

# Installation Instructions



## BENDIX® AD-IP® AIR DRYER INSTALLATION

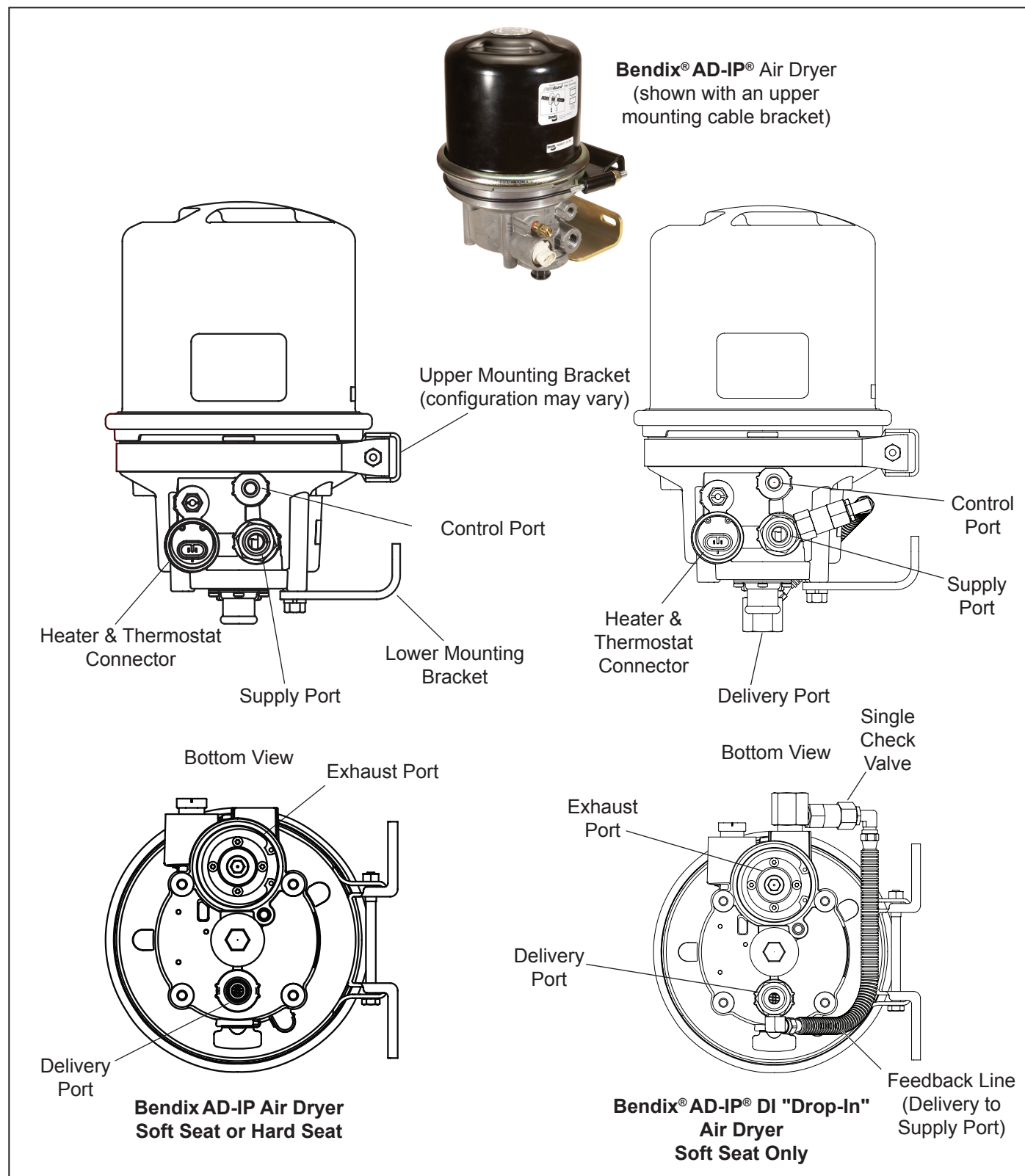


Figure 1 – Bendix® AD-IP® Air Dryer Models



## GENERAL SAFETY GUIDELINES

**WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS  
TO AVOID PERSONAL INJURY OR DEATH:**



When working on or around a vehicle, the following guidelines should be observed **AT ALL TIMES**:

- ▲ Park the vehicle on a level surface, apply the parking brakes and always block the wheels. Always wear personal protection equipment.
- ▲ Stop the engine and remove the ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically-charged components.
- ▲ Do not attempt to install, remove, disassemble or assemble a component until you have read, and thoroughly understand, the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
- ▲ If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning **ANY** work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system, a Bendix® DRM™ dryer reservoir module, or a Bendix® AD-9si® air dryer, be sure to drain the purge reservoir.
- ▲ Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
- ▲ Never exceed manufacturer's recommended pressures.
- ▲ You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.
- ▲ Never connect or disconnect a hose or line containing pressure; it may whip and/or cause hazardous airborne dust and dirt particles. Wear eye protection. Slowly open connections with care, and verify that no pressure is present. Never remove a component or plug unless you are certain all system pressure has been depleted.
- ▲ Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, wiring, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
- ▲ Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
- ▲ Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
- ▲ For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.
- ▲ The power **MUST** be temporarily disconnected from the radar sensor whenever any tests **USING A DYNAMOMETER** are conducted on a vehicle equipped with a Bendix® Wingman® system.

## ABOUT THE BENDIX® AD-IP® AIR DRYER

Bendix® AD-IP® air dryers are available in soft seat, hard seat, and soft seat Drop-In (DI) configurations. The soft seat and hard seat references the air dryer purge valve configuration. These instructions may be used to install each of these configurations.



### CAUTION

The AD-IP hard seat and AD-IP soft seat air dryers are identical in appearance but – due to internal differences in the purge valve – are **NOT** interchangeable. Verify the replacement air dryer is of the same style being replaced.

The AD-IP air dryer can be used with all domestic compressors including the Holset Type “E” or “QE” single cylinder compressor.

The AD-IP air dryer can be used on vehicles equipped with the Holset “E” or “QE”-type air compressors (See Figure 2B). The Bendix AD-IP Drop-In air dryer is specifically designed

for this application (See Figures 1 & 2) and must be added when these compressors are used.

*NOTE: The soft seat of the AD-IP air dryer turbo cut-off valve, along with the feedback line kit, eliminates the need for the Holset E-Con valve which is sometimes plumbed in the compressor discharge line. However, external plumbing of the feedback line kit is required. (See Figures 2 and 3).*

Packaged together are the following:

## VEHICLE APPLICATION REQUIREMENTS

Item Description	AD-IP Air Dryer Assembly	AD-IP Drop-In Air Dryer Assembly
Air Dryer Assembly	1	1
Mounting Bracket Kit (Not included with Reman AD-IP Air Dryer)	1	1
Feedback Line Kit	—	1

**Table 1 – Bendix AD-IP Air Dryers Assembly Contents**

## GENERAL

The basic application requirements presented here apply to all Bendix® AD-IP® air dryer installations. The majority of highway vehicles in use today will meet the installation requirements of the AD-IP air dryer, however, some may not.

Examples of vehicles that may not meet the installation requirements include: transit coaches, trash compactors, bulk trailer unloading operations, etc. While the air dryer can be used on these vehicles, the installation procedure presented here may require modification to ensure proper operation and service life. Consult your local authorized Bendix parts outlet or your Bendix sales representative for additional information.

1. **Charge Cycle Time** - During normal, daily operation the compressor should recover from governor "cut-in" to governor "cut-out" (usually 100 psi to 120 psi) in 90 seconds, or less, at engine RPMs corresponding with the vehicle vocation.
2. **Purge Cycle Time** - During normal vehicle operation, the air compressor must remain unloaded for a minimum of 30 seconds between charge cycles. This minimum purge time is required to ensure complete regeneration of the desiccant material. An occasional purge time less than 30 seconds will not have a detrimental affect on the air dryer's performance.
3. **Reservoir Volume** - Total vehicle reservoir volume can impact the charge and purge cycle time. *Table 2* can be used as a guide in determining if additional help is required. For more information, contact the Bendix Tech Team for a copy of the application specification BW-110-A.

Total Vehicle Reservoir Volume (Cu. In.)	Air Dryer Model
Less than 9,000	AD-IP air dryer
Greater than 9,000	AD-IP extended purge air dryer or contact Bendix for additional information

**Table 2 – AD-IP Air Dryer Selection Guide**

## INSTALLING A BENDIX AD-IP AIR DRYER WITH A HOLSET E OR QE COMPRESSOR

### GENERAL

The vehicle installation guidelines presented in the previous section apply to all Bendix AD-IP air dryer installations. Vehicles equipped with the Holset Type E or QE compressor require the following additional considerations.

#### STANDARD AD-IP AIR DRYER (See Figure 2A)

If a standard AD-IP air dryer is installed on a vehicle that did not previously have an air dryer or air system aftercooler, a separate feedback line and single check valve must be installed.

If a standard AD-IP air dryer is replacing an older style air dryer or air system aftercooler—one that did not incorporate an integral turbo cut-off device—the Holset ECON valve must be removed. The feedback line and single check valve must remain in place.

#### BENDIX AD-IP® DI "DROP-IN" AIR DRYER (See Figures 2B & 3)

**NOTE:** For all Bendix® AD-IP® DI (Drop In) air dryers, the feedback line kit must be assembled to the air dryer as shown in Figure 3. If the AD-IP DI air dryer is being installed on a vehicle that did not previously have an air dryer, or air system aftercooler, no additional considerations are necessary. Install the AD-IP DI air dryer in the manner described in the previous section.

### VEHICLE PREPARATION

1. Park the vehicle on a level surface and prevent movement by means other than the brakes.
2. Drain all reservoirs to 0 psi (0 kPa).

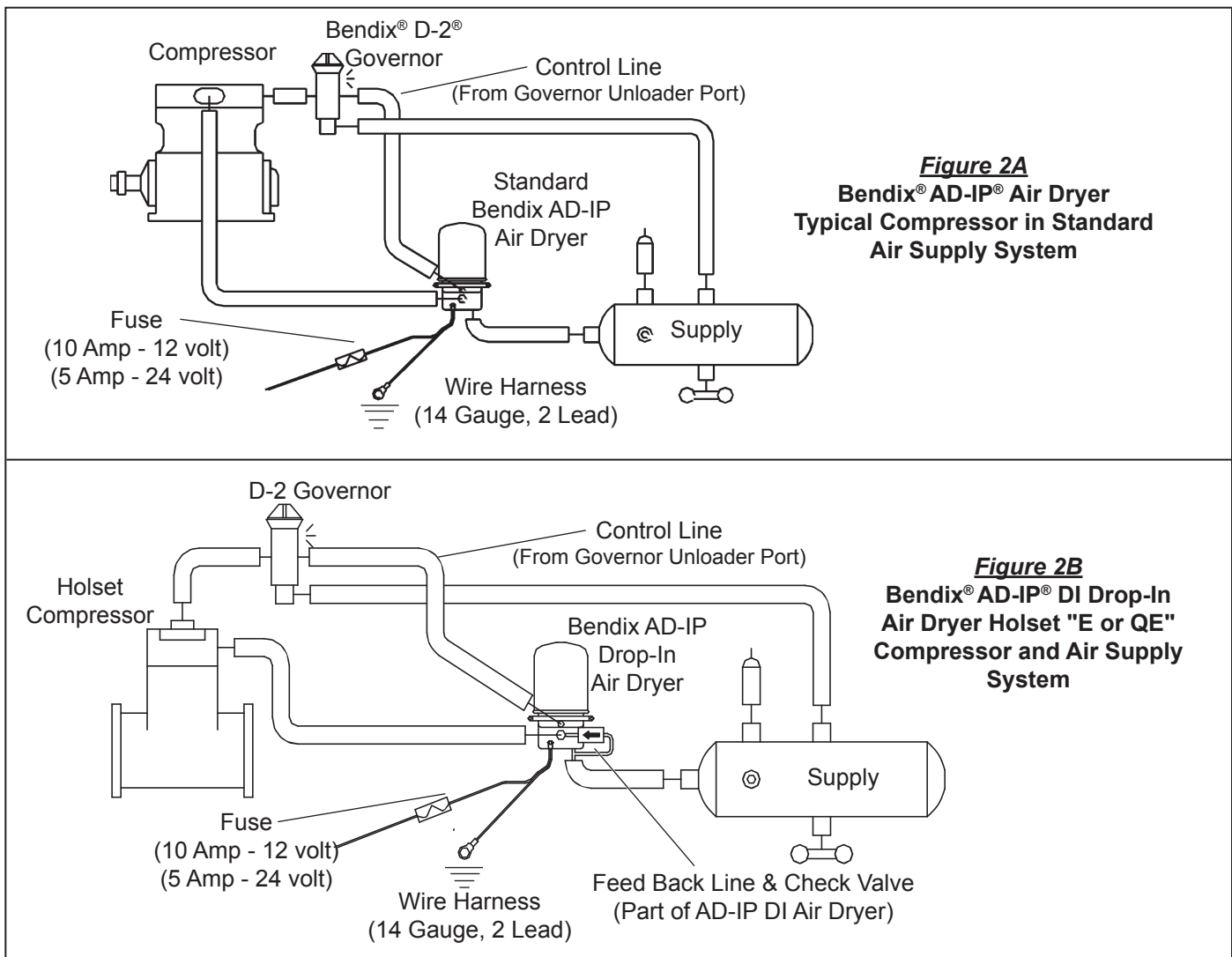
### LOCATING THE AD-IP AIR DRYER ON THE VEHICLE

1. The AD-IP air dryer must be mounted vertically (purge exhaust toward road surface) outside the engine compartment and in an area of air flow when the vehicle is in motion. The AD-IP air dryer must not be exposed to direct wheel splash. If the air dryer is located directly behind the axle, a mud flap is required.
2. Maintain a minimum clearance of 12" between the air dryer and any potential heat source (e.g. vehicle exhaust). If this is not feasible, a heat shield must be used.
3. Make certain that adequate clearance from moving components (e.g. drive shaft, suspension, pitman arm, etc.) is provided.
4. Locate the air dryer on the vehicle so that a minimum of 1/2" clearance above the air dryer is available to allow desiccant cartridge removal. A minimum of an 8" clearance below the air dryer is required to allow for cartridge bolt removal.
5. When choosing the mounting location for the AD-IP air dryer, note the discharge line length requirements in *Table 3*.



Under normal operating conditions, the maximum inlet air temperature for the AD-IP air dryer is 160°F (71°C).

6. If possible, locate the air dryer so that the purge exhaust does not expel contaminants on vehicle components. If this is not feasible, the purge exhaust may be redirected away from the vehicle. A one (1) inch ID hose can be clamped on the purge exhaust cover to allow the exhaust to be redirected.



**Figure 2 – Bendix® AD-IP® Air Dryers and Charging System Schematics**

## MOUNTING THE BENDIX® AD-IP® AIR DRYER

1. Refer to the instructions packaged with the bracket installation kit (included with the service new AD-IP air dryers) and attach the mounting brackets to the air dryer as instructed. If needed, mounting bracket kit (*Bendix part number 5001247*) can be purchased from any authorized Bendix parts outlet.
2. A universal mounting plate (*Bendix part number 113209*) is available to facilitate the mounting of the air dryer to the vehicle. It can be obtained through an authorized Bendix parts outlet.
3. Mount the Bendix® AD-IP® air dryer on the vehicle using 3/8" bolts (grade 5 min.) and washers. Torque to 25 ft-lbs (300 in-lbs).
4. Components and the location used to mount the AD-IP air dryer on the vehicle must be rigid enough to minimize air dryer vibration.

## PURGE CONTROL LINE

1. Make certain a governor, such as the Bendix® D-2® governor, is installed as illustrated in *Figure 2*. The governor must be in place before proceeding to step 2.
2. Install a purge control air line having a minimum inside diameter of 3/16" between the AD-IP air dryer control port and an unused unloader port on the governor. The control line must be plumbed direct to the governor, and not in series with automatic drain valves, lubrication systems, etc.
3. The control line should slope downward to the air dryer end cover without forming any sharp bends and potential water traps.



## COMPRESSOR DISCHARGE LINE

### GENERAL:

While minimum diameters are specified, larger line diameters generally improve performance and life and reduce temperatures, particularly in severe applications.

1. The compressor discharge line material should be a wire braided Teflon® hose, copper tubing, or a combination of both. (Some vehicle manufacturers use wire braided Teflon and rubber hose.)
2. The compressor discharge line should slope downward from the compressor discharge port to the Bendix® AD-IP® air dryer supply port without forming water traps, kinks, or restrictions. Crossovers from one side of the frame rail to the other, if required, should occur as close as possible to the compressor.
3. Extension fittings and combination fittings (i.e., no more than two supply fittings coupled together) must not be installed at the AD-IP air dryer supply port. A straight fitting installed at the AD-IP air dryer supply port is preferred; however, a 45° or a 90° fitting can be used in that order of preference. Make certain the fitting orientation does not cause the compressor discharge line to "run uphill" to the air dryer supply port.
4. Compressor discharge line lengths, and inside diameter requirements, are dependent on the vehicle application and are shown in *Table 3*.

### DELIVERY LINE

1. Install an air line of the same approximate inside diameter (ID) as the compressor discharge line between the AD-IP air dryer delivery port and the first (supply) reservoir. This line should also slope downward to the reservoir, if possible.

### EXHAUST LINE

1. If it is necessary to direct AD-IP air dryer discharge contaminates away from vehicle components, a one (1) inch (25.4 mm) I.D. hose can be clamped on the special AD-IP air dryer purge valve exhaust cover.

### WIRING THE HEATER/THERMOSTAT

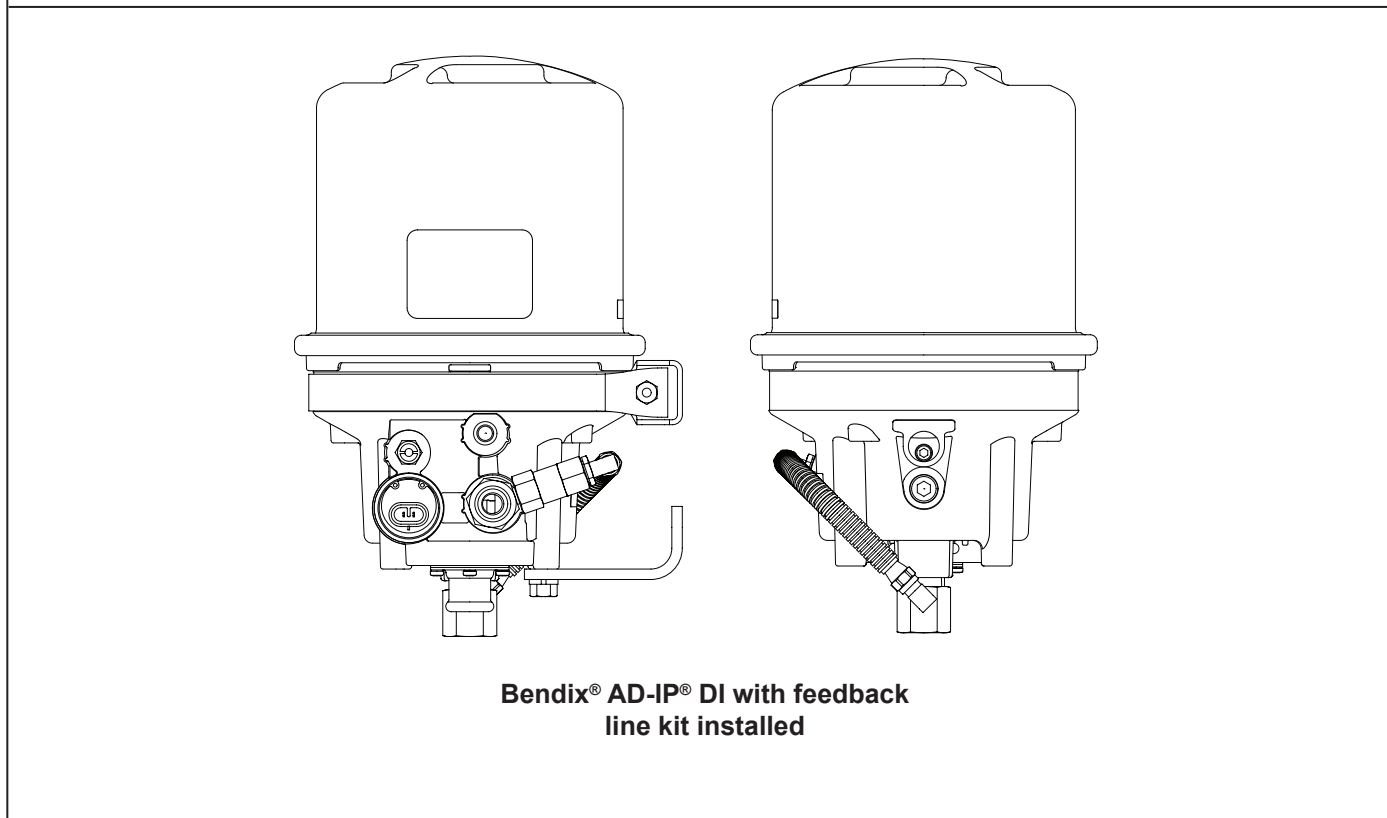
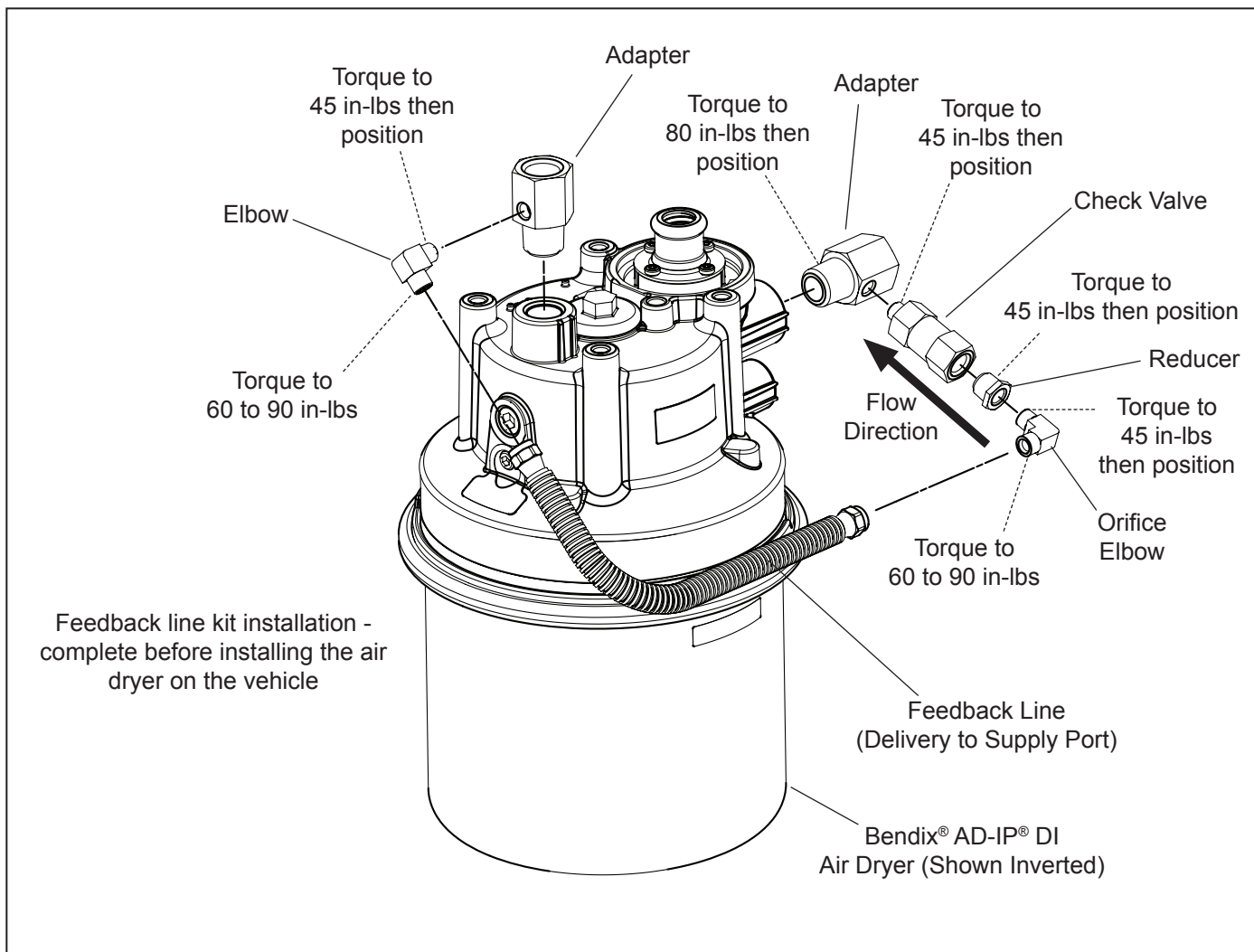
1. The air dryer is available with either a 12- or 24-volt heater. Determine the vehicle's electrical system voltage and make certain that the air dryer that is to be installed contains the same voltage heater. The air dryer part number can be used to determine the air dryer heater voltage requirement. The heater voltage can also be identified by the color of the heater assembly connector. (See *Table 4*.)
2. If the vehicle was not originally equipped with an air dryer, it will be necessary to obtain an air dryer wire harness assembly and splice kit, (*Bendix part number 109871N*).
3. If it is necessary to lengthen the heater wiring harness, use 14 GA wire and make certain all wire splices are waterproof.

4. If the vehicle was originally equipped with an air dryer, reconnect the vehicle's wiring harness to the air dryer.
5. Tie wrap, or support, all electrical wires leading to the air dryer at 6-8 inch intervals. *NOTE: Wires should have sufficient slack and not be completely taught.*

### TESTING THE BENDIX® AD-IP® AIR DRYER

Before placing the vehicle in service, perform the following tests:

1. Close all reservoir drain cocks.
2. Build-up system pressure to governor cut-out and note that the air dryer purges with an audible escape of air.
3. Apply and release the service brakes to reduce system air pressure to governor cut-in. Note that the system once again builds to full pressure and is followed by a purge at the air dryer exhaust.
4. It is recommended that the vehicle be tested for leakage using the following procedure to ensure that the air dryer will not cycle excessively:
  - A. Apply the parking brakes, build system pressure to governor cut-out, and allow pressure to stabilize for at least one (1) minute.
  - B. Observe the dash gauge pressures for two (2) minutes and note any pressure drop.
    - 1) Pressure Drop: Single Vehicle – A two (2) psi drop within two (2) minutes is allowable for either service reservoir.
    - 2) Pressure Drop: Tractor/Trailer – A 6 psi drop within two (2) minutes is allowable for either service reservoir.
    - 3) Pressure Drop: Tractor/2 Trailers – An 8 psi drop within two (2) minutes is allowable for either service reservoir.
  - C. Make necessary repairs and repeat step 4.
  - D. Release the parking brakes, build system pressure to governor cut-out and allow pressure to stabilize for at least one (1) minute.
  - E. Make and hold an 80-90 psi brake application (a block of wood can be used to hold the foot valve down during these tests).
  - F. Allow pressure to stabilize for one (1) minute then begin timing for two (2) minutes while watching the dash gauges for a pressure drop.
    - 1) Pressure Drop: Single Vehicle – A 4 psi drop within two (2) minutes is allowable for either service reservoir.
    - 2) Pressure Drop: Tractor/Trailer – A 6 psi drop within two (2) minutes is allowable for either service reservoir.
    - 3) Pressure Drop: Tractor/2 Trailers – An 8 psi drop within two (2) minutes is allowable for either service reservoir.



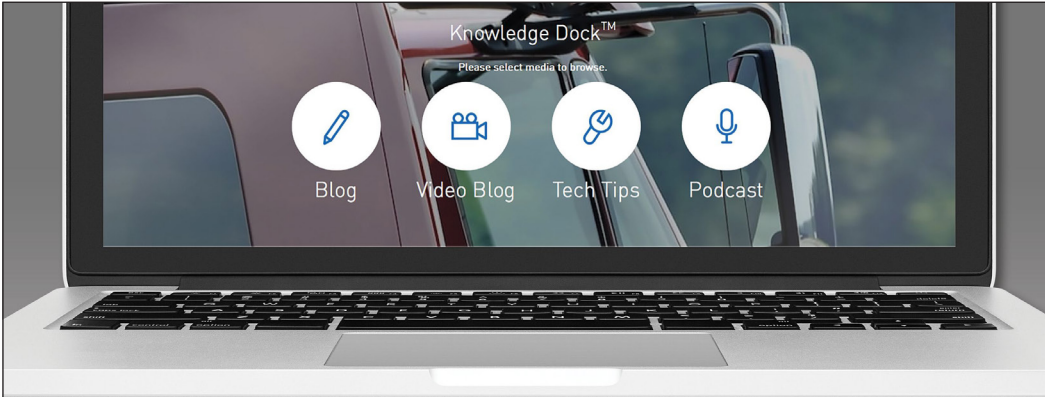
**Figure 3 – Bendix® AD-IP® DI Air Dryer Feedback Line Kit Installation**

Typical Pickup & Delivery (P&D), School Bus and Line Haul		
The minimum discharge line length is 6 feet, the maximum is 16 feet.		
Discharge Line Length	Minimum Line I.D.	Other Requirements
6.0 – 9.5 ft.	1/2 in.	None
9.5 – 12.0 ft.	1/2 in.	Last 2-3 feet, including the supply port fitting, must be insulated with 1/2 inch thick closed cell polyethylene pipe insulation.
12.0 – 16.0 ft.	5/8 in.	Last 2-3 feet, including the supply port fitting, must be insulated with 1/2 inch thick closed cell polyethylene pipe insulation.
If the discharge line length must be less than 6 feet or greater than 16 feet, contact your local Bendix sales or service representative or authorized parts outlet for further information.		
High Duty Cycle Vehicles (City Transit Bus, Refuse Trucks, Etc.)		
The minimum discharge line length is 10 feet, the maximum is 16 feet.		
Discharge Line Length	Minimum Line I.D.	Other Requirements
10.0 – 16.0 ft.	5/8 in.	None
If the discharge line length must be less than 10 feet or greater than 16 feet, contact your local Bendix sales or service representative or authorized parts outlet for further information.		

**Table 3 – Compressor Discharge Line Specifications**

Identifying Air Dryer Heater Voltage	
Air Dryer Heater Voltage	Air Dryer Connector Identification
12 Volts	White (no other markings)
24 Volts	Gray or White with a Red Dot

**Table 4 – Air Dryer Heater Voltage**




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