

# ATKOMATIC Solenoid Valves

## *Valve Ordering Information*

ATKOMATIC valves can be ordered from any of the Circle Seal distributors. A complete list of all authorized stocking distributors is on the Internet at <http://www.circle-seal.com>.

There are 3 methods of ordering ATKOMATIC solenoid valves:

- 1 Specifying the current catalog number
- 2 Specifying the complete application information
- 3 For some older valves, referencing a serial number.

### **Method 1: Specifying the current catalog number**

This is the preferred method for ordering solenoid valves.

These catalog numbers are constructed as outlined in the product offering section and more detailed instructions are on pages 4–5. Use of these catalog numbers eliminates the need for communicating lengthy text describing all of the application information. Use of these catalog numbers will facilitate order processing in the factory.

Note that the same application information as described in Method 2 must be obtained from the customer to create the catalog number.

### **Method 2: Specifying the complete application information**

- 1 Valve type: normally open or normally closed. This is the position that the valve will return to when electricity is removed.
- 2 Pilot operated, direct lift of semi-direct lift. This selection can be made by reviewing the customer's application with regard to minimum pressure drop and flow requirements (page 4-5).
- 3 Pipe size. If this is not known, it can be determined from the flow,  $C_v$ , and/or pressure drop requirement obtained from the customer and/or using the formula from the catalog (see page 13 of the Atkomatic Technical Manual).
- 4 Material of construction: bronze or stainless steel. This selection is made considering compatibility with the fluid and sometimes determined by pressure and size requirements.
- 5 Fluid: the exact type and state (gas or liquid). The fluid temperature is required if it is elevated or if the fluid is more viscous than 150 SUS at room temperature or if fluid compatibility is an issue.
- 6 Voltage: both the voltage and frequency (if different from 60 Hz, the assumed default).
- 7 Maximum operating pressure (maximum differential pressure).

Note that this is not necessarily the maximum pressure at which a particular valve series can perform. More often than not, applications require a specific operational capability that is below the maximum operating pressure of the valve series. Specifying the actual operating pressure requirement allows maximizing the overall performance of the valve by appropriate sizing of the valve's internal orifices. Select the pressure category that matches or most closely exceeds the maximum operational requirement for the application.

- 8 Ambient temperature if elevated above normal room temperature 104° F (40° C), the maximum ambient for continuous coil operation).
- 9 Options: valve position indicator, manual opening device, or manual throttling device.

Note: If the 4 or 5 digit catalog base number is already known steps 1 through 4 have already been completed.

### **Method 3: Referencing a serial number**

This may apply when an order is placed to duplicate a previously built ATKOMATIC Solenoid Valve. The serial number is a 6-digit number that appears on the valve's nameplate at the top of the coil housing. Valves produced after July, 1998 are not serialized and this method of ordering is not applicable to them. The factory maintains files of serialized valves built between July, 1990 and July, 1998 and may be able to duplicate these upon order. Due to incomplete records, this is not a recommended method of ordering valves.

Without this information it is not possible to select a valve or accept and process an order.

### **Repair Kits Ordering Information**

To order a repair kit for a valve, specify the valve catalog number preceded by a K\ . For instance the repair kit for a 31820–200PMAA1S valve is K\31820–200PMAA1S. Typical contents of repair kits are shown in the section for each valve series in this catalog.

*NOTE: All ATKOMATIC valves are built exclusively for the type of fluid and pressure indicated on the product nameplate. Attempted usage at higher pressures and/or different fluids can result in immediate or delayed valve malfunction (failure to open or close and/or leakage).*

# Instructions for Creating the Solenoid Valve Catalog Numbers

Note: Not all the categories apply to all valve series (see the catalog numbering key for each valve series in the Product Offering section, pages 7-70).

1 Match the customer's needs to a catalog base number or valve series using the process outlined in steps 1 through 4 of Method 2 (specifying the complete application information) of the previous section.

2 Fill in the first 3 digits after the dash with the appropriate coil voltage code leaving zeros in 2 of the 3 spaces for the unused voltages (see page 3-4 of the Atkomatic Technical Manual).

*Note: The valves are designed to operate reliably with a voltage within  $\pm 10\%$  of the nominal catalog voltage for normally closed valves and  $+10\% - 0\%$  for normally open valves.*

3 Select the coil insulation temperature rating: class H (180° C rise) or class B (155° C rise). Class B coils can be successfully used when fluid temperatures are between 0° and 220° F (-18° C and +104° C) and the ambient is at room temperature. Class H coils are recommended for other ambient and fluid temperature ranges or where maximum coil life is desired. Usage examples for class H coils include cryogenic fluids, steam, and hot locations such as boiler fuel feed. If in doubt, default to class H which, although slightly more expensive, provides the customer a higher degree of coil burnout protection. Note that class H coils are typically used by default on most stainless steel valves and class B coils or class H coils can be specified on the bronze valves (see page 5 of the Atkomatic Technical Manual).

4 Select the connection type. The default is pipe thread (NPT) which is the preference of the majority of industrial customers. British pipe threads are frequently specified for the Japanese market. AND threads, Aminco threads, flanges, tube stubs, pipe stubs, socket welded connections, butt welded connections, and couplings are options that cause the valve to become a project valve that is numbered differently than catalog valves.

5 Select the operating pressure (for pilot operated and semi-direct lift valves) or orifice size (for direct lift valves)\*. This pressure is the actual maximum pressure differential that the valve will be operated at. This can be (and frequently is) less than the maximum possible pressure for a particular valve series (see page 1 of the Atkomatic Technical Manual for an explanation of operational pressure and the individual valve series pressure capabilities in the Product Offering section, pages 7-70).

a) Direct lift valves

The diameter of the flow orifice specified determines the flow capacity or Cv of the valve. Note that as larger orifice sizes are selected, the pressure differential that the valve can open against is decreased. Conversely, increasing the differential pressure across the valve requires the use of a smaller flow orifice and therefore results in a lower flow capacity or Cv. This relationship between operational pressure and flow orifice sizing is displayed on charts in the catalog pages for each valve. Note that the viscosity of the fluid has a significant influence on the operational pressures. This is caused by the viscous drag on the plunger as it moves through the fluid during valve opening. This effect is also displayed in the catalog tables which show different operational pressures for three fluids with different viscosity's (representative fluids for these 3 categories are air, water, and hydraulic oil). The pressures given are the maximum operational differential pressures that the valves can operate reliably with the particular orifice selected.

\* The 50000 Series normally open direct lift valve is an exception to this. The operating pressure range must be known and is specified by the second digit of the catalog number. This is because the construction of the pressure containment changes for pressures above 1500 psi (104 bar).

b) Pilot operated and semi-direct lift valves

The maximum operational differential pressure the valve is built to operate against is specified here. Note that this is not necessarily the maximum pressure at which a particular valve series can perform. More often than not, applications require a specific operational capability that is below the maximum pressure rating of the valve. Specifying this actual pressure requirement allows maximizing the overall performance of the valve by appropriate sizing of the valve's internal orifices. Select the pressure category that matches or most closely exceeds the maximum operational requirement for the application.

6 Select the main seat and pilot seat material(s)

The following is a set of general rules to guide in the selection of seat materials:

a) Select materials that are chemically compatible with the fluid at operational temperatures. This may at first sound difficult but actually is no different than selecting seal material for any other type of product including other Circle Seal components. There are many sources for chemical compatibility data such as:

- 1) The technical section of Circle Seal's catalog.
- 2) Parker's o-ring handbook.
- 3) *Chemical Resistance Guide for Elastomers* by Kenneth Pruett, Compass Publications, P.O. Box 2276, La Mesa, CA 91943, (619) 589-9336

b) Rubber seats (disk & pilot) cannot be used over 500 psig. This is the maximum pressure at which these seals will perform

reliably. Plastic (PTFE or PCTFE) or metal seats must be used for pressures above 500 psi. In full ported valves, a rubber disc seal can be physically displaced by flow forces if exposed to pressure drops exceeding 500 psig. In direct lift valves pressure drops over 500 psi will deform a rubber seat reducing the orifice size and although the valve may still function, flow will be restricted.

- c) Rubber seats (Buna N, Viton®, & EPR) are capable of effecting the most positive seals especially at low pressures. See the factory leakage standards section for the maximum allowable leak rates for production acceptance testing. Typical temperature limitations for rubber seats and seals are:

Buna N: -65° F to +275° F (-54° C to +135° C)

Viton®: -15° F to +400° F (-29° C to +204° C)

EPR: -65° F to +300° F (-54° C to +149° C)

Note that these temperatures are the maximum that the compound can withstand and their suitability with a specific fluid may require more restrictive temperature limitations.

- d) Plastic seats (PTFE & PCTFE) can seal reliably with only moderate leakage at low pressure differentials. See the factory leakage standard section (see page 15 of the Atkomatic Technical Manual) for the maximum allowable leak rates for production acceptance testing. Typical temperature limitations for plastic seats and seals are:

PCTFE: -400° F to +400° F (-240° C to +204° C)

PTFE: -450° F to +500° F (-268° C to +260° C)

Note that these temperatures are the maximum that the compound can withstand and their suitability with a specific fluid may require more restrictive temperature limitations.

- e) Metal seats (brass or stainless steel). Metal pilot seats are commonly used in liquid applications where the fluid does not present a hazard from a flammability or toxic aspect. These applications include most water, oil, liquid nitrogen, etc. applications. The purpose of using metal pilot seats is that the life of the product is enhanced as compared to a rubber or plastic pilot seats. Also the operational pressure capability is increased (the valve is able to operate at higher pressures more reliably) with a slightly increased leakage allowance. Metal disc or main valve seats are typically used where temperature limitations require their use.

#### 7 Select the seal material

Generally, use the same material for the external seals as was used for the valve seats i.e. if Buna N seats are used, then Buna N body seals are also used. (An exception is PCTFE which is not available in o-rings in the standard catalog product). The valve body seal materials are not subject to the 500 psi limitation that the seats; for instance, PTFE disc seats can be used at high pressure with Viton® body seals.

#### 8 Specify the fluid media by type category (see page 1 of the Atkomatic Technical Manual for assistance in selection the fluid category). The categories are:

- a) Gas: this includes all types of fluids that remain in the gaseous state
- b) Low viscosity liquid: all liquid fluids up to a viscosity of 40 SUS (4.3 centistokes) such as water, mineral oil, gasoline, JP-4, #2 diesel & fuel oil, and other light oils depending on their temperature
- c) High viscosity liquid: all liquid fluids from a viscosity of 41 SUS to 150 SUS (32 centistokes) such as light to medium weight oils depending on their temperature (hydraulic fluids such as MIL-5606, #3 & #4 diesel & fuel oil)
- d) Steam
- e) Cryogenic fluids: includes all fluids that can be in either a liquid or gaseous state such as liquid nitrogen, liquid oxygen, liquid hydrogen, liquid argon, CO<sub>2</sub>, etc.

*Note: In cases where the fluid can exist at either a liquid or gaseous state, select a cryogenic make-up regardless of the temperatures involved. An example of this would be butane, which can be a gas or liquid depending on pressure at temperatures at or near room temperature.*

#### 9 Select the coil housing (see pages 8 and 12 of the Atkomatic Technical Manual for coil housing information).

- a) Standard NEMA 1
- b) Waterproof NEMA 4
- c) Explosion-proof NEMA 7
- d) Combination explosion- and waterproof NEMA 4 & 7

#### 10 Specify options desired (available on selected series, see page 71).

- a) valve position indicator
- b) manual opening device
- c) manual metering device

Consult with you local stocking distributor or the sales department at the factory for assistance in selecting and specifying valve products for specific applications.