

# Installation & Maintenance Instructions

ASCO RED-HAT II OPEN-FRAME, GENERAL PURPOSE, WATERTIGHT/EXPLOSION  
PROOF SOLENOIDS OPTIONAL FEATURE FOR OPEN FRAME (GENERAL PURPOSE)  
CONSTRUCTION ONLY

**SERIES**  
8003G/H  
8007G/H  
8202G/H

## **⚠ WARNING** To reduce the risk of death, serious injury, or property damage:

- Personnel installing, maintaining, or operating this equipment must be qualified and follow these instructions. See also separate solenoid installation & maintenance instructions. Keep this document.
- Before installing or maintaining the valve, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area.

## **⚠ ADVERTISSEMENT** Pour réduire les risques de décès, de blessures graves ou de dommages matériels:

- Le personnel qui installe, entretient ou exploite cet équipement doit être qualifié et suivre les instructions qui s'y rapportent. On suivra aussi les instructions d'installation et de maintenance de la bobine délivrées séparément. Gardez ce document.
- Avant d'installer ou d'intervenir sur la vanne, couper le courant, dépressuriser la vanne, éteindre toutes les flammes nues et éviter tout type d'étincelle ou d'ignition. Évacuer les liquides dangereux ou combustibles vers un endroit sûr.

### — SERVICE NOTICE —

ASCO® solenoid valves with design change letter “G” or “H” in the catalog number (ex. 8210G1) have an epoxy encapsulated ASCO™ Red Hat II™ solenoid. This solenoid replaces some of the solenoids with metal enclosures and open-frame constructions. Follow these installation and maintenance instructions if your valve or operator uses this solenoid.

See separate instructions for basic valve.

### DESCRIPTION

Catalog numbers 8003G/H, 8007G/H and 8202G/H and are epoxy encapsulated pull-type solenoids. The green solenoid with lead wires and 1/2 conduit connection is designed to meet Enclosure Type 1-General Purpose, Type 2-Dripproof, Types 3 and 3S-Raintight, and Types 4 and 4X-Watertight. The black solenoid on catalog numbers prefixed “EF” or “EV” is designed to meet Enclosure Types 3 and 3S-Raintight, Types 4 and 4X-Watertight, Types 6 and 6P-Submersible, Type 7, Explosionproof Class I, Division I Groups A, B, C, & D and Type 9, -Dust-Ignitionproof Class II, Division I Groups E, F & G. The Class II, Groups F & G Dust Locations designation is not applicable for solenoids or solenoid valves used for steam service or when a class “H” solenoid is used. See *Temperature Limitations* section for solenoid identification and nameplate/retainer for service. When installed just as a solenoid and not attached to an ASCO valve, the core has a 0.250-28 UNF-2B tapped hole, 0.38 or 0.63 minimum full thread.

NOTE: Catalog number prefix “EV” denotes stainless steel construction.

Solenoid catalog numbers 8202G/H1, 8202G/H3, 8202G/H5 and 8202G/H7 are epoxy encapsulated push-type, reverse-acting solenoids having the same enclosure types as previously stated for Catalog numbers 8003G/H1 and 8003G/H2. 8007G/H are 3-way solenoid operators with a pipe port or adapter, exhaust protector or vent at the top of the solenoid base sub-assembly.

**Series 8003G/H, 8007G/H and 8202G/H solenoids are also available in:**

- **Open-Frame Construction:** The green solenoid may be supplied with 1/4” spade, screw or DIN terminals. (Refer to Figure 4)

- **DIN Plug Connector Kit No. K236034:** Use this kit only for solenoids with DIN terminals. The DIN plug connector kit provides a two pole with grounding contact DIN Type 43650 construction (See Figure 6).

- **Panel Mounted Construction:** These solenoids are specifically designed to be panel mounted by the customer. Refer to Figures specified in this I&M and the section on *Installation of Panel Mounted Solenoid* for details.
- **Junction Box:** This junction box construction meets Enclosure Types 2, 3, 3S, 4, and 4X. Only solenoids with 1/4” spade or screw terminals may have a junction box. The junction box provides a 1/2” conduit connection, grounding and spade or screw terminal connections within the junction box (See Figure 5).
- **Multipin Connectors:** All Multipin connectors (VT, VB, ZT, ZB) do not have any enclosure ratings.

NOTE: For China RoHS Hazardous Substances table, please go to the link below or scan QR code:

[www.asco.com/ChinaRoHSDisclosure](http://www.asco.com/ChinaRoHSDisclosure)



### SOLENOID CHARACTERISTICS

Series 8003G/H and 8007G/H - When the solenoid is energized, the core is drawn into the solenoid base sub-assembly.

**IMPORTANT: When the solenoid is de-energized, the initial return force for the core, whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force for AC construction is 11 ounces, and 5 ounces for DC construction.**

Series 8202G/H - When the solenoid is energized, the disc holder assembly seats against the orifice. When the solenoid is de-energized, the disc holder assembly returns.

**IMPORTANT: Initial return force for the disc or disc holder assembly, whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force is 1 pound, 5 ounces.**

### Temperature Limitations

For maximum solenoid ambient temperatures, refer to chart. The temperature limitations listed, only indicate maximum application temperatures for field wiring rated at 90 °C. Check catalog number prefix and watt rating on nameplate to determine maximum ambient temperature. See valve installation and maintenance instructions for valve temperature limitations.

NOTE: For steam service, refer to *Wiring* section, *Junction Box* for temperature rating of supply wires.

Temperature Limitations For Series 8003G, 8007G or 8202G			
Watt Rating	Catalog Number Coil Prefix	Class of Insulation	Maximum Ambient/ Fluid Temperature
10.1 & 17.1	NONE, EF, EV, KF, KP, SC, SD, SF, SP, VT, VB, ZT & ZB	F	125 °F (52 °C)
10.1, 17.1 & 24.6	(EV/EF)HB, (EV/EF)HT, KB, KH, KC, SS, ST, SW, SU, (EV/EF)HC	H	140 °F (60 °C)
11.6 & 22.6	NONE, EF, EV, KF, KP, SC, SD, SF, SP, VT, VB, ZT & ZB	F	104 °F (40 °C)
11.6 & 22.6	(EV/EF)HB, (EV/EF)HT, KB, KH, SS, ST, SU, SV	H	104 °F (40 °C)
15.6	NONE, KB, SS, SV	H	104 °F (40 °C)
12.0	NONE, EF, EV, KF, SC, SF, VT, ZT	F	131 °F (55 °C)

Approved minimum fluid and ambient temperature is -76 °F (-60 °C) for the operator. Actual temperature can be limited depending on valve limits.

Temperature Limitations for Series 8003H, 8007H and 8202H Solenoids						
Prefix <sup>1</sup>	Coil Class	Watt Ratings			Maximum Ambient/ Fluid Temperature	
		AC		DC		
		60 Hz	50 Hz			°C
EF, EV	FT	10.1	10.1	-	52	125
EF, EV	FB	17.1	17.1	-		
	FT	10.1	10.1	-	55	131
	FB	17.1	17.1	-		
	HT	-	-	11.6		
	HF	-	-	15.6		
	HB	-	-	22.6		
EF, EV	HT	-	-	11.6	40 <sup>2</sup>	104 <sup>2</sup>
EF, EV	HF	-	-	15.6		
EF, EV	HB	-	-	22.6		
	HT	10.1	10.1	-		
	HB	17.1	17.1	-		
EF, EV	HT	10.1	10.1	-	60 <sup>3</sup>	140 <sup>3</sup>
EF, EV	HB	17.1	17.1	-		
EF, EV	HC	-	-	24.6		

<sup>1</sup> = EF, EV data applies to Explosionproof coils only.

<sup>2</sup> = Some DC solenoid valves can be operated at maximum ambient temperature of 55 °C / 131 °F with reduced pressure ratings. See valve I&M for maximum operating pressure differential ratings.

<sup>3</sup> = Steam Service Valves have a maximum ambient temperature of 55 °C / 131 °F.

## INSTALLATION

### Product Verification

Check nameplate for correct catalog number, service, and wattage. Check front of solenoid for voltage and frequency. Never apply incompatible fluids or exceed pressure rating of the valve. Contact ASCO or your supplier for more information about this valve or other valve options if this valve is not suitable for your application.

### Strainer or filter requirement

To protect the solenoid valve, install a strainer or filter, suitable for the service involved, in the inlet side as close to the valve as possible. Clean periodically depending on service conditions.

**⚠ WARNING** Electrical hazard from the accessibility of live parts. To prevent the possibility of death, serious injury or property damage, install the open - frame solenoid in an enclosure.

**⚠ ADVERTISSEMENT** Risque d'accès aux parties électriques actives. Afin d'éviter tout risque de mort, blessure ou dommage, installer la bobine dans un boîtier.

### FOR BLACK ENCLOSURE TYPES 7 AND 9 ONLY

**⚠ CAUTION** To prevent fire or explosion, do not install solenoid and/or valve where ignition temperature of hazardous atmosphere is less than 165 °C. On valves used for steam service or when a class "H" solenoid is used, do not install in hazardous atmosphere where ignition temperature is less than 180 °C. See nameplate/retainer for service.

**⚠ ATTENTION** Afin d'éviter le risque de feu ou d'explosion, ne pas installer la bobine ou l'électrovanne ou la température d'inflammation en atmosphère explosible est inférieure à 165 °C. Pour les vannes vapeur ou lorsqu'une bobine de classe H est utilisée, ne pas installer en atmosphère explosible lorsque la température d'inflammation est inférieure à 180 °C. Consulter les conditions d'utilisations sûres indiquées sur le produit ou dans la notice.

NOTE: These solenoids have an internal non-resettable thermal fuse to limit solenoid temperature in the event that extraordinary conditions occur which could cause excessive temperatures. These conditions include high input voltage, a jammed core, excessive ambient temperature or a shorted solenoid, etc. This unique feature is a standard feature only in solenoids with black explosionproof/dust-ignitionproof enclosures (Types 7 & 9).

**⚠ CAUTION** To protect the solenoid valve or operator, install a strainer or filter, suitable for the service involved in the inlet side as close to the valve or operator as possible. Clean periodically depending on service conditions. See ASCO Series 8600 and 8601 for strainers.

**⚠ ATTENTION** Afin de protéger l'électrovanne ou l'actionneur, installer une crépine ou un filtre adapté le plus proche possible en amont de l'électrovanne ou de l'actionneur. Nettoyer périodiquement le filtre en fonction des conditions d'utilisation. Se référer aux séries 8600 et 8601 pour les crépines.

### Positioning

This solenoid is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

### Wiring

**⚠ WARNING** To reduce the risk of electrocution, fire, or property damage, wiring must comply with local codes and the National Electrical Code.

**⚠ ADVERTISSEMENT** Pour réduire les risques d'électrocution, d'incendie ou de dommages matériels, le câblage doit être conforme aux codes locaux et au NEC.

All solenoids supplied with lead wires are provided with a grounding wire which is green or green with yellow stripes and a 1/2" conduit connection. To facilitate wiring, the solenoid may be rotated 360°. For explosionproof solenoid version, the conduit lead wires are factory sealed for use in hazardous locations. On some solenoids, a grounding wire (green or green with yellow stripes) is provided.

**⚠ WARNING** The solenoid must be grounded with grounding wire (if included) or rigid metallic conduit - do not rely on pipe as ground.

**⚠ ADVERTISSEMENT** La bobine doit être mise à la terre avec un fil de terre (le cas échéant) ou via un conduit métallique rigide - n'utilisez pas la tuyauterie comme masse.

**⚠ CAUTION** Cryogenic Applications - Solenoid lead wire insulation should not be subjected to cryogenic temperatures. Adequate lead wire protection and routing must be provided.

**⚠ ATTENTION** Application cryogénique. Les câbles électriques ne doivent pas être soumis à des températures cryogéniques. Une protection adéquate des câbles électriques doit être fournie.

**⚠ CAUTION** (For 12.0-Watt construction only): These solenoids are provided with a special coil containing solid state components that can be damaged by transient voltages, over voltage, high temperatures or improper valve assembly.

**⚠ ATTENTION** (Construction 12.0 watts uniquement): ces électrovannes sont fournies avec une bobine spéciale contenant des composants semi-conducteurs qui peuvent être endommagés par des tensions transitoires, des surtensions, des températures élevées ou un assemblage inapproprié de la vanne.

- When establishing the valve's electrical connections, the circuit that it is being connected to needs to have the proper SPD (Surge Protective Device) installed. This is to limit the effects of over voltages and impulse currents caused by lightning and switching surges occurring on the power lines. Failure to provide this conditioning on the affected circuits can lead to either open circuiting or short circuiting of the solenoid valve coil. Information on the proper sizing of SPDs and installation requirements can be found in numerous industry standards such as IEC 61643---12, IEEE STD. C62.23, IEEE

STD. C62.41.1 and IEEE STD. C62.41.2. SPDs used should be capable, based on the class of the installation, of limiting the  $U_p$  (Voltage Protection Level) to 600 volts for coils marked 120 VAC or less, and limiting the  $U_p$  to a 1000 volts for coils marked with voltages greater than 120 VAC.

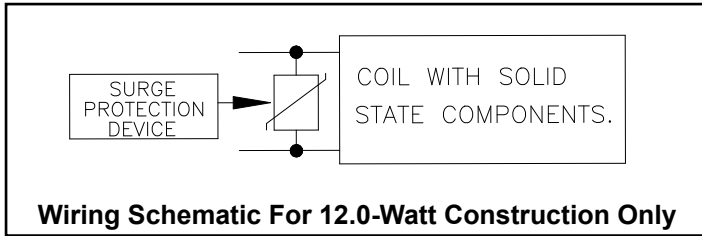
- The coil is designed for continuous duty in the maximum ambient temperature.

NOTE: The maximum ambient temperature should not be exceeded for prolonged periods of time.

- Do not apply voltage in excess of 110% of the nominal voltage.
- Do not energize (or apply voltage to) the coil unless the solenoid is completely assembled.

**⚠ CAUTION** Failure to comply with the above can result in premature coil failure.

**⚠ ATTENTION** Le non-respect des consignes ci-dessus peut entraîner une défaillance prématurée de la bobine.



### Additional Wiring Instructions For Optional Features:

- Open-Frame solenoid with 1/4" spade terminals**

For solenoids supplied with screw terminal connections use #12-18 AWG stranded copper wire rated at 90 °C or greater. Torque terminal block screws to 10±2 in-lbs [1,1±0,2 Nm]. A tapped hole is provided in the solenoid for grounding, use a #10-32 machine screw. Torque grounding screw to 15-20 in-lbs [1,7-2,3 Nm]. On solenoids with screw terminals, the socket head screw holding the terminal block to the solenoid is the grounding screw. Torque the screw to 15-20 in-lbs [1,7-2,3 Nm] with a 5/32" hex key wrench.

- Junction Box**

The junction box is used with spade or screw terminal solenoids only and is provided with a grounding screw and a 1/2" conduit connection. Connect #12-18 AWG standard copper wire only to the screw terminals. Within the junction box use field wire that is rated 90 °C or greater for connections. For steam service use 105 °C rated wire up to 50 psi or use 125 °C rated wire above 50 psi. After electrical hookup, replace cover gasket, cover, and screws. Tighten screws evenly in a crisscross manner.

Multipin Connector		
Connector Type	Mating Connector	Application
VT / VB	4-Pin, M12, Female, Single Keyway	DC
	4-Pin, M12, Female, Dual Reverse Keyway	AC
ZT / ZB	3-Pin, Mini, Female, Single Keyway	AC / DC

- DIN Plug Connector Kit No. K236034**

- The open-frame solenoid is provided with DIN terminals to accommodate the plug connector kit.
- Remove center screw from plug connector. Using a small screwdriver, pry terminal block from connector cover.
- Use #12-18 AWG stranded copper wire rated at 90°C or greater for connections. Strip wire leads back approximately 1/4" for installation in socket terminals. The use of wire-end sleeves is also recommended for these socket terminals. Maximum length of wire-end sleeves to be approximately 1/4". Tinning of the ends of the lead wires is not recommended.

- Thread wire through gland nut, gland gasket, washer and connector cover.

NOTE: Connector housing may be rotated in 90° increments from position shown for alternate positioning of cable entry.

- Check DIN connector terminal block for electrical markings. Then make electrical hookup to terminal block according to markings on it. Snap terminal block into connector cover and install center screw.
- Position connector gasket on solenoid and install plug connector. Torque center screw to 5±1 in-lbs [0,6±1,1 Nm].

NOTE: Alternating current (AC) and direct current (DC) solenoids are built differently and cannot be converted from one to the other by changing the coil.

### Installation of Solenoid

Solenoids may be assembled as a complete unit. Tightening is accomplished by means of a hex flange at the base of the solenoid.

### Installation of Panel Mounted Solenoid (See Figures 1 and 2)

- Disassemble solenoid following instruction under *Solenoid Replacement* then proceed.
- Install solenoid base sub-assembly through customer panel. 8202H panel mounted solenoids include a retainer to adapt the solenoid base sub-assembly to the customer panel. (See Figure 2)
- Position finger washer on opposite side of panel over solenoid base sub-assembly.
- Replace solenoid, nameplate/retainer and red cap.
- Make electrical hookup, see *Wiring* section.

### Solenoid Temperature

Standard solenoids are designed for continuous duty service. When the solenoid is energized for a long period, the solenoid becomes hot and can be touched by hand only for an instant. This is a safe operating temperature.

## MAINTENANCE

**⚠ WARNING** To prevent the possibility of death, serious injury or property damage, turnoff electrical power, depressurize solenoid operator and/or valve, and vent fluid to a safe area before servicing.

**⚠ ADVERTISSEMENT** Pour éviter tous danger de mort, de blessure grave ou de dommage matériel, avant d'intervenir sur la vanne, couper le courant, purger la vanne dans une zone sécurisée.

### Cleaning

All solenoid operators and valves should be cleaned periodically. The time between cleaning will vary depending on medium and service conditions. In general, if the voltage to the solenoid is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. Clean strainer or filter when cleaning the valve.

### Preventive Maintenance

- Keep the medium flowing through the solenoid operator or valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history is the best indication of a proper interval between exercise cycles.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any worn or damaged parts.



## Causes of Improper Operation

- **Faulty Control Circuit:** Check the electrical system by energizing the solenoid. A metallic *click* signifies that the solenoid is operating. Absence of the *click* indicates loss of power supply. Check for loose or blown fuses, open-circuited or grounded solenoid, broken leadwires or splice connections.
- **Burned-Out Solenoid:** Check for open-circuited solenoid. Replace if necessary. Check supply voltage; it must be the same as specified on nameplate/retainer and marked on the solenoid. Check ambient temperature and check that the core is not jammed.
- **Low Voltage:** Check voltage across the solenoid leads. Voltage must be at least 85% of rated voltage.

## Solenoid Replacement

1. Disconnect conduit, coil leads, and grounding wire.

NOTE: Any optional parts attached to the old solenoid must be reinstalled on the new solenoid.

2. Disassemble solenoids with optional features as follows:

- **Spade or Screw Terminals**

Remove terminal connections, grounding screw, grounding wire, and terminal block (screw terminal type only).

NOTE: For screw terminals, the socket head screw holding the terminal block serves as a grounding screw.

- **Junction Box**

Remove conduit and socket head screw (use 5/32" hex key wrench) from center of junction box. Disconnect junction box from solenoid.

- **DIN Plug Connector**

Remove center screw from DIN plug connector. Disconnect DIN plug connector from adapter. Remove socket head screw (use 5/32" hex key wrench), DIN terminal adapter, and gasket from solenoid.

3. For 8003 G/H, 8007G without pipe adapter, and 8202G, snap off red cap from the top of the solenoid base sub-assembly. For 8007G with pipe adapter, remove piping or tubing from pipe adapter and remove pipe adapter. For 8202H solenoids, use a suitable hex wrench to loosen retaining clip screw and remove retaining clip.
4. Push down on solenoid. Then using a suitable screwdriver, insert blade between solenoid and nameplate/retainer. Pry up slightly and push to remove nameplate.

NOTE: Series 8202G/H solenoids have a spacer between the nameplate/retainer and solenoid.

5. Remove solenoid from solenoid base sub-assembly.
6. Reassemble in reverse order of disassembly. Use exploded views for identification and placement of parts.

**⚠ WARNING** Verify that the solenoid is grounded with grounding wire or rigid metallic conduit – do not rely on pipe as ground.

**⚠ AVERTISSEMENT** Vérifiez que la bobine est mise à la terre avec un fil de terre ou via un conduit métallique rigide - n'utilisez pas la tuyauterie comme masse.

7. For 8007G solenoids with pipe adapter, torque pipe adapter to 90 inch-pounds maximum [10.2 Nm maximum]. Then make up piping or tubing to pipe adapter on solenoid. For 8202H solenoids, torque retaining clip screw to 6 +/- 2 inch lbs (0.7 +/- 0.2 Nm).

**⚠ WARNING** Perform internal (seat) leakage test (including checking valve for proper operation and checking for external leaks) before returning to service. Use a nonhazardous, noncombustible fluid if practical.

**⚠ AVERTISSEMENT** Réaliser un test de fuite interne (siège) (y compris un contrôle du fonctionnement correct de la vanne et un contrôle de la fuite externe) avant la remise en service. Utiliser si possible un fluide non dangereux et non combustible.

## Disassembly and Reassembly of Solenoids

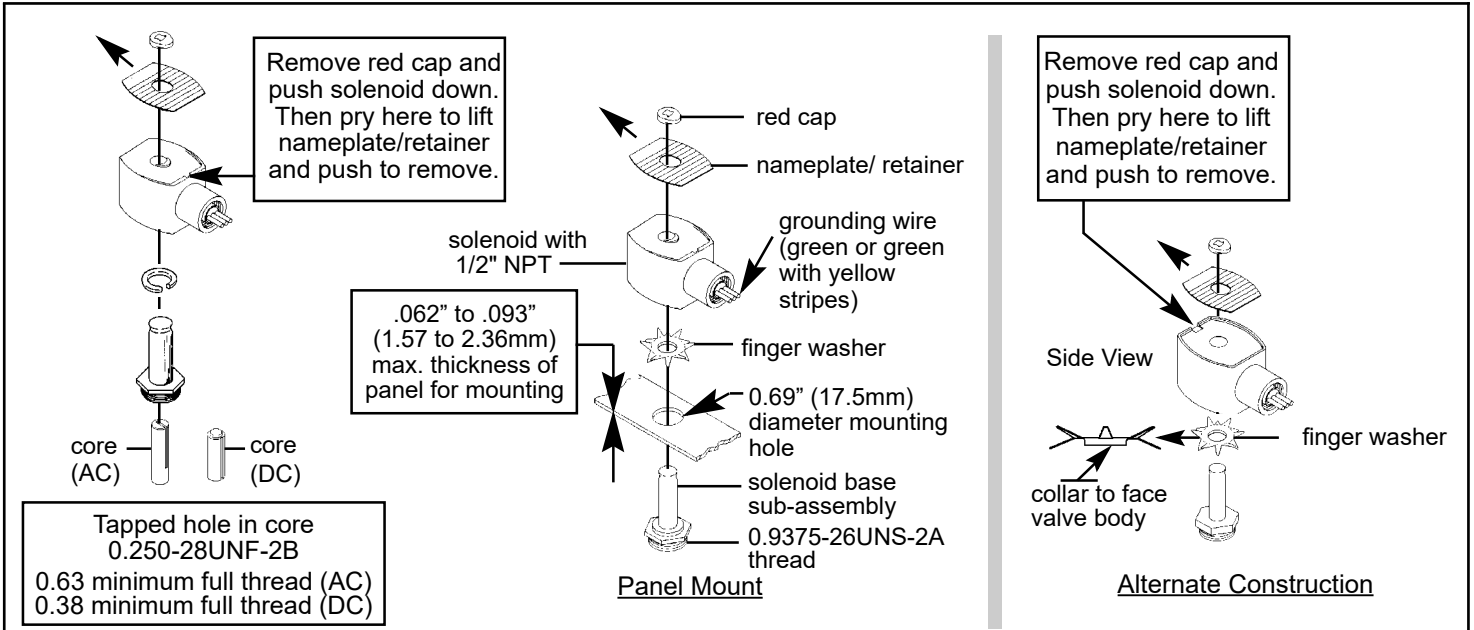
1. Remove solenoid, see *Solenoid Replacement*.
2. Remove spring washer from solenoid base sub-assembly. For 3-way construction, remove pipe adapter and plugnut gasket.
3. Unscrew solenoid base sub-assembly from valve body.
4. Remove internal solenoid parts for cleaning or replacement. Use exploded views for identification and placement of parts.
5. If the solenoid is part of a valve, refer to basic valve installation and maintenance instructions for further disassembly.
6. Torque solenoid base sub-assembly and adapter to 175±25 in-lbs [19,8±2,8 Nm].

## ORDERING INFORMATION FOR ASCO SOLENOIDS

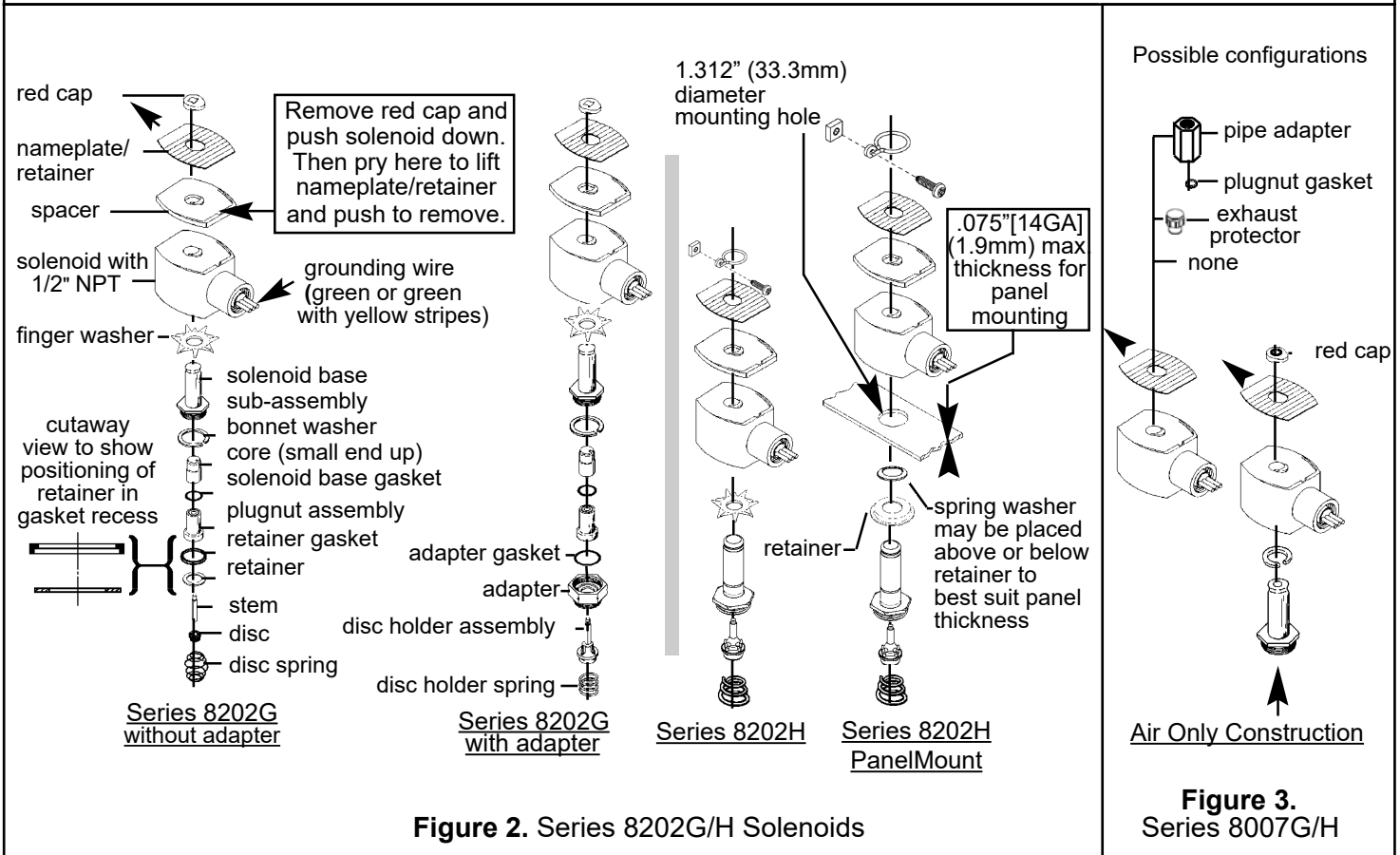
When Ordering Solenoids for ASCO Solenoid Operators or Valves, order the number stamped on the solenoid. Also specify voltage and frequency.

# Torque Chart

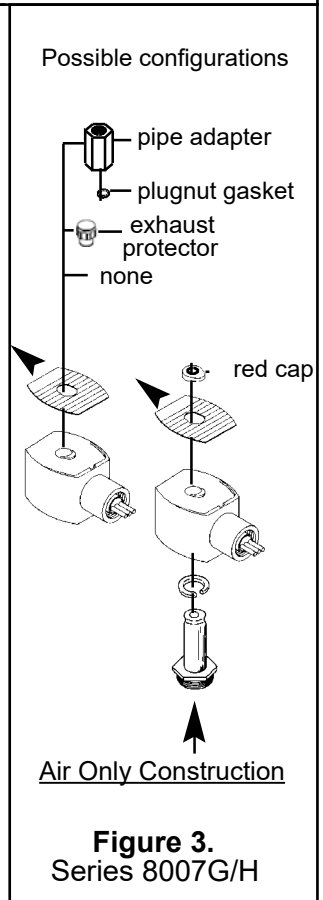
Part Name	Torque Value in Inch-Pounds	Torque Value in Newton-Meters
Solenoid Base Sub-assembly	175 ± 25	19,8 ± 2,8
Pipe Adapter	90 maximum	10,2 maximum



**Figure 1. Series 8003G/H Solenoids**



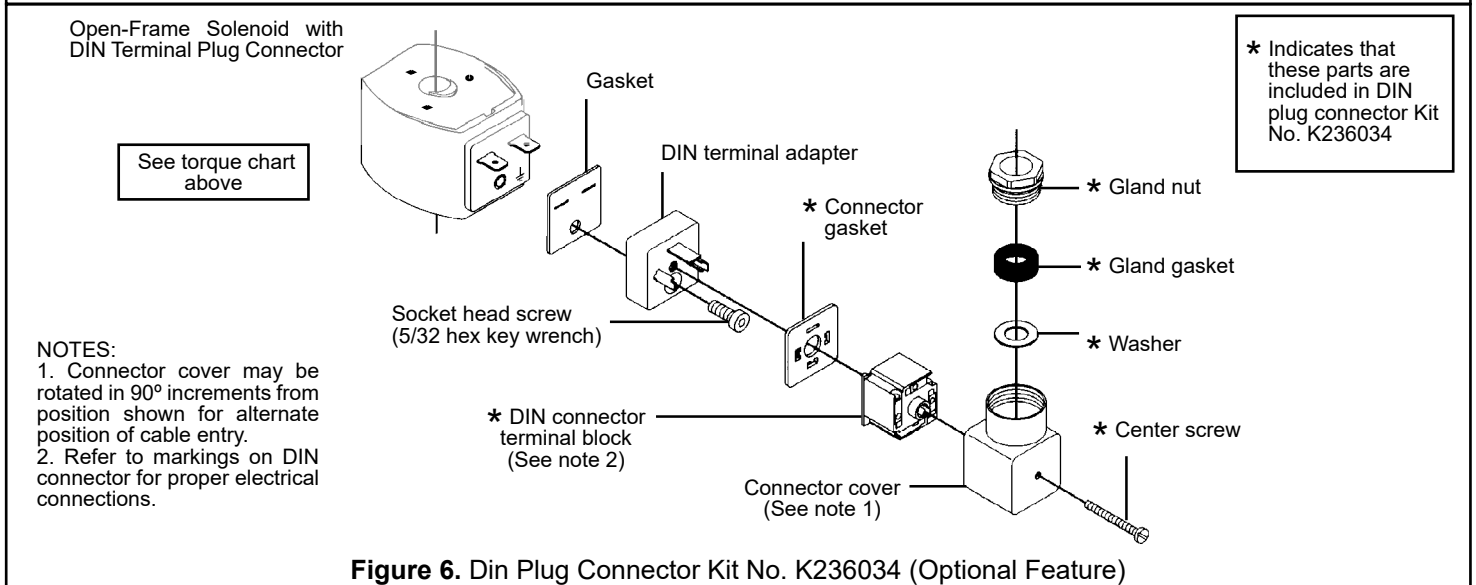
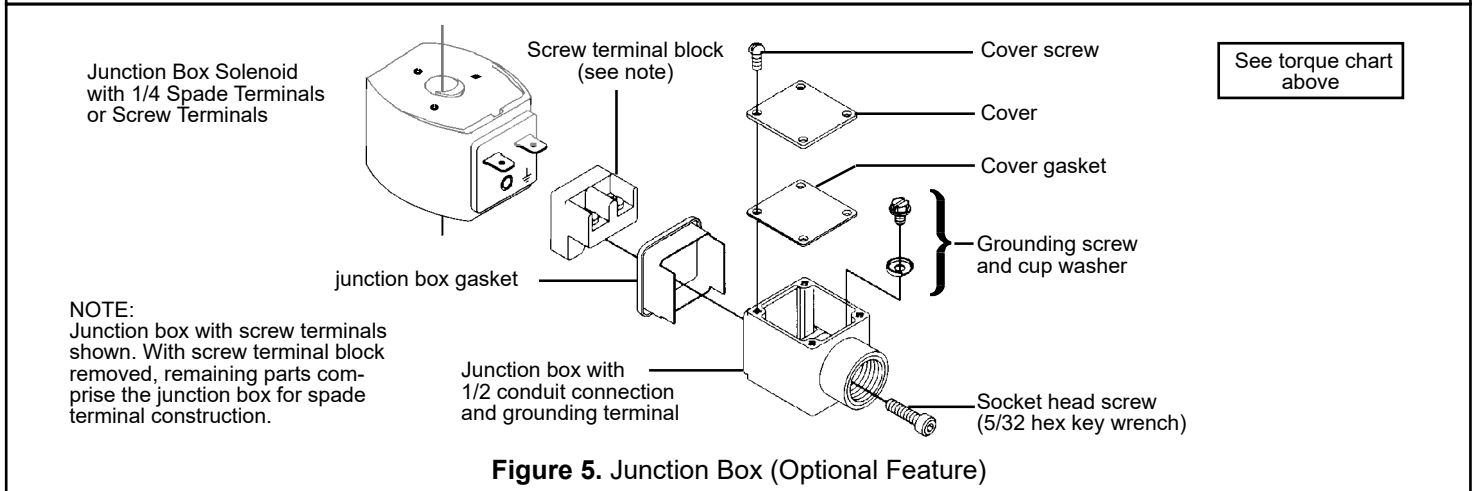
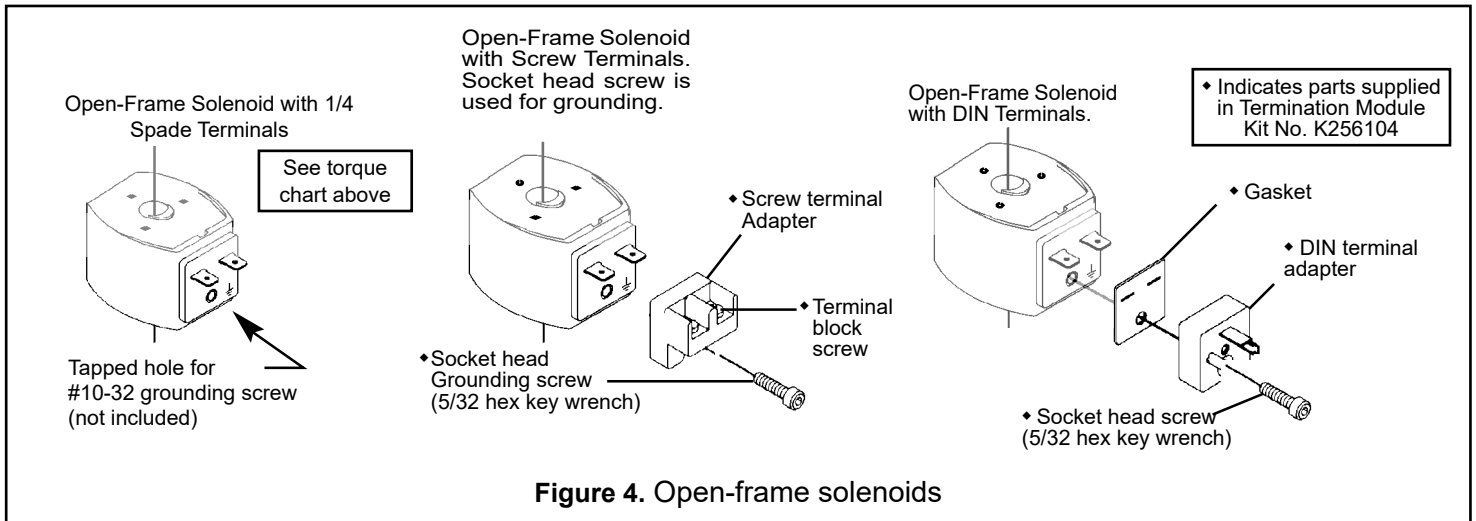
**Figure 2. Series 8202G/H Solenoids**



**Figure 3.  
Series 8007G/H**

# Torque Chart

Part Name	Torque Value in Inch-Pounds	Torque Value in Newton-Meters
Terminal block screws	10 ± 2	1,1 ± 0,2
Socket head screw	15 - 20	1,7 - 2,3
Center screw	5±1	0,6 ± 0,1



## Torque Chart

Part Name	Torque Value in Inch-Pounds	Torque Value in Newton-Meters
Terminal block screws	10 ± 2	1,1 ± 0,2
Socket head screw	15 - 20	1,7 - 2,3
Center screw	5±1	0,6 ± 0,1

