

Customised speed programming of energy-saving motors for refrigeration



„Energy-saving axial fan – a profitable investment!“

Introduction

Reducing energy consumption through improved efficiencies has become one of the most important demands of our time. When it comes to refrigeration plants, especially to cooling cabinets, refrigerated shelves and freezer chests, there is rising demand for energy-efficient components. However, the fans used inside to cool these units are still mainly powered by shaded pole motors, which are not very efficient. Obviously, going for an energy-saving axial fan in such applications is a profitable investment.

Economic and efficient

Non-stop operation (24 h/day) and the far-too-frequent use of uneconomic and outdated motor systems cause very high energy costs in refrigeration plants. Using the ebm-papst energy-saving motors - optimised for these applications – instead results in a substantial saving potential for the end user.

Though their primary costs are higher for technical reasons, these energy-saving motors pay for themselves within one to two years.

Another advantage lies in the fact that the electronically commutated external-rotor motors have a very long service life. This just emphasizes how economic these motors are.

The second speed step for night operation at lower refrigeration capacity, easily realised electronically, helps to take advantage of still more energy-saving potential.

The solution with EC motors (EC = electronically commutated) has the great advantage of freely programmable speeds that can be adapted to any customer application. Using ebm-papst EC fans, the customer can therefore individually adjust and adapt his air performance in the design and development phase of his refrigeration plant already.

Once there are serial deliveries, the customer can then either use a standard fan and program it himself, or he can get large quantities of the fan adapted to his specifications. Based on one basic electronic design, customised variants are then programmed in production (end of line), thus making it possible to take specific customer demands into account at very little expense.

Moreover, the option of setting the speed himself gives the service technician in the field a far better chance of adapting the plant to changes in application and ambient conditions.

Programming function

Either a PC or a laptop with USB interface is needed. ebm-papst supplies its customers with a PC monitor programme, the programming adapter with the relevant connecting cables and a wall power supply as accessory (**figure 1**).

The programming adapter facilitates communication between PC and motor/fan interface via a USB port. As soon as a software driver is installed, all standard USB-connectable Microsoft operation systems are supported. Downward compatibility to USB standard 1.1 and 2.0 is given.

Customised speed programming of energy-saving motors for refrigeration via USB interface

The USB-RS232 converter used transcribes the rather complicated USB protocol as RS232 protocol and transmits the data to an 8-bit micro-controller. This micro-controller monitors the connection set-up with the connected motor and, via I²C bus, transmits data to the EEPROM found on the motor electronics.

The housing of the programming adapter contains three integrated LEDs for visual display and indication of applied operating voltage, data transmission and alarm (figure 2).

Software

The user-friendly surface and the operating manual as part of the delivery scope enable the user to do his own programming within a short period of time.

The operating software designed by ebm-papst monitors the entire writing and reading process. This software can be operated under all conventional USB-supported Microsoft operating systems.

When the software is started, 1000 rpm are loaded for both speeds.

The user now has the choice to either press the "read" button and read out the speeds as saved in the motor, or to enter new speed values and to transmit them to the motor by pressing the "write" button.



Figure 1: Energy-saving motor as axial fan design being programmed

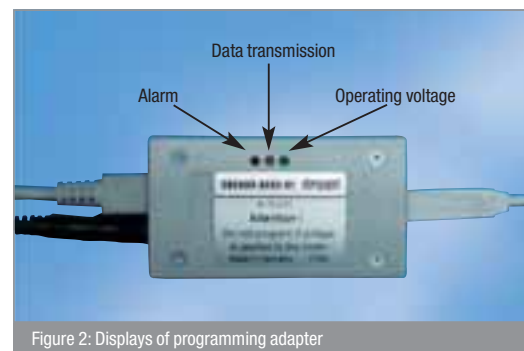


Figure 2: Displays of programming adapter

The transmission time elapsed is indicated optically (see figure 3). The customer can also switch to various interface ports via PC surface.

Transmission progress display indicates the transmission period elapsed

After transmission, the colour of the input boxes changes from red to white.

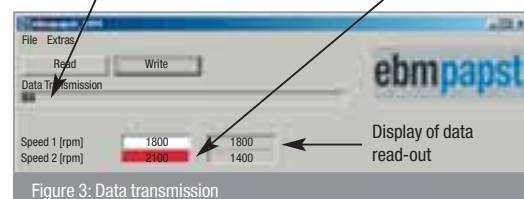


Figure 3: Data transmission

„Programming adapter – customer-friendly and cost-saving!“

The software also allows the user to select one of the languages provided (German, English, French, or Italian) in the menu and to gain information on the software version supplied.

Moreover, individual speed profiles can be generated and saved and, whenever needed, these can be reloaded and retransmitted. This enables the customer to save and use frequently recurring setting profiles.

The software features various alarm windows to warn the user of transmission failures and to inform him of the cause of alarm.

Perspective

In future, ebm-papst EC motors will come equipped with a programming interface as a standard. This new feature will make it far easier to adapt the motors to specific application demands and to also carry out post-assembly software updates.

This makes it possible to restrict the diversity of types to a few basic designs, with the manifold customer applications to be realised - in terms of software – shortly before these customised designs are to be shipped or once they have reached the customer (on site). This new standard reduces the logistic expenditure and the variant management for both ebm-papst and the customer enormously, thus allowing all parties to save costs.



Thomas Kohlschreiber
Electronics design
ebm-papst Muldingen GmbH & Co. KG