

ACARA Filtered Power Connector 65A, 100A, 150A, 250A

AFC

- The ACARA power connector family offers significant size reduction
- Best filtering performance with integrated feedthrough capacitor
- High current and high performance contact
- Reduced costs of components and assembly
- Die ACARA Power Connector Familie offeriert eine sehr kompakte Bauform
- Beste Dämpfungsleistung durch integriertem Durchführungs-kondensator
- Hochstrom und highperformance Kontakte
- Verringerung der Montage- und Bauteilekosten
- Les connecteurs de la série ACARA power connecteur se présentent sous une forme très compacte
- Excellentes performances de filtrage grâce à un condensateur feedthrough intégré
- Contacts de très haute qualité, adaptés aux voltages importants
- Réduction des coûts d'assemblage et de composants



Technical specifications

Maximum operating voltage:	Y2, 300VAC (EN132400) / 300VAC (UL1283) Y4, 130VAC (EN132400) / 130VAC (UL1283)
Typical operating voltage:	48VDC
Operating frequency:	DC to 60Hz
Current ratings:	65 to 250A @ 50°C (UL1977/UL1283)
High test voltage for capacitors:	Y2 3000VDC for 2 sec Y4 1700VDC for 2 sec
Connect/disconnect cycles:	500 cycles
Temperature range:	-25°C to +100°C (25/100/21)
Flammability corresponding to:	UL 94V0
Capacitor:	Y2 and Y4 according to EN132400

Approvals



ACARA product has several patents pending

Schaffner EMC and Anderson Power Products are leaders in the fields of EMI suppression and power interconnect and have partnered to produce the ACARA system of EMI filtered electrical power connectors. Filtered connectors are available in a variety of capacitance values. ACARA capacitors/connectors offer excellent EMI suppression to very high frequencies up to 10GHz.

The mechanical design has been developed for a fast mounting and the positive latch mechanism keeps mated connectors firmly together. The polarized housings (with user selective key for a secure application and removable filtered power connecting) is a big advantage. The ACARA concept reduces both component and assembly costs.

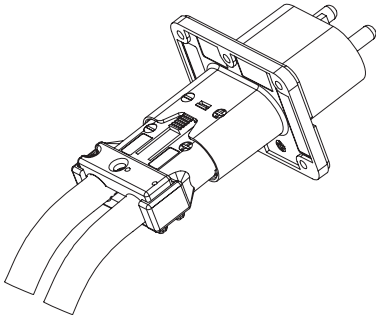
Schaffner EMV AG und Anderson Power Products, Marktführer im Bereich von EMV und Kontaktierungssystemen, sind eine Partnerschaft eingegangen für die Herstellung von EMV-Filter integriert im Steckersystem ACARA. Das ACARA System hat eine breite Variation an Kondensatorwerten. Diese garantieren hohe Dämpfungseigenschaften bis in den Bereich von 10GHz.

Das mechanische Design ist konzipiert für schnelles Montieren. Die polarisierte Steckerverbindung und der bewährte Verriegelungsmechanismus sichern eine einwandfrei funktionierende Applikation und dennoch entfernbare Kontaktierung mit dem Ziel, Montagekosten sowie Bauteilekosten zu reduzieren.

Les Stés Schaffner EMC et Anderson Power Products, leaders sur le marché de la compatibilité électromagnétique et des systèmes de connexions ont conclu un partenariat en vue de produire des filtres d'antiparasitage intégrés dans les prises électriques ACARA. Le système ACARA offre une large palette de condensateurs permettant d'obtenir des excellentes valeurs de compensation jusqu'aux fréquences de 10GHz.

La conception mécanique et le design en permettent un montage rapide. La connexion par prise, pôle à pôle, ainsi qu'un mécanisme de verrouillage éprouvé assurent à l'utilisateur une application ayant un fonctionnement sûr tout en permettant d'ôter le contact en vue de réduire les coûts de montage et de composants.

Concept



The connector has been designed to reduce the total costs of ownership and maximize the modularity of rack design or fast connectable applications. The ACARA connectors are manufactured to accommodate very high current connections up to 250A and for high frequency filtering up to 10GHz.

The ACARA connector keeps inventory levels down and cuts cost. Keying of the connector ensures that the cables and the connector are mated correctly.

The capacitor has a very low internal series inductance. This provides a suppression performance over a much wider frequency range than a conventional two-wire capacitor of equivalent value.

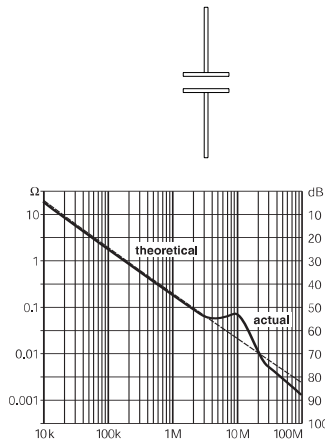


Figure 1. Typical frequency response of a 1µF feedthrough capacitor compared to the ideal theoretical response.

Due to the leads a normal capacitor has a self-inductance. These leads operate like small series inductances.

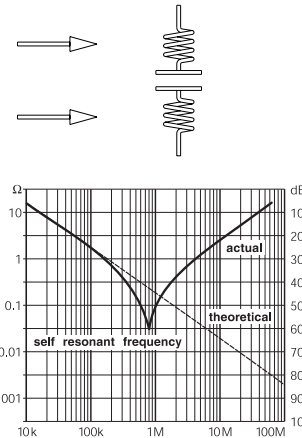


Figure 2. Typical frequency response of a conventional 1µF capacitor with 20mm leads compared to the ideal theoretical response.

The ACARA connector has a current-carrying conductor passing through the center of the capacitor. This co-axial conductor is one terminal of the capacitor. The other terminal is the metal outer casing of the capacitor, which was specifically designed for being attached to a grounded metal bulkhead. This design is common to all ACARA filters and ensures that any radio frequency currents carried on the central conductor are shunted to earth by the capacitor.

Because of the extremely low series inductance resulting from this type of construction, the self-resonant frequency of an ACARA capacitor will be very high. A typical frequency response is shown in figure 1. As frequency increases, the impedance of the feedthrough capacitor decreases continuously to provide excellent performance to beyond 10GHz. Some small resonances can be expected in the performance characteristics of ACARA capacitors as shown in figure 1. These are usually attributable to distributed inductance within the capacitor and can cause its high frequency response to vary slightly from the theoretical.

With the ACARA filtered connectors you will have the best performance. High frequency (line) will be filtered to the ground. Applications like computer systems will therefore be protected. The combination of connector and filter results in an effective solution to simplify the contacting concept.

Features and advantages

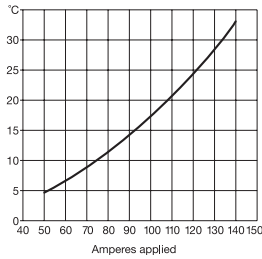
- Connector and filter as all in one solution
- Filtering for high frequencies up to 10GHz
- Keying of the connector insures that the cables and the connector are mated correctly
- Reverse polarity protection
- High currents up to 250A

Applications

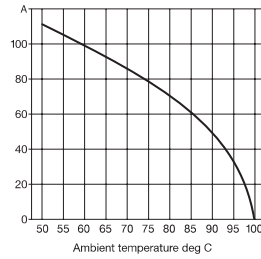
High frequency applications in an enclosure, where a connector and a filter is required. Computer systems, 48VDC systems (widely used in telecom), 18V battery back-up power plants where power needs to be readily available, large enterprise servers migrating towards 48VDC. In all of these applications, on site installation is often a second thought and overlooked when budgeting for the total installed cost.

Connector

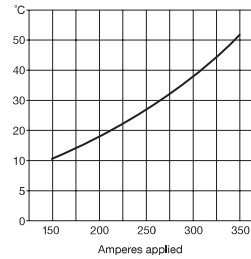
AFC100, 2 AWG wire



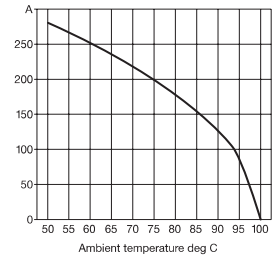
AFC100, 2 AWG wire



AFC250, 2 AWG wire



AFC250, 2 AWG wire



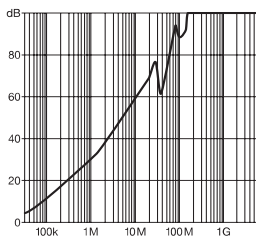
The success of ACARA depends on a very low contact resistance, and this design provides a very high quality material and a clever metallization process so there is no risk of overheating effects. The Hot-pluggable connector has a very low arcing between the male and female connector. ACARA is designed for 500 connect/disconnect cycles and 250 cycles under nominal load according UL1977 and EN 60984 giving optimum performance and flexibility. Servers, Base stations, and telecom equipment can easily be connected and disconnected.

The material used in the contact and the mechanical construction of ACARA are important to reach the service conditions of the customer application. The diagrams above show a typical temperature rise of a 100A and 250A connector. The contact resistance of the connector is most important. For example with 100A nominal load, the temperature rise of the contact is only approximately 17°C.

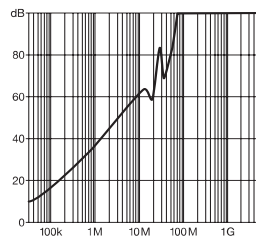
The patented ACARA connector family offers fast easy connecting and a long lifetime with hundreds of connect/disconnect cycles. To achieve this high conductivity copper is used which gives a low temperature rise. The copper material has good spring properties at contact interface and with good formability for crimping to finely stranded copper conductors. The spring system provides high mechanical shock/vibration stability with no contact bounce.

Typical insertion loss

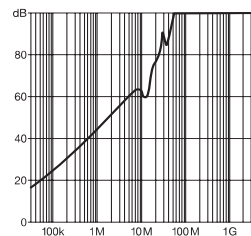
100nF



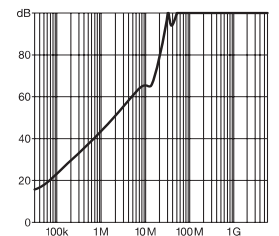
220nF



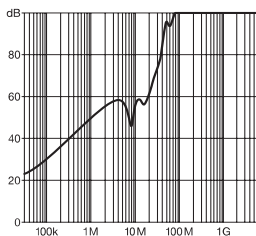
470nF



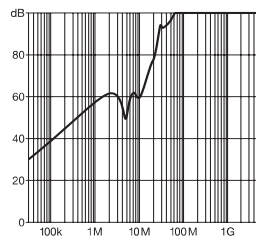
600nF



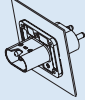
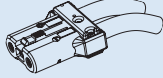
1000nF



2100nF



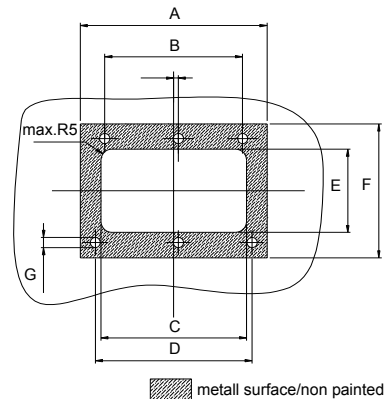
Assortment

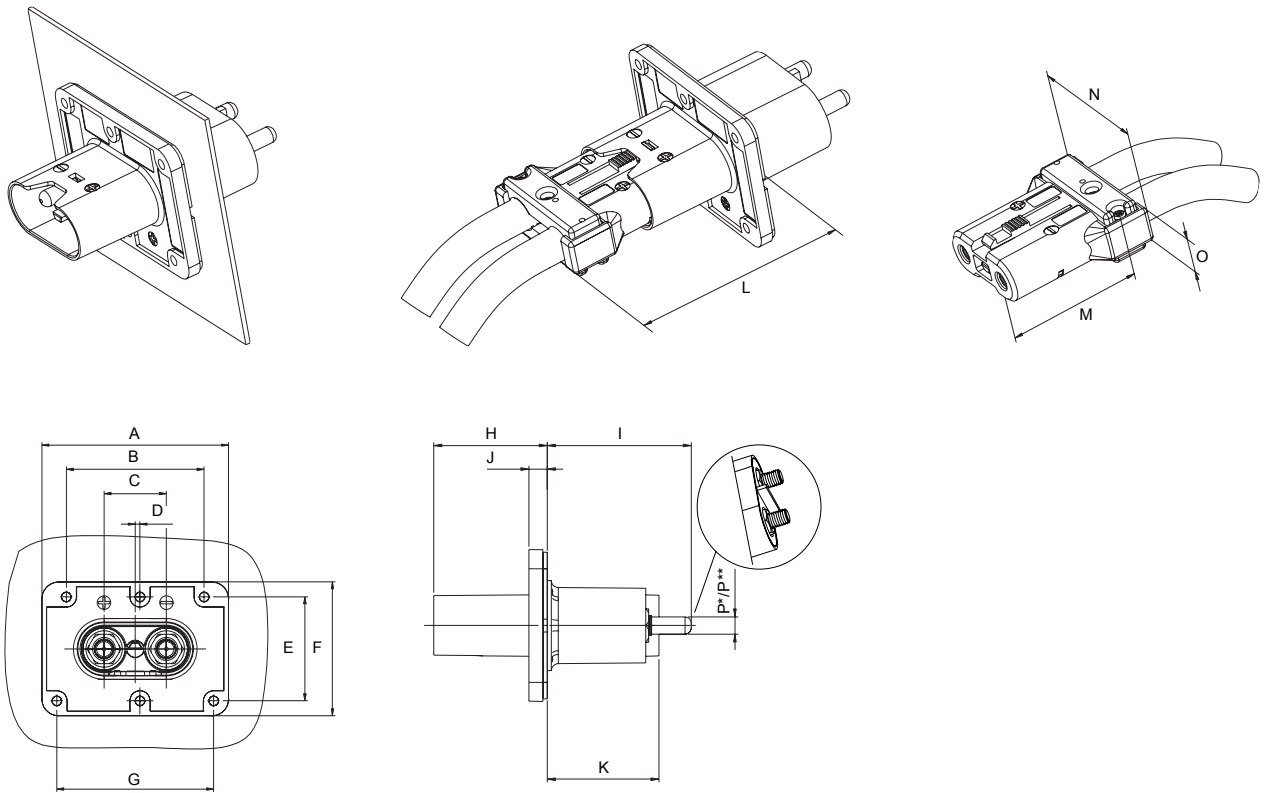
Filter with capacitor 	Current rating @ 50°C [A]	Capacity [nF]	Capacitor class Y2/Y4 (EN, UL)	Power connector 
AFC-065-F*(X)/B0600 AFC-065-F*(X)/B0470 AFC-065-F*(X)/A0220 AFC-065-F*(X)/A0100	65 65 65 65	600 470 220 100	Y4 Y4 Y2 Y2	AFC-065-P*(Y)/*(Z)
AFC-100-F*(X)/B0600 AFC-100-F*(X)/B0470 AFC-100-F*(X)/A0220 AFC-100-F*(X)/A0100	100 100 100 100	600 470 220 100	Y4 Y4 Y2 Y2	AFC-100-P*(Y)/*(Z)
AFC-150-F*(X)/B2100 AFC-150-F*(X)/B1000 AFC-150-F*(X)/B0470 AFC-150-F*(X)/B0220	150 150 150 150	2100 1000 470 220	Y4 Y4 Y2 Y2	AFC-150-P*(Y)/*(Z)
AFC-250-F*(X)/B2100 AFC-250-F*(X)/B1000 AFC-250-F*(X)/B0470 AFC-250-F*(X)/B0220	250 250 250 250	2100 1000 470 220	Y4 Y4 Y2 Y2	AFC-250-P*(Y)/*(Z)
* please use instead of X A = for bus bar B = for threaded				* please use instead of Y C = for crimp E = for pre-wired * please use instead of Z 2AWG = for 2 AWG crimp barrel 4AWG = for 4 AWG crimp barrel M95 = for 95mm ² crimp barrel M70 = for 70mm ² crimp barrel M50 = for 50mm ² crimp barrel M35 = for 35mm ² crimp barrel M25 = for 25mm ² crimp barrel 2M = for 2 AWG 2M length 3M = for 2 AWG 3M length 5M = for 2 AWG 5M length

AFC mechanical data

Dimensions - Cut out

	A	B	C	D	E	F	G
AFC065	82.3	60.8	64.3	69.2	36.8	59	4.5
AFC100	82.3	60.8	64.3	69.2	36.8	59	4.5
AFC150	114.3	96.75	90.55	96.75	62.6	76.2	6.2
AFC250	114.3	96.75	90.55	96.75	62.6	76.2	6.2





Dimensions

	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P*	P**
AFC065	82.3	60.8	27.5	2.1	45.8	59	69.2	44.1	56.1	43.5	83.2	62.5	55.1	15.2	M8	6.6
AFC100	82.3	60.8	27.5	2.1	45.8	59	69.2	44.1	56.1	43.5	83.2	62.5	55.1	15.2	M8	6.6
AFC150	114.3	96.75	40	3.17	62.6	76.2	96.75	57.46	75.94	65.81	125	98.4	84.8	22.4	M12	8.9
AFC250	114.3	96.75	40	3.17	62.6	76.2	96.75	57.46	75.94	65.81	125	98.4	84.8	22.4	M12	8.9

P* = Treated

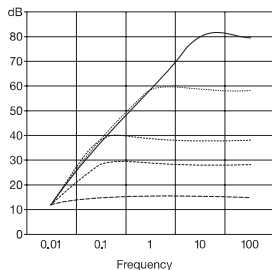
P** = Busbar

All dimensions in mm; 1 inch = 25.4 mm

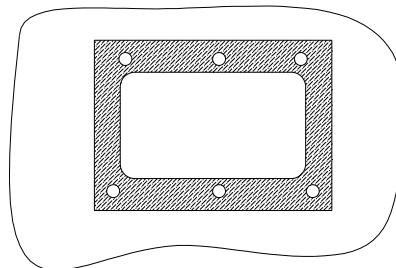
Tolerances according to ISO2768-m / EN22768-m

Important

The influence of a poor earth contact is very high. The insertion loss of the ACARA filter will be reduced significantly if there is only a small resistance from the connector to ground. The ground is connected over the case and a special electric conductive rubber. The contact has to be connected over the housing and the conductive cut-out panel. The resistance has to be as low as possible.



— 0 Ohm
 0.01 Ohm
 - - - - 0.1 Ohm
 - · - · - 1 Ohm
 - - - - 3 Ohm



In the diagram you will find the influence between the resistance to ground and insertion loss. This part of the installation is extremely important for the filter performance.

Application

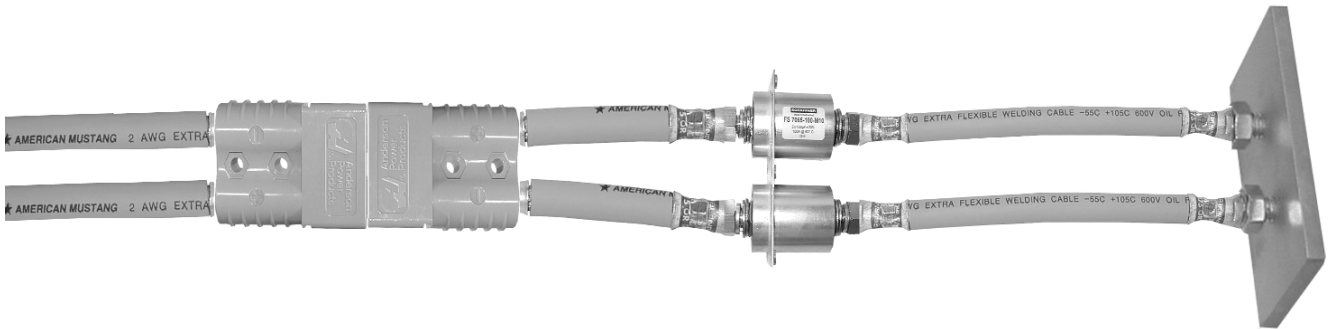
Very often equipment is lacking space for an EMC filter at the mains input and are looking for a time saving assembly. ACARA has the EMC filter inside the power connector, making it easy to assemble with reverse polarity protection. The high current connector is hot-pluggable and easy to connect and disconnect with an excellent EMI suppression to very high frequencies up to 10 GHz.

The performance features of ACARA

- High power contacts
- High current capabilities
- Very compact design
- Reduce costs of components and assembly
- Reverse polarity protection
- Filtering for high frequencies up to 10GHz
- UL, SEMKO approval
- Dual knowledge for one perfect solution as the base for the ACARA

Current solution

DC power connection to filter and bus bar with 14 parts and 6 screw connections

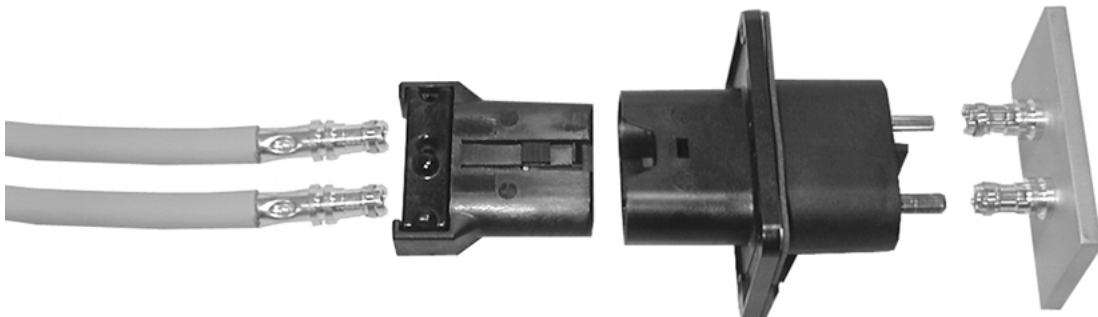


Disadvantage of existing solution

- One connector is needed and connected with high assembly time
- More space is needed
- More parts are needed (non integrated solution)
- Hot-pluggable contacts are necessary (cost factor cause of the high current connector)
- Very high assembly time needed

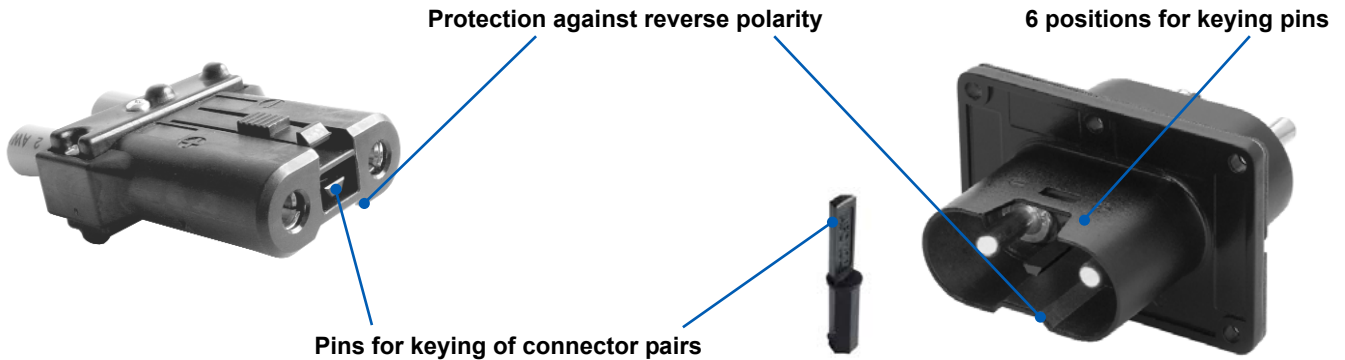
These connectors are used to connect and disconnect equipment to the power source quickly, safely and reliably. These connectors are used most in DC-power supplies, base stations and converters.

ACARA with inbuilt high performance filter (up to 10GHz) and connectable with just 6 parts



ACARA is the clever contact system with EMC filter inside the power connector

The housing has a reverse polarity protection. The keying of the connector insures that the cables and the connector are mated correctly. Different power requirements are easily configured with the 6 position keying pin. The isolated case and the design of the contact makes the connector pluggable or unpluggable under full load (according to UL 1977).



Customer-specific parameters for the ACARA contact concept and application guide in general

Filter

We need to know current, voltage, frequency, interference spectrums.

- Current, to find the diameter. You will have a very high self heating influence of filter and contact.
- Voltage, to have the right electric strength for the capacitor.
- Frequency, interference spectrums to find the best capacitor value.

Connector

For the connector we need to know the maximum environmental temperature and the temperature rise from the application, standards and also the wire diameter. Ambient temperature, the connector is adjusted on an ambient temperature with 20°C. Under nominal load we will have a self heating effect. Possible self heating effect, it depends of the standards. Sometimes customer only can accept a self heating about 15°K or 30°K (in Europe not as important as it is in USA).

Diameter of wire; the self heating decreases the bigger the wire diameter becomes. The wire is thermally conductive. The influence of self heating effect is high. Please see the current temperature derating curve for an ACARA AFC100 connector. Possible applications are applications:

- Computer systems
- Power supply most for telecommunications
- Battery backup-systems
- Servers
- Base stations

Application examples

Good reasons for UPS-Systems

- DC-Systems are useful, even customers can reduce the losses and are able to connect servers over high current contacts. The losses are around 10%. This system you will find most in ERP- business-solutions.
- AC-Systems have most around 40% losses.

Application note UPS-System

Ambient temperature max 65°, voltage 48VDC, wire connector 25 mm² for crimp connection, current 70 A, UL and EN certification necessary.

Solution: AFC100-FBA0220 filter and AFC100-PC/M25 connector

The 100A connector has a temperature rise about 8°K at 70A. The ambient temperature is + 65°C The temperature can rise up to 73°C. The capacitors can be used up to 100°C. If we use smaller wire diameter, the temperature rise will be higher than 73°C.

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