OPEN FRAME SOLENOIDS

1. Design and Features

The open frame solenoid is the simplest form of construction of all the types of solenoids manufactured, and is shown in Fig. 1. Though the design is simple in construction, obtaining maximum performance requires the use of high permeable steel, and good quality manufacturing technology to assure the minimizing of air gaps in the metal frame assembly. Additionally, high quality coil winding techniques are used to maximize the number of coil windings that are housed in the allowable space.

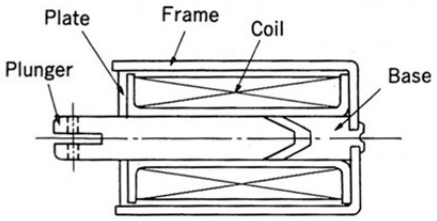

Fig. 1

2. Stroke and Force

The open frame solenoid is designed for long strokes. As such, the pole piece designs are conical to maximize performance over longer strokes. To improve efficiency, the solenoid stroke should be minimized in the application.

3. Operational Considerations

A) Temperature

The coil data for the open frame solenoids shows the values at ambient temperature 20℃ and with a standard heat sink. If a solenoid is used at a rating shown in the coil data, it is designed so that the coil temperature rises and reaches equilibrium at approximately 65℃. In applications where the ambient temperature is higher than 40℃, possible thermal damage can occur. Temperature rise tests should be performed by the customer to assure that the coil does not reach 105℃. Coils can be constructed to operate at temperatures higher than 105℃ without thermal damage. Please consult the factory for details.

B) Return Spring

The open frame solenoid does not include a return spring. Therefore, the application must include a return spring.

C) Plunger and Shaft Modifications

It is not recommended that customer modify the plunger or shaft, as the shafts are manufactured and plated at the factory. Any special configurations can be supplied. Please consult the factory for details.

D) Installation of Solenoid

The open frame solenoid uses tapped holes for mounting in the frame.

Caution needs to be observed that the mounting screws used to attach these solenoids are the correct length so as not to damage the coil.

4. General Characteristics

Insulation class	Class A (105℃) Lead wire class A (105℃)
Dielectric strength	AC 1000V 50/60 Hz 1 min. (at normal temperature and normal humidity)
Insulation resistance	More than 100 Mohm at DC 500V megger (at normal temperature and normal humidity)
Expected life	300,000 cycles

(Solenoid cycle life is very dependent upon side load, frequency of use, and environmental conditions. Cycle life tests should be performed by the customer.)

5. How to Select a Solenoid

Before selecting an open frame solenoid, the following information must be determined :

A) Force

The actual force required in the application should be increased using a safety factor multiplier of 1.3 to arrive at the force value that should be used in your specification.

B) Duty Cycle

Use the aforementioned formula to calculate duty cycle. Also note the maximum on time. (See page 2)

C) Stroke

Stroke is determined by application requirements.

D) Operating Voltage
Operating DC voltage is determined by the application and voltage available.

After determining these specifications, one can find the correct size solenoid for the application, using the force-stroke characteristic tables and graphs. The coil data is also shown for different sizes of magnet wire. If the exact operating voltages is not in the coil data table, please consult the factory for details.
To determine the force output of the solenoid after temperature rise, please use the amp-turn force graphs (page 100) after calculating the amp-turns.

6. Ordering Information

●When ordering an open frame solenoid, the correct part number needs to be determined, from the catalog information.
●Example of a complete part number :
SK0520A06AA

7. Labeling

For open frame solenoids the part number labeling is as follows :
A) Standard Solenoid (no modifications).
The solenoid label will have the part number and the date code (which identifies the year and week of manufacture).

Example : SK0520A06AA 9405

Solenoid Size (Type No.)
Date Code (year and week)

B) Special Configuration (required for any modification to a standard design)
Any change from the standard catalog design requires that a custom part number be assigned, which will also include the date code of manufacture.

Example : M93020F 9405

Special part number
Date Code (year and week)