E
Connection diagram	73 K732 E

Documentation	Date	Signature
Issued	**20.09.2006**	**A. Scherer**
Checked		

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C 4575K-U002

Documentation	**No:**
Specifications	70 C4575K-U002 E
General description converter	77 1471 E
Operational characteristics	77 0012 E

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Specifications C 4575K-U002

Input

Voltage range	500 - 850V DC, unit switches off at under- and overvoltage
Recommended input fuse	two-pole 8A slow, external
No-Load input power	approx. 6W
Switch-on time	300 ms typical
Immunity:	
- ESD	acc. to EN 61000-4-2 (level 3)
- Bursts	acc. to EN 61000-4-4 (level 3)
- High-energy pulses	acc. to EN 61000-4-5 (level 3)

Output

Voltage rating	38V DC (adjustable 28 - 38V DC)
Current rating	24A
Line regulation (±10%)	0.1 %
Load regulation (10-90%)	approx. 2 %
Ripple	≤ 1%
Load transient (10-90-10%)	6 % typical
Response time to ± 1 %	2 ms typical
Turn-on rise time	Softstart, 300 ms
Overload protection	current limited to 105 - 110% of full load
Overvoltage protection	OVP switches off module with automatic return to operation OVP adjusted to 42V DC
Remote sensing	to be connected to the output or to the load under regard of polarity
Redundant operation	with decoupling diode
Parallel operation	current balancing by decoupling diode

General

Temperature coefficient	0.02 %/°C typical
Operating temperature	-40°C to +75°C
Load derating	2.5 %/°C from +55°C
Storage temperature	-40°C to +85°C
Cooling	natural convection
Efficiency at full load	approx. 85%
Switching frequency	approx. 20 kHz
Isolation resistance	> 10 MΩ at 500V DC
Isolation voltage	acc. to EN 60950, class 1
Construction (safety)	acc. to EN 60950, class 1
Creep age distance	acc. to VDE 0110, ≥4 mm
Air distance	acc. to VDE 0110, ≥3 mm
Earth leakage	< 3.5 mA at 230V AC, acc. to EN 60950
RFI-interference	acc. to EN 55022, class A
M.T.B.F.	approx. 100.000 h at 40° C
Connection	see connection diagram
Dimensions	see dimension outline drawing

Options

- Special mechanics for assembly in the cabinet K732
- Varistor parallel to input (installed in the K732)
- Wrong polarity protection by series diode in the (+) input line
- Extended temperature range (-40°C)
- Decoupling diode in the (+) output line
- Tropical protection
- Increased mechanical strength

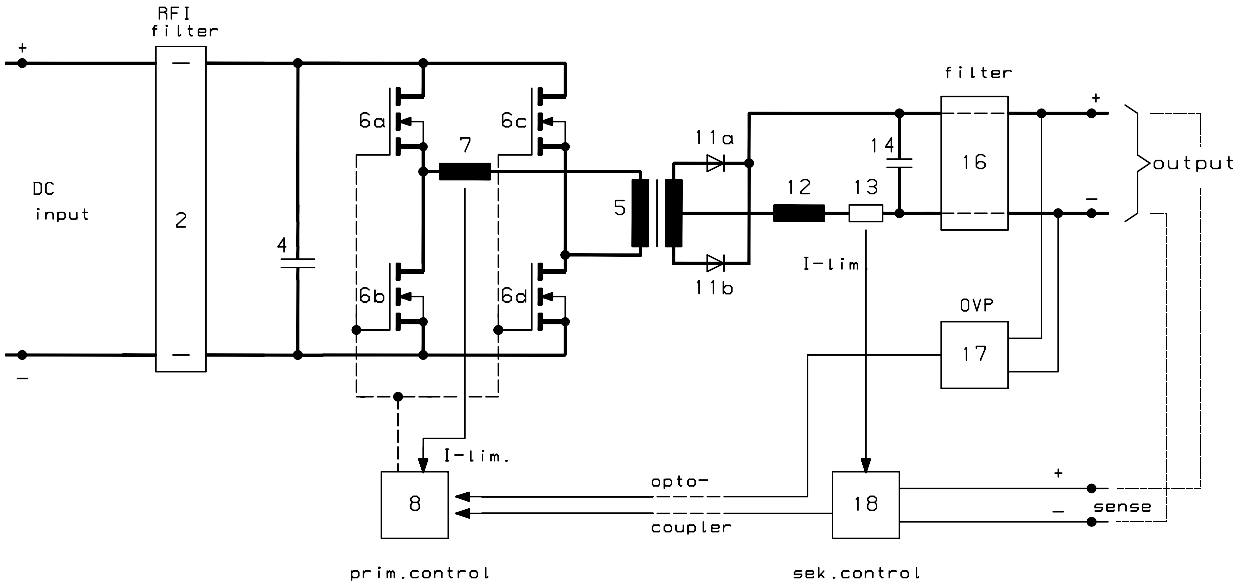
1) Primary Circuit

The input is connected to the primary switching system via RFI filter 2. The filter reduced switching noise that is conducted into the primary supply system. The switching system is provided in a full-bridge connection. Switching transistors 6a and 6d as well as 6b and 6c are controlled by circuit 8 alternately conducting with variable pulse-width, connecting the rectified input voltage with alternating polarity to the primary winding of transformer 5. The signal across shunt 7 is used for current limiting for the protection of the semiconductors against excessive current.

2) Secondary Circuit

The voltage of the primary winding is transformed to the secondary side in the turns ratio of the windings, is then rectified by diodes 11a and 11b and filtered by choke 12 in conjunction with capacitor 14. The average value of the voltage across the capacitor depends on the input voltage and the on-/off-ratio of the switching transistors. It is conducted to the output terminals via ripple filter 16.
The output voltage is connected via external sense leads to control circuit 18. There it is compared with a reference, and the error signal controls via an opto-coupler the switching transistors at the primary side.

For overvoltage protection (OVP) circuit 17 senses internally the output voltage and turns off the switching transistors via an opto-coupler if a certain adjustable level is reached. The circuit automatically returns to operation with a delay of approximately 0,5 s but is repeatedly switched off if the voltage limit is exceeded again after every new start.
For current limiting the signal across shunt 13 starts to reduce the output voltage if the current exceeds a certain limit (normally 1.1-times the rated value). For the reason of dynamic stability this circuit responds with some delay whereas the primary limiting circuit acts nearly instantaneously for fast protection of the semiconductors.



1. Indication of operation

Operation of the module is indicated by a green LED at the front of the module connected in parallel to the output. With option “dd” (decoupling diode in output) the LED is connected to the anode side of the decoupling diode.

2. Voltage control

For maintaining constant output voltage, stabilized against variations of the input voltage and of the output load, the output voltage is compared with an adjustable reference, and the error signal controls the on/off-ratio of the primary switching transistor(s) (= **"pulse-width modulation"**). The module has terminals that permit sensing the output voltage at a remote point in order to compensate for the voltage drop along the power leads from the module to the load (**"remote sensing"**), or sensing may be done at the connector of the module, if no compensation is required. It is important that the sense connections are never interrupted as otherwise, as a consequence of the missing signal, the output voltage would excessively rise causing the overvoltage protection ("OVP") to interfere.

3. Current limitation

To protect the module and the load against excessive current, circuitry is provided that senses the output current and overrides voltage control when a certain load level (normally 1.1-times the rated value) is reached. An additional circuit senses the primary current and interferes if the primary current exceeds a maximum value. Whereas the secondary current limitation circuit is slightly delayed to achieve dynamic stability, the primary circuit responds fast and protects the power semiconductors against current surges.

4. Short circuit protection

The output of the unit is fully short circuit-protected by the secondary current limitation circuit which overrides voltage control if the programmed current limitation level is reached.

5. Overvoltage protection ("OVP")

To protect the load and the internal circuits against excessive output voltage, an independent circuit switches off the primary control pulses if a certain adjustable output voltage is exceeded so that no more energy is transmitted to the secondary side. Different from "crow-bar" circuits which apply a short circuit across the output terminals by firing a thyristor, the system used here does not provide protection against overvoltage that comes from outside which, however, is quite unlikely to happen. The unit may stay off and has to be re-started, or - in the standard version -automatically returns to operation with a delay of approx. 2 sec. and switches off repeatedly if the overvoltage condition continues to exist.

6. Starting

When the module is connected to input power, the primary capacitors will be charged by a high current pulse. The magnitude of this pulse mainly depends on the supply system. This current pulse can be reduced by fitting a thermistor in series with the input, as the thermistor has a relatively high value of resistance as long as it is cold, which becomes very low as the thermistor heats up. This current limitation will not be effective if the power is interrupted for a short period of time only, not allowing the thermistor to cool down.

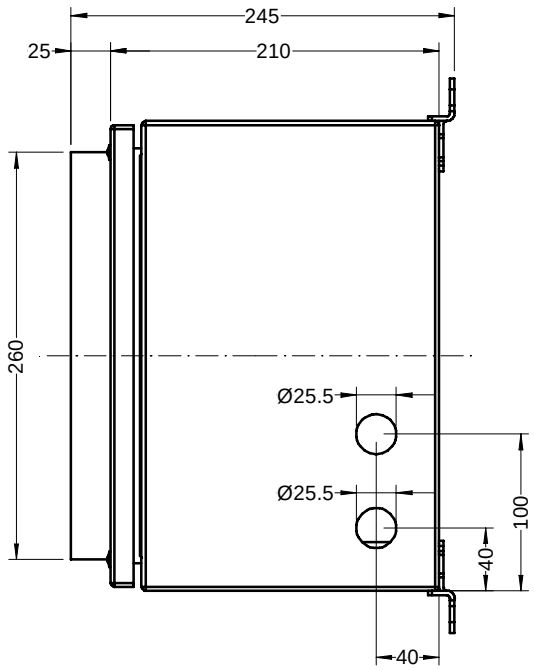
The rise of the output voltage is electronically delayed by a soft-start circuit on the control board and does not contribute to the current surge at the input when the unit is connected to power. The output voltage reaches the final value approx. 2 sec. after the application of input power.

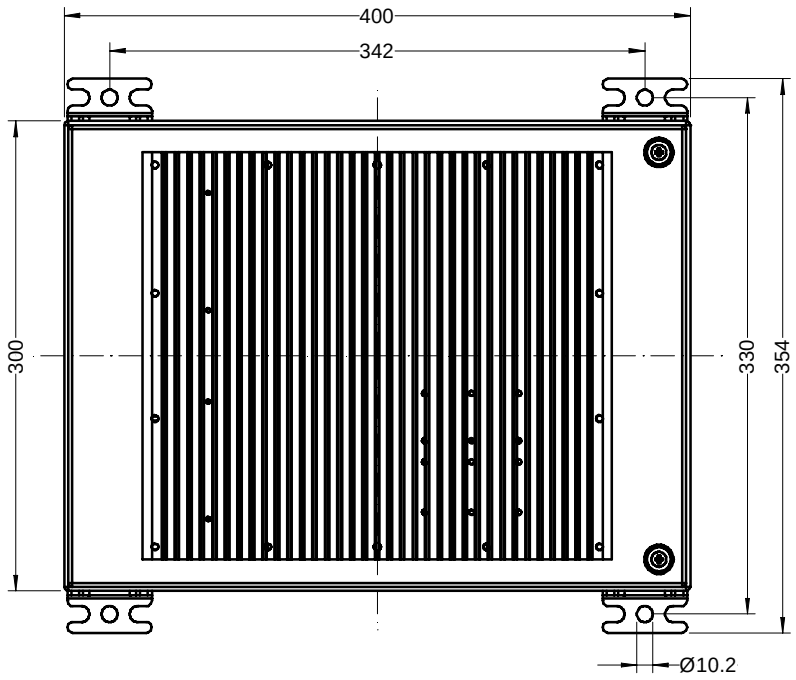
7. Parallel operation (only with option "DD" or "CS ")

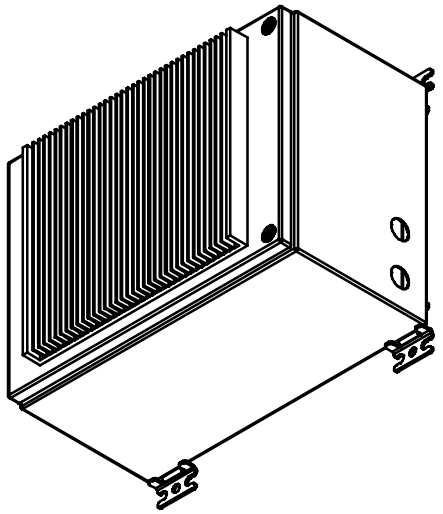
Units may be operated in parallel for increasing the total output power or for redundancy. For the first kind of application an electronic circuit is available for active current sharing. In the second case, decoupling diodes should be used, and the additional voltage drop across these diodes improves the balance of the individual output currents.

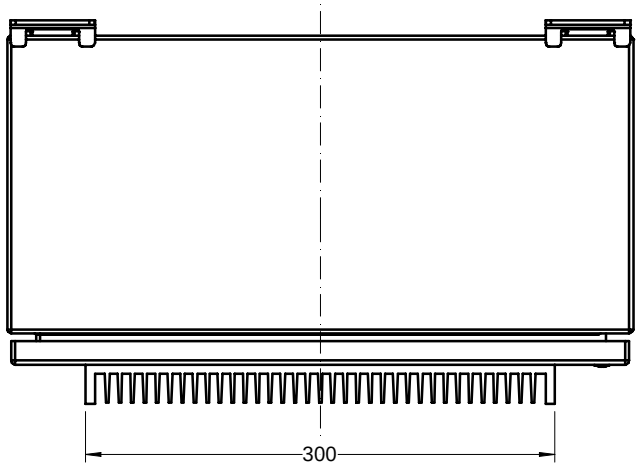
8. Spike suppression

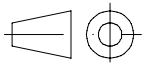
High input voltage spikes generated in the supply system that could disturb operation of the unit or cause damage will be absorbed by a varistor across the input lines.











Cabinet material: high-grade steel (1.4301, 1,5mm)
Protection acc. to: outside IP 55, inside IP00
Weight: approx. 16kg

				Bearb.	14.09.06	Scherer	SCHAEFER	Benennung: Dimensions outline drawing K732	Zeichnungsnummer: 74 K732 E	Blatt: 1
				Gepr.						
				EDV						
Rev.	Änderung	Datum	Name		Datum	Name	Ers. f.:	Ers. d.:		1 Bl.

Terminal block:

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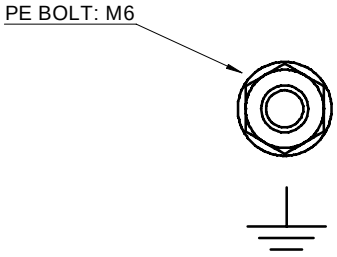
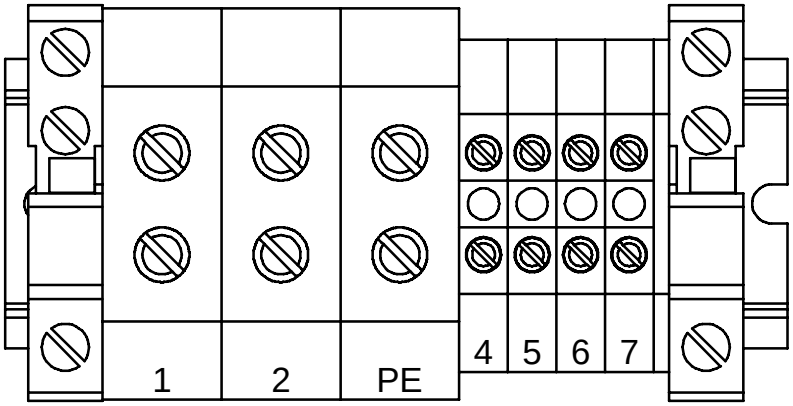
1 - 2	0.75 - 35mm² / UK 35 (Phoenix)
PE	0.75 - 35mm² / UK 35 (Phoenix)
4 - 7	0,2 - 4mm² / UK 5N (Phoenix)

PE BOLT: M6





1	2	PE	4	5	6	7
–	+	⏚	-S	–	+	+S
DC INPUT 500 - 850V				DC OUTPUT 38V (28 - 38V) 24A		

Sense (-S and +S):
Remote sense terminals have to be connected to the output, either at the module, or at the load, under regard of polarity.

				Bearb.	12.09.06	Scherer	SCHAEFER	Benennung Connection diagram K732	Zeichnungsnummer 73 K732 E	Blatt
				Gepr.						
				EDV						
Rev.	Änderung	Datum	Name		Datum	Name	Ers. f.:	Ers. d.:		Bl.