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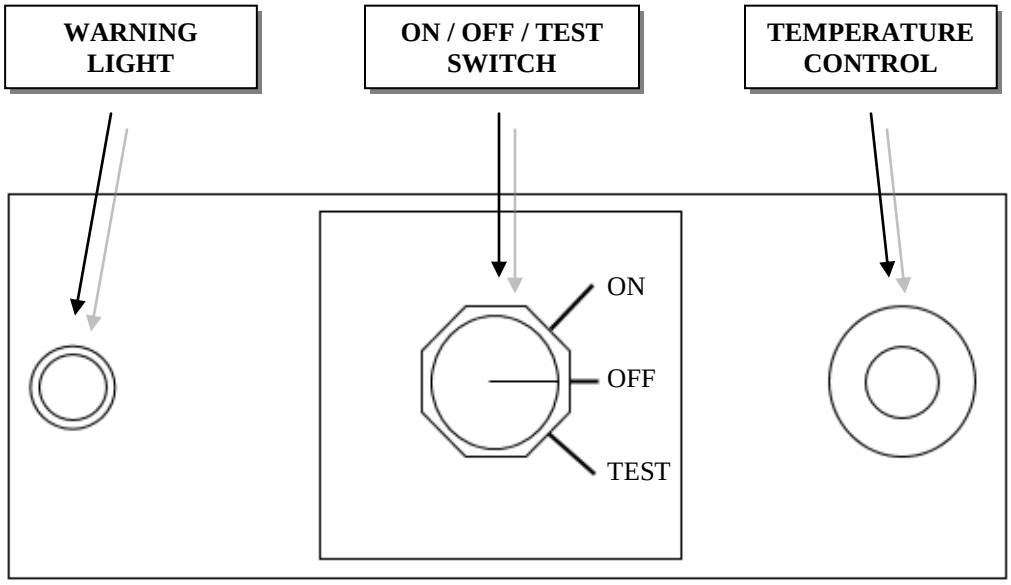
ENGINEERS AND MANUFACTURERS OF ULTRA-LOW FREEZERS

LN_2 BACK-UP SYSTEM

INSTRUCTIONS



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1.1 PRE-INSTALLATION INSTRUCTIONS

Before connecting the LN_2 back-up system, perform all actions below to prevent self injury or damage to system mechanics:

- Connections to back-up only preformed by qualified personnel.
- Back-up switch is in the ***OFF*** position.
- Liquid Siphon valve on cylinder is closed.
- Connect flare fitting to the liquid valve on cylinder.
- Open valve on cylinder to check all fittings for leaks.
- Close valve until freezer is put into service.

All hoses and connections should be inspected by qualified personnel every 30 days for worn or damaged parts, failure to do so could result in a hazard.

1.2 BACKUP SYSTEM INSTRUCTIONS

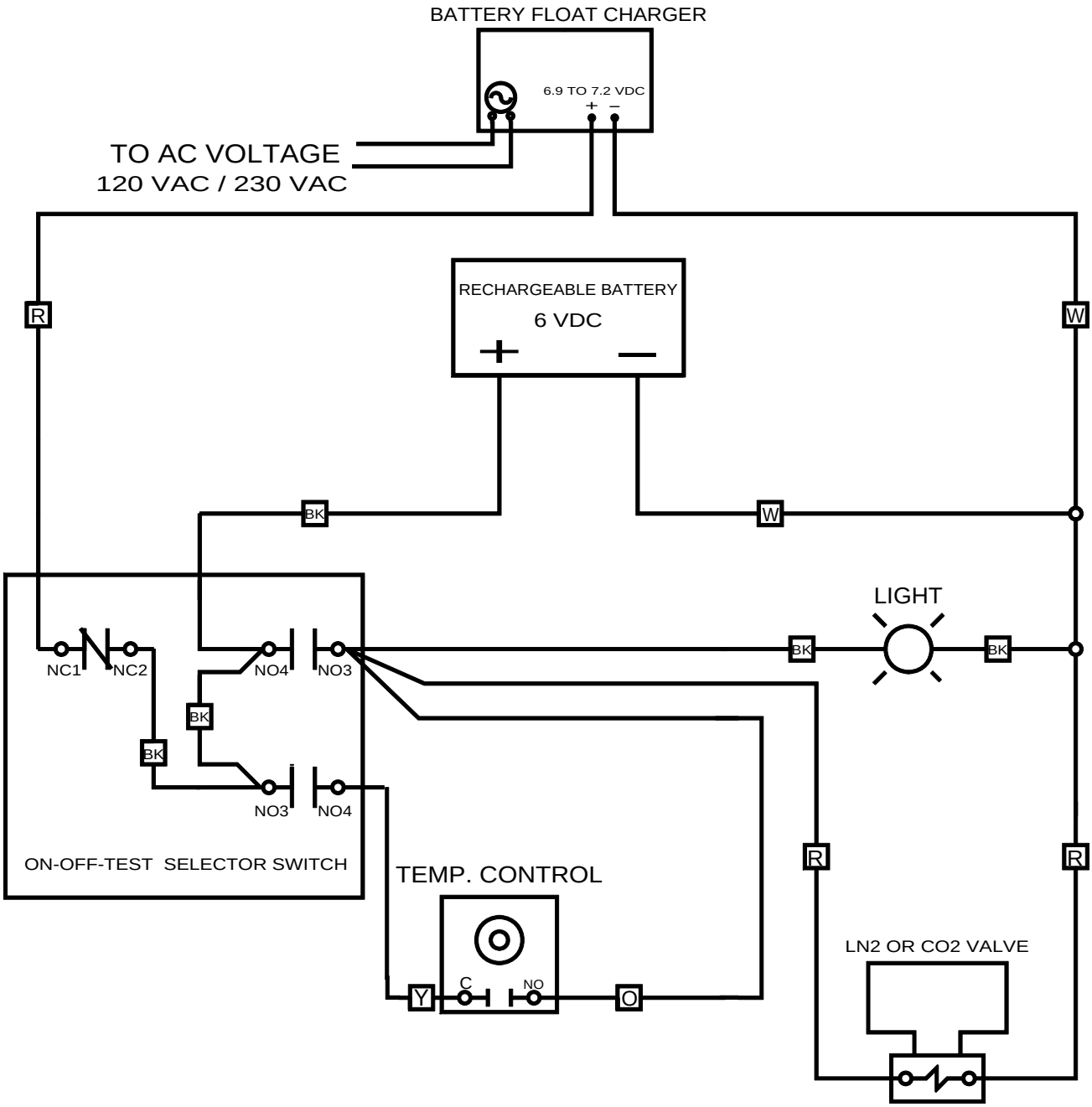
Before operating the LN_2 back-up system, be sure that the switch is turned to the ***OFF*** position.

The switch should remain in the ***OFF*** position until the desired temperature of the freezer is reached. Then set the back-up system control to the desired temperature. When the freezer temperature control indicates the desired temperature put the back-up system switch in the ***ON*** position. The back-up system will not operate until the temperature of the freezer rises warmer than the back-up system temperature control setting. The switch should remain in the ***ON*** position as long as the unit is operating.

TEST

The switch has a TEST position that can be used anytime to see if the battery is charged or if the back-up system is working properly.

1.3 WIRING & VALVE DIAGRAM, NITROGEN DOCUMENTS



COLOR CODE
O = ORANGE
R = RED
W = WHITE
B = BLUE
Y = YELLOW
BK = BLACK

LN2 OR CO2 BACK-UP SYSTEM

1-2007

NITROGEN

AIRCO nitrogen has four properties that make it immensely valuable to industry: 1) Gaseous nitrogen is essentially inert to most materials, even at the temperature of molten iron; 2) liquid nitrogen at −320.4°F (−196°C) is an excellent expendable refrigerant; 3) both gaseous and liquid nitrogen are inexpensive; 4) AIRCO nitrogen is exceptionally pure. Gaseous nitrogen at atmospheric pressure has no taste, color or odor. It's a poor conductor of heat and electricity. And nitrogen gas has a low solubility in most common liquids. Nitrogen gas has no toxic properties at atmospheric pressure, other than the possible personnel hazard of suffocation due to displacement of air. It's often used as a pressurizer in food aerosol cans.

At −320°F (−196°C) and standard atmospheric pressure, gaseous nitrogen condenses into a water-white liquid, with 696.5 volumes of gaseous nitrogen becoming one volume of the liquid. The liquid is nonmagnetic, stable against mechanical shock and does not produce toxic or irritating vapors. The only caution required is in handling liquid nitrogen due to its low temperature.

Nitrogen is essentially inert to most materials at room temperature. It remains inert to many products even at the temperature of molten iron.

Nitrogen, however, is not totally inert. Under high temperature and catalysis, it combines with hydrogen to form ammonia. It also combines with oxygen at high temperatures to produce various nitrogen oxides. Nitrogen also reacts with calcium carbide to produce calcium cyanamide under high temperatures.

Nitrogen gas will react at room temperature only with lithium and finely divided calcium. At high temperatures, nitrogen in the atmosphere may combine with magnesium, aluminum, chromium, iron and other metals, forming nitrides.

Additional properties of gaseous and liquid nitrogen are given in the following tables.

High-purity, low dew-point gaseous nitrogen is available from AIRCO Welding Products distributors in a variety of containers, ranging from high-pressure cylinders to tube trailers. Liquid nitrogen for refrigeration, or for low-cost storage also is available from local AIRCO Welding Products distributors throughout the nation. Customer stations are available from these distributors for liquid storage and vaporization on-site, as required by the user. AIRCO Distributors also can arrange for installation of unattended on-site nitrogen plants for large-volume users who find on-site generation of their own nitrogen from the air the most economical procedure.

Nitrogen content and maximum impurities in AIRCO nitrogen are:

PHYSICAL PROPERTIES

NAME OF GAS	NITROGEN
Chemical Symbol	N_2
Molecular Weight	28.0134
Color	None
Odor	None
Taste	None
Spec. Gravity (Air = 1) 70°F. 1 Atm.	0.9669
Density, Lb. per Cu. Ft. 70°F. 1 Atm.	0.07245
Spec. Vol. Cu. Ft. per Lb. 70°F. 1 Atm.	13.803
Density Sat'd Vapor, Lb. per Cu. Ft. 1 Atm.	0.2874
Normal Boiling Point °F	−320.36
Heat of Vaporization BTU per Pound	85.6
Critical Pressure Atmospheres, Abs.	33.54
Lb. per Sq. In., Abs.	492.9
Critical Temp. °F.	−232.40
Triple Point Pressure Atmosphere, Abs.	0.1238
Lb. per Sq. In., Abs.	1.819
Triple Point Temp. °F.	−346.01
Specific Heat, Const. Press	0.2488 @77°F
Ratio Specific Heats	1.4014 @70°F
Coeff. Viscosity, Micropoises @ 77°F.	177.96
Thermal Conductivity, 32°F. BTU/(Sq. Ft) (Hr.) (°F/Ft.)	0.0139
Ionization Potential, Volts	14.5
Excitation Potentials: First Resonance Potential, Volts	6.3

	CGA GRADE	
	L	F
	Liquid	Gas
nitrogen, min. % (v/v)	99.995	99.9
water, ppm (v/v)	5.7	34
dew point		
°F	−84	−60
°C	−64	−51
oxygen	20 ppm	0.1%

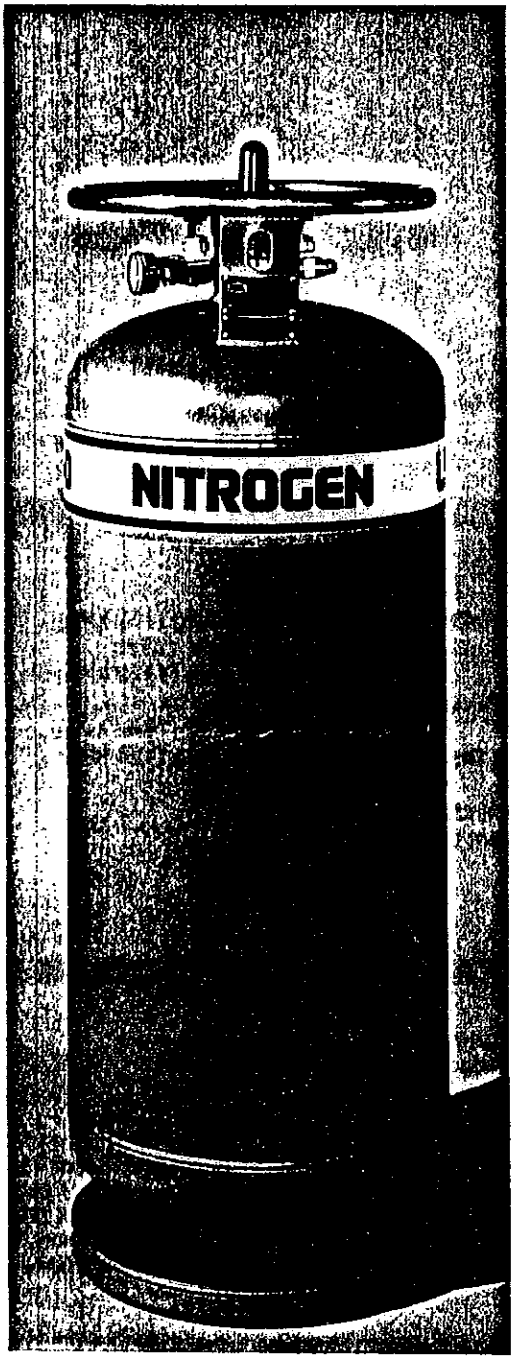
CONVERSION DATA

	WEIGHT		GAS		LIQUID	
	POUNDS Lb	KILOGRAMS Kg	CUBIC FEET SCF	CUBIC METERS Nm^3	GALLONS Gal	LITERS L
1 Pound	1.0	0.4536	13.803	0.3627	0.1481	0.5608
1 Kilogram	2.206	1.0	30.42	0.7998	0.3262	1.2349
1 SCF Gas	0.07246	0.03286	1.0	0.02628	0.01074	0.04065
1 Nm^3 Gas	2.757	1.2508	38.04	1.0	0.4080	1.5443
1 Gal Liquid	6.745	3.060	93.11	2.447	1.0	3.785
1 L Liquid	1.782	0.8083	24.60	0.6464	0.2642	1.0

SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F. Liquid measured at 1 atmosphere and boiling temperature.

Nm^3 (normal cubic meter) gas measured at 1 atmosphere and 0°

LS-160, LS-160/S
LIQUID NITROGEN CYLINDERS



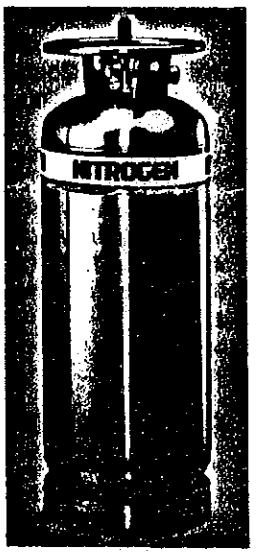
Dependable storage and delivery service.

The durable LS-160 and new stainless steel LS-160/S provide dependable storage and low pressure distribution service for all your liquid nitrogen requirements.

They are the ideal supply containers for efficient delivery of liquid nitrogen to smaller vessels, refrigerators, cold traps and laboratory dewars.

The cylinders combine reliable performance and dependability with a rugged exterior finish that retains factory-new appearance. A heavy steel ring around the top protects controls and instruments and makes handling easier. A 2-year warranty assures quality and dependability with every LS-160 and LS-160/S Liquid Nitrogen Cylinder.

- Low normal evaporation rate for long retention periods.
- Easy hook-up with transfer hose.
- Plumbing readily accessible.
- Adapts to higher pressures—up to 150 PSIG.



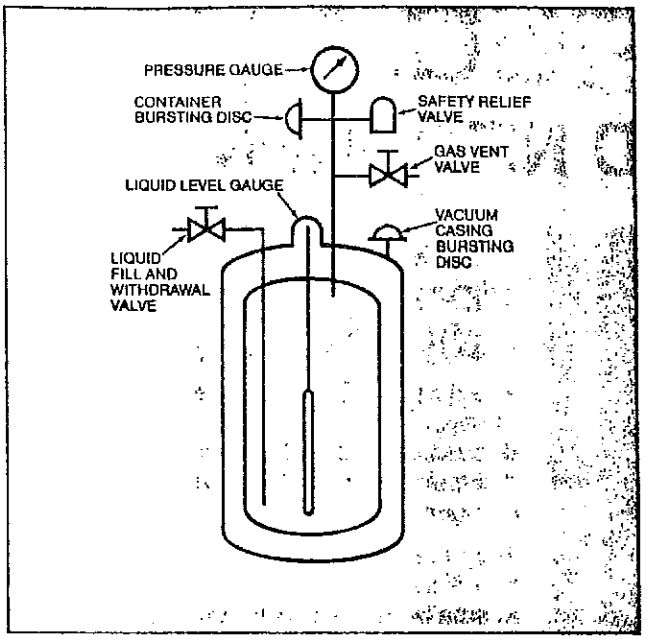
LS-160/S stainless steel cylinder.

The new stainless steel LS-160/S is designed to meet unusual atmospheric or special service requirements. Stainless steel cylinders provide an excellent liquid storage and delivery system for institutional and laboratory applications where appearance and cleanliness is expected. Costly repainting of cylinders is eliminated.

Lower evaporation means better economy.

The normal evaporation rate of the LS-160 and LS-160/S is very low, only 1.5% of capacity per day. This means less venting and longer retention periods. Pressure is sustained by normal evaporation, except during periods of continuous or heavy withdrawal. An external pressurizing gas supply can be added when desired discharge conditions exceed normal flow capacity. The effective combination of durability, economy and bulk capacity make the cylinders especially well-suited for storage and supply. When full, each unit holds up to 160 liters (42 gallons). For transfer of liquid nitrogen, just connect the transfer hose and open the liquid valve. It's that easy. You can also add a cryogenic phase separator to avoid splashing.

UNION CARBIDE
CRYOGENIC EQUIPMENT



Flow diagram

SPECIFICATIONS

Dimensions:
- Diameter ..... 20 inches (51 cm)
- Height ..... 58 inches (147 cm)

Weight:
- Nominal, empty ..... 218 lb. (99 kg)
- Tare ..... stamped on cylinder
- Liquid nitrogen contents only ..... 285 lb. (129 kg)

Capacity (nominal):
- Gallons 42
- Liters 160

Normal Evaporation Rate ..... 1.5% of capacity/day

Design Specification DOT-4L150

Rated (DOT) Service Pressure ... 150 psig (1034 kPa)

Safety Devices:
- Inner Container Relief Valve Setting . 22 psig (152 kPa)
- Inner Container Relief Valve Setting—special cases only ..... 170 psig (1172 kPA)
- Inner Container Bursting Disk Rating ..... 271 psig (1868 kPa)
- Vacuum Bursting Disk Rating ..... 18 psig (124 kPa)

Line Connections:
- Liquid Filling & Withdrawal, Pressurizing & Vent Line } ... CGA 295 (½ O.D.T. SAE male, 45° flare)

ACCESSORIES:

Transfer hoses are made of flexible metal covered with bronze braid and are available in 4-ft. and 6-ft. assemblies. Hoses attach to the LS-160 and LS-160/S with a ½-inch ODT 45° flare connector. The opposite end has a ⅜-inch IPS thread. When transferring liquid nitrogen to open vessels, add a cryogenic phase separator to avoid splashing.

INSTRUCTION LITERATURE: Form 13-751

ORDERING INFORMATION:

LS-160 Liquid Nitrogen Cylinder	1604-0C00
LS-160/S Liquid Nitrogen Cylinder (Stainless Steel)	1604-0C08
Transfer Hose Assembly, 4-ft. (inert gas)	1191-9C95
Transfer Hose Assembly, 6-ft. (inert gas)	1601-9C95
Cryogenic Phase Separator (1⅜" OD)	1193-8C80
Cryogenic Phase Separator (1" OD)	1193-8C82
Cryogenic Phase Separator (½" OD)	1193-8C83

UNION CARBIDE CORPORATION • Cryogenic Equipment
General Office: Old Ridgebury Road, Danbury, CT 06817
(203) 794-2000

Sales Offices:
CALIFORNIA: One California Street, San Francisco, CA 94111 (415) 765-1328 • **ILLINOIS:** 120 South Riverside Plaza, Chicago, IL 60606 (312) 454-2289 • **NEW JERSEY:** 308 Harper Drive, Moorestown, NJ 08057 (609) 235-6200 • **TEXAS:** Two Greenway Plaza East, Houston, TX 77046 (713) 840-6238 • **INTERNATIONAL:** Old Ridgebury Road, Danbury, CT 06817 (203) 794-5156 • Telex: RCA 221930 • Cable Address: CRYOGENICS

UNION CARBIDE CRYOGENIC EQUIPMENT

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Installation & Maintenance Instructions

ASCO Red-Hat II®

OPEN–FRAME, GENERAL PURPOSE, WATERTIGHT/EXPLOSIONPROOF SOLENOIDS

SERIES
8003G/H
8202G/H

(Section 1 of 2)

— 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 and 8202G/H 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 1 Groups A, B, C, & D and Type 9, –Dust–Ignitionproof Class II, Division 1 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.

Series 8003G/H and 8202G/H solenoids are available in:

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

Optional Features For Type 1 – General Purpose Construction Only

- **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).
- **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).

OPERATION

Series 8003G/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.**

INSTALLATION

Check nameplate for correct catalog number, service, and wattage. Check front of solenoid for voltage and frequency.

⚠ 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.

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.

NOTE: These solenoids have an internal non–resetable 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.

E21903–121/11

Temperature Limitations

For maximum valve 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 maximum fluid temperature.

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

Temperature Limitations For Series 8003G or 8202G Solenoids for use on Valves Rated at 10.1, 11.6, 17.1, or 22.6 Watts

Watt Rating	Catalog Number Coil Prefix	Class of Insulation	Maximum † Ambient Temp.
10.1 & 17.1	None, FB, KF, KP SC, SD, SF, & SP,	F	125°F (51.7°C)
10.1 & 17.1	HB, HT, KB, KH, SS, ST, SU,	H	140°F (60°C)
11.6 & 22.6	None, FB,KF, KP, SC, SD, SF, & SP.	F	104°F (40°C)
11.6 & 22.6	HP, HT, KB, KH, SS, ST, SU, & SV	H	104°F (40°C)

† Minimum ambient temperature −40° F (−40° C).

Temperature Limitations for series 8002H/8003H solenoids (Catalog Numbers 8262H & 8263H valves)

Prefix①	Coil Class	Wattage Ratings AC 60 Hz	Wattage Ratings AC 50 Hz	Wattage Ratings DC	Max. Ambient Temperature (°C)	Max. Ambient Temperature (°F)
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	40②	104②
	HB	–	–	22.6		
EF, EV	HT	–	–	11.6		
EF, EV	HB	–	–	22.6		
	HT	10.1	10.1	–	60③	140③
	HB	17.1	17.1	–		
EF, EV	HT	10.1	10.1	–		
EF, EV	HB	17.1	17.1	–		

①=EF, EV data applies to Explosionproof coils only.
②=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.
③=Steam Service Valves have a maximum ambient temperature of 55°C / 131°F.

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

Wiring must comply with local codes and the National Electrical Code. 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 the watertight and explosionproof solenoid, electrical fittings must be approved for use in the approved hazardous locations.

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

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 [1,0±1,2 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.

- **DIN Plug Connector Kit No.K236034**

1. The open−frame solenoid is provided with DIN terminals to accommodate the plug connector kit.
2. Remove center screw from plug connector. Using a small screwdriver, pry terminal block from connector cover.
3. 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.
4. 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.

5. 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.
6. 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)

1. Disassemble solenoid following instruction under *Solenoid Replacement* then proceed.
2. 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)
3. Position finger washer on opposite side of panel over solenoid base sub–assembly.
4. Replace solenoid, nameplate/retainer and red cap.
5. 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, turn off electrical power, depressurize solenoid operator and/or valve, and vent fluid to a safe area before servicing.

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 lead wires 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. For 3–way construction, piping or tubing must be removed from pipe adapter.

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. Snap off red cap from top of solenoid base sub–assembly. For 3–way construction with pipe adapter (Figure 3), remove pipe adapter, nameplate and solenoid. Omit steps 4 and 5.
4. Push down on solenoid. Then using a suitable screwdriver, insert blade between solenoid and nameplate/retainer. Pry up slightly and push to remove.

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.
7. Torque pipe adapter to 90 inch–pounds maximum [10,2 Nm maximum]. Then make up piping or tubing to pipe adapter on solenoid.

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.

Installation & Maintenance Instructions

ASCO Red-Hat II ®

OPEN–FRAME, GENERAL PURPOSE, WATERTIGHT/EXPLOSIONPROOF SOLENOIDS

SERIES
8003G/H
8202G/H

NOTICE: See Installation and Maintenance Instructions, I&M No. V6584R12 – Section 1 of 2 for detailed instructions.

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

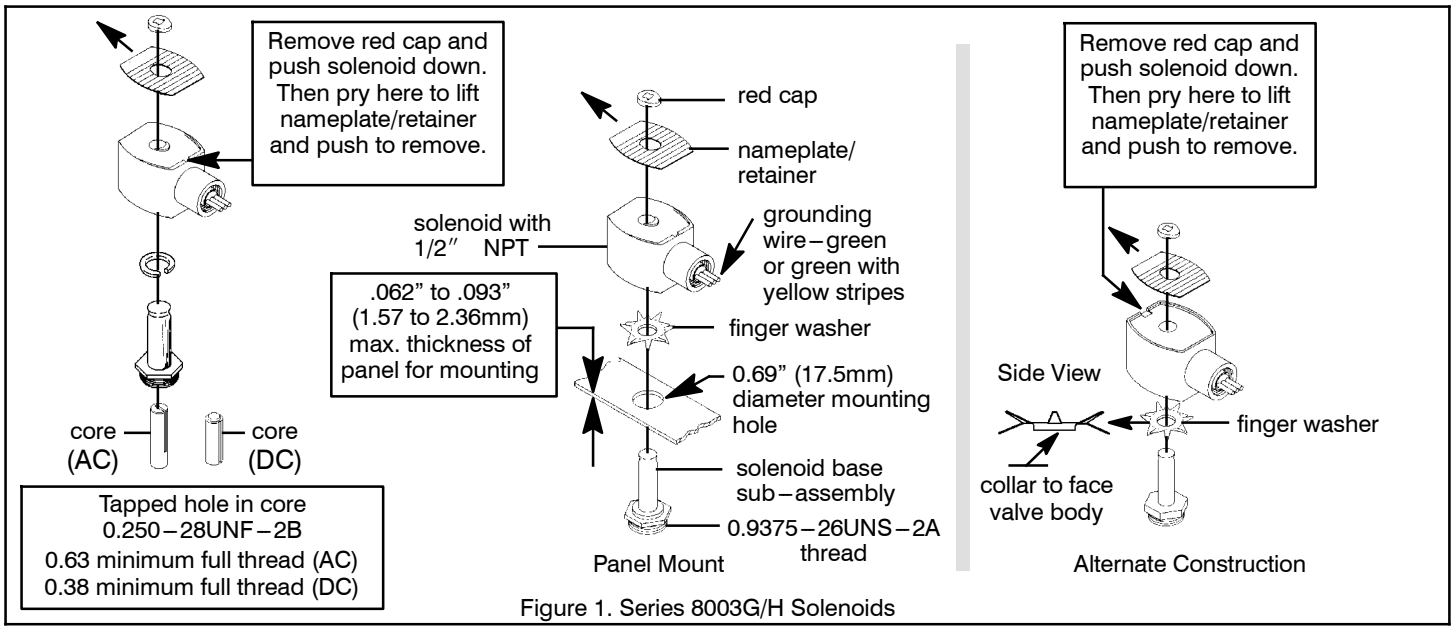

Figure 1. Series 8003G/H Solenoids

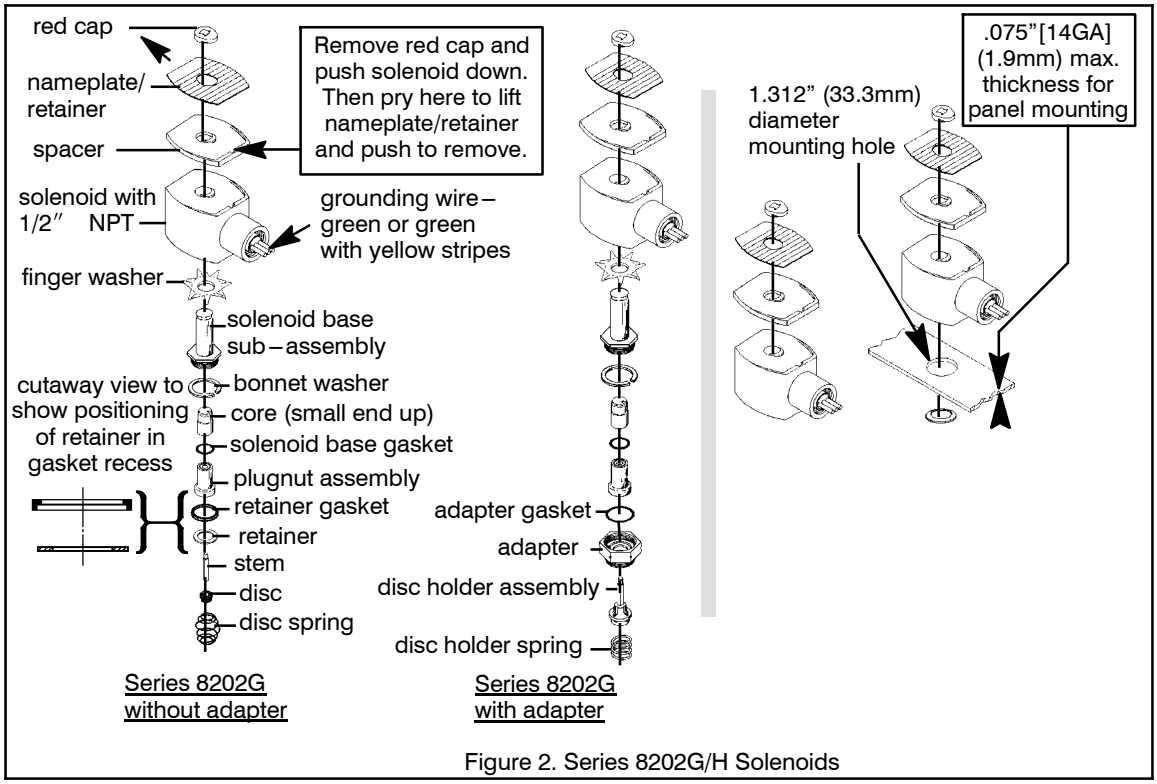

Figure 2. Series 8202G/H Solenoids

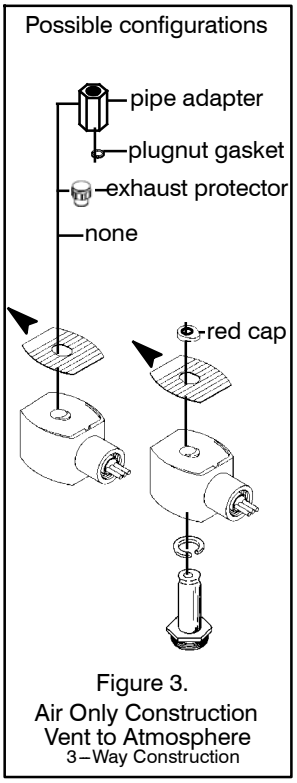

Figure 3.
Air Only Construction
Vent to Atmosphere
3–Way Construction

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

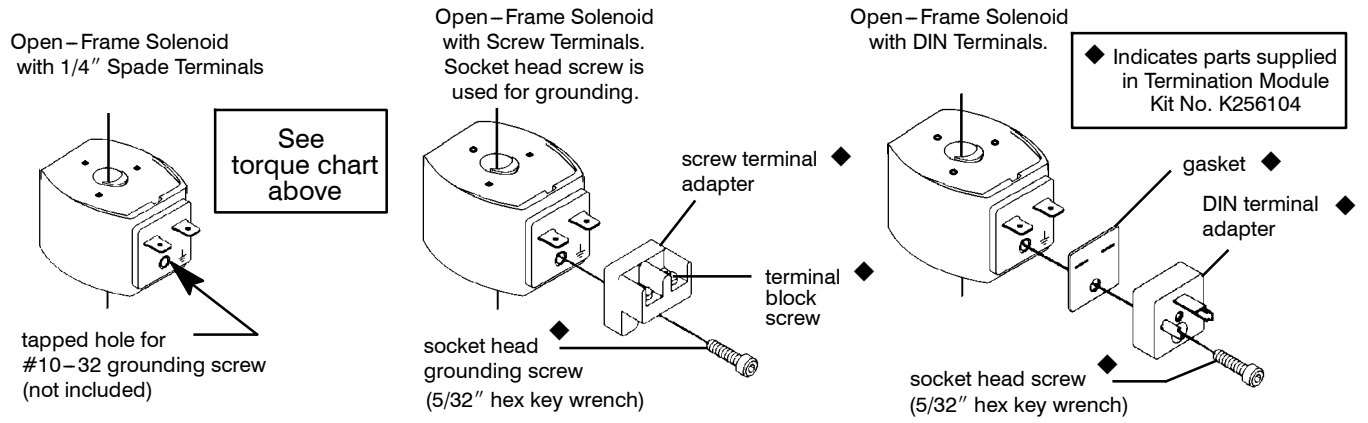

Figure 4. Open–frame solenoids

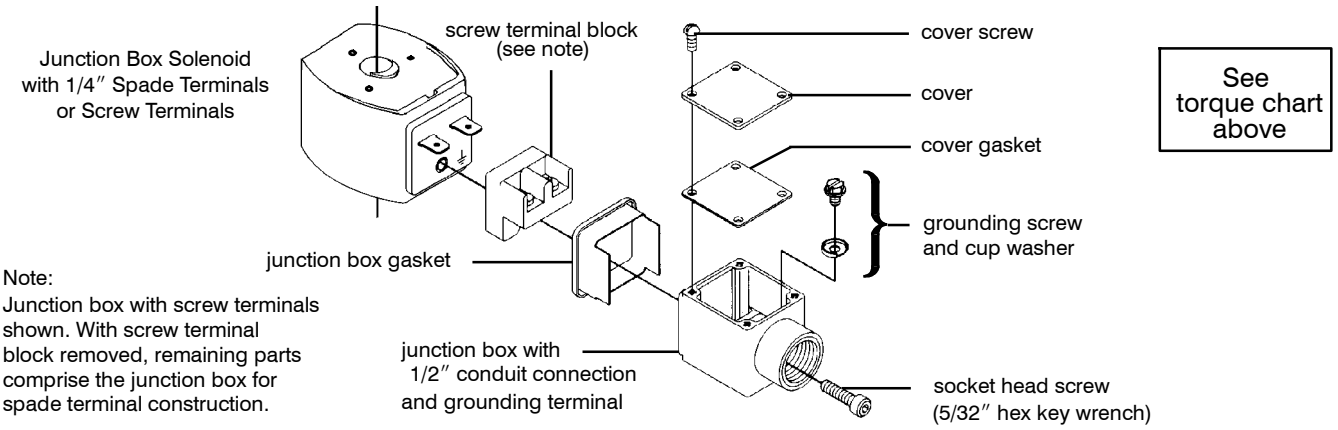

Figure 5. Junction box (optional feature)

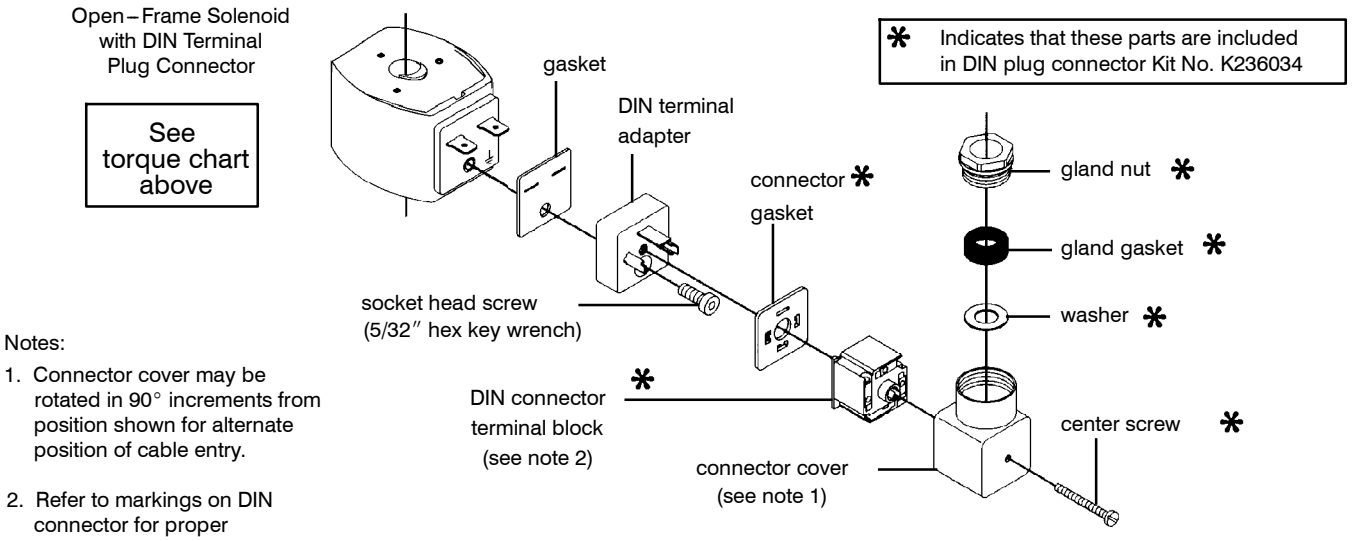

Figure 6. DIN plug connector kit No. K236034 (optional feature)

1.4 BACKUP SYSTEM BATTERY

BACK-UP SYSTEM BATTERY
RECHARGEABLE BATTERY LIFE APPROXIMATELY 3 YEARS.

BATTERY REPLACEMENT
Power Sonic PS-6100 F2 (6V,12 Ah/20 HR) OR EQUIVELENT

CAUTION! BATTERY SHOULD BE INSPECTED AND MAINTAINED BY QUALIFIED PERSONNEL ONLY.

	BLACK WITH YELLOW BACKGROUND	LIGHTNING BOLT	CAUTION: RISK OF ELECTRICAL SHOCK
	BLACK WITH YELLOW BACKGROUND	EXCLIMATION POINT	CAUTION: REFER TO ACCOMPANYING DOCUMENTS

1.5 BACKUP SYSTEM PARTS LIST

1. Temperature Control No. UE-E55S-E20BC
2. LN-2 Solenoid Valve No. ASCO-8263A24OLT 6/DC
3. Hose Connection ½" Male Flare
4. Rechargeable Battery, No, Power Sonic – PS-6100 F2
5. Battery Float Charger No. CEUVBC6V
6. Selector Switch No. M22-WRK3-K22
7. Plunger Bridge No. M22-XW
8. Alarm Light (red) No. 1090A1