Anticipation of power problems

Battery chargers

DEMCO 12 and 24 Volt light fittings with fluorescent - and compact lamps are to be powered by DC current.
The DC current is to be drawn from either a battery or a battery charger that has a good DC output without peak voltages.

Problems often occur when the electric power is drawn directly from a battery charger and the battery is disconnected. In this case peak voltages can damage the electronics. Therefore a battery charger should always be connected to the battery, and **never** direct to the light fittings. The battery functions as a capacitor and levels off the peak voltages of the battery charger.

Wiring to light fittings

Light fittings with fluorescent lamps and compact lamps are to be connected directly to the battery. No other "consumers" should be allowed on the wiring to the battery, in order to avoid induction currents. Induction currents are hazardous to the electronics of the light fittings. Therefore the electric circuits of lighting and other "consumers" always are to be separated.

Low voltages

DEMCO inverters operate even below their nominal voltage. When the voltage is too low, the inverters will try to supply the necessary current for the fluorescent lamps: the electronic components get too hot and their life time is shortened substantially.

For example these problems occur when:

- the battery of mobile vehicle shops will not be charged in a proper way when the engine doesn't run enough. When the lighting is operated continuously, the battery will have a too low voltage to supply the light fittings in a proper way;
- installations have too thin wiring and will face voltage loss (see below).

Calculation of voltage loss in copper wiring

Too thin copper wiring will cause a voltage loss.
When the voltage loss is too high, the light fittings operate at a voltage that is too low.
This causes:

- difficult starting in cold circumstances;
- reduction of the life time of inverters;
- reduction of the life time of fluorescent lamps.

The maximum voltage loss should not exceed 5%.

With the following formula the voltage loss in a copper cable can be calculated:

$$\frac{2 \times \text{distance between battery and light fittings (m)} \times \text{factor } 0.0175}{\text{cable diameter in mm}^2} \times \text{amperes (total current of the light fittings)} = \text{voltage loss}$$

In a 12 Volt installation the voltage loss should not exceed 5% x 12 Volt = 0.6 Volt and in a 24 Volt installation the voltage loss should not exceed 5% x 24 Volt = 1.2 Volt.

Example: a truck fitted with 10 light fittings of 1.5 ampere each, distance to the battery is 15 meter, cable diameter is 2.5 mm^2 has a voltage loss of:

$$\frac{2 \times 15 \times 0.0175}{2.5} \times (10 \times 1.5) = 3.15 \text{ Volt.}$$

The outcome of the formula shows that either in a 12 Volt or 24 Volt installation this voltage loss exceeds the 5% mark.
This can be solved by mounting thicker or more copper cables in our example.

Light output lamps

The Lumen per watt ratio of a common light bulb is approximately 10 Lumen per Watt. The largest part of the energy consumption is converted into heat! Only 5% is converted into light!

Fluorescent tubes and compact lamps generate less heat. The Lumen per Watt ratio of a PLS11 Watt compact lamp at room temperature is 80 Lumen per Watt.

Illumination at low temperatures

At low ambient temperatures a light fitting equipped with a PLS 11 Watt fluorescent compact lamp has -in combination with the DEMCO inverters- a **2 to 3 times higher** light output than a light fitting equipped with the often used 8 or 13 Watt fluorescent tube!

Research from Philips and in our own laboratory shows that the light output of a fluorescent compact lamp at low temperatures can be increased by the application of a cap on the outer end of a compact lamp, the so called heat cap. Dutch Electro applies this heat cap in all light fittings equipped with fluorescent compact lamps (PLS and PLL).

Besides the standard compact lamps, Philips has developed a special fluorescent compact lamp that is very suitable for illumination at low temperatures: the PLL 24 Watt **Polar** and PLL 36 Watt **Polar**. These fluorescent compact lamps have an even higher light output at low temperatures than the standard fluorescent compact lamps. The standard compact lamps as well as the Polar compact lamps are suitable for low temperature applications.

Please inquire for more specific information on illumination at low temperatures.

Cable gland for cable entry

The application of a cable gland for cable entry makes a fitting air tight. In case of large temperature fluctuations, there will occur a pressure difference and the **possibility of water leakage!** Therefore we don't advise the application of a cable gland.

If the fitting is mounted water tight -for example by sealing the fitting to the surface of the vehicle- the application of a cable gland is not necessary.

Cleaning diffusers

Dutch Electro fluorescent fittings are, in general, equipped with polycarbonate diffusers.
These diffusers need to be cleaned in the following order:

- *Dusting*
  Dust with a soft, damp cloth or chamois. Dry or gritty cloths may cause surface scratches and create a static electric charge on the surface of the polycarbonate diffusers.
- *Lukewarm cleaning*
  Clean polycarbonate diffusers with mild soap and lukewarm water. Use a clean soft cloth, applying only light pressure. Rinse with clean water and dry by blotting with a damp cloth or chamois.
- *Do not apply*
  Window cleaning sprays, kitchen scouring compounds or solvents such as acetone, gasoline, alcohol, oils, carbon tetrachloride or lacquer thinner or any substance that is not compatible with these polycarbonate diffusers. These can scratch the surface and / or weaken the products causing small surface cracks called 'crazing'.