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Version 1

Title

Battery Electric Vehicle (BEV) - Constant Air Compressor Cycling

Abstract

Air compressors may be observed cycling continuously at intervals of 10 to 30 seconds. This behavior persists even when no air leaks are present in the system.

Content

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Valid For

Mack Chassis - LRe
Volvo Chassis - VNRe
Model Years - 2021 to current

Air compressors may be observed cycling continuously at intervals of 10 to 30 seconds. This behavior persists even when no air leaks are present in the system.

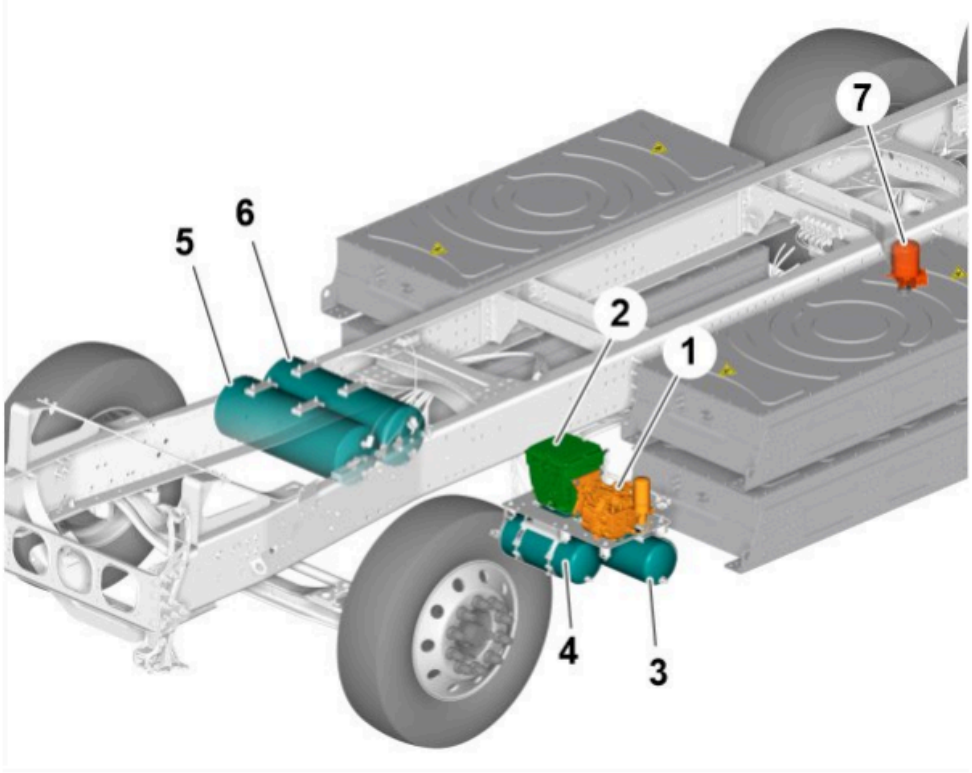
Observations

- **No air leaks:** System checks confirm the absence of leaks.
- **Secondary air tank pressure:** The pressure in the secondary air tank does not drop during the purge cycle.
- **Root cause:** Some secondary air tanks are misbuilt with a check valve (non-return valve) installed, which is preventing proper system operation.

Technical Reference

Refer to Identity **163110085** in IMPACT (**Under the service tab**) for details. The secondary air tank should not have a check valve installed in the line labeled **3b** (connection between the secondary tank and the wet tank).

Live UI

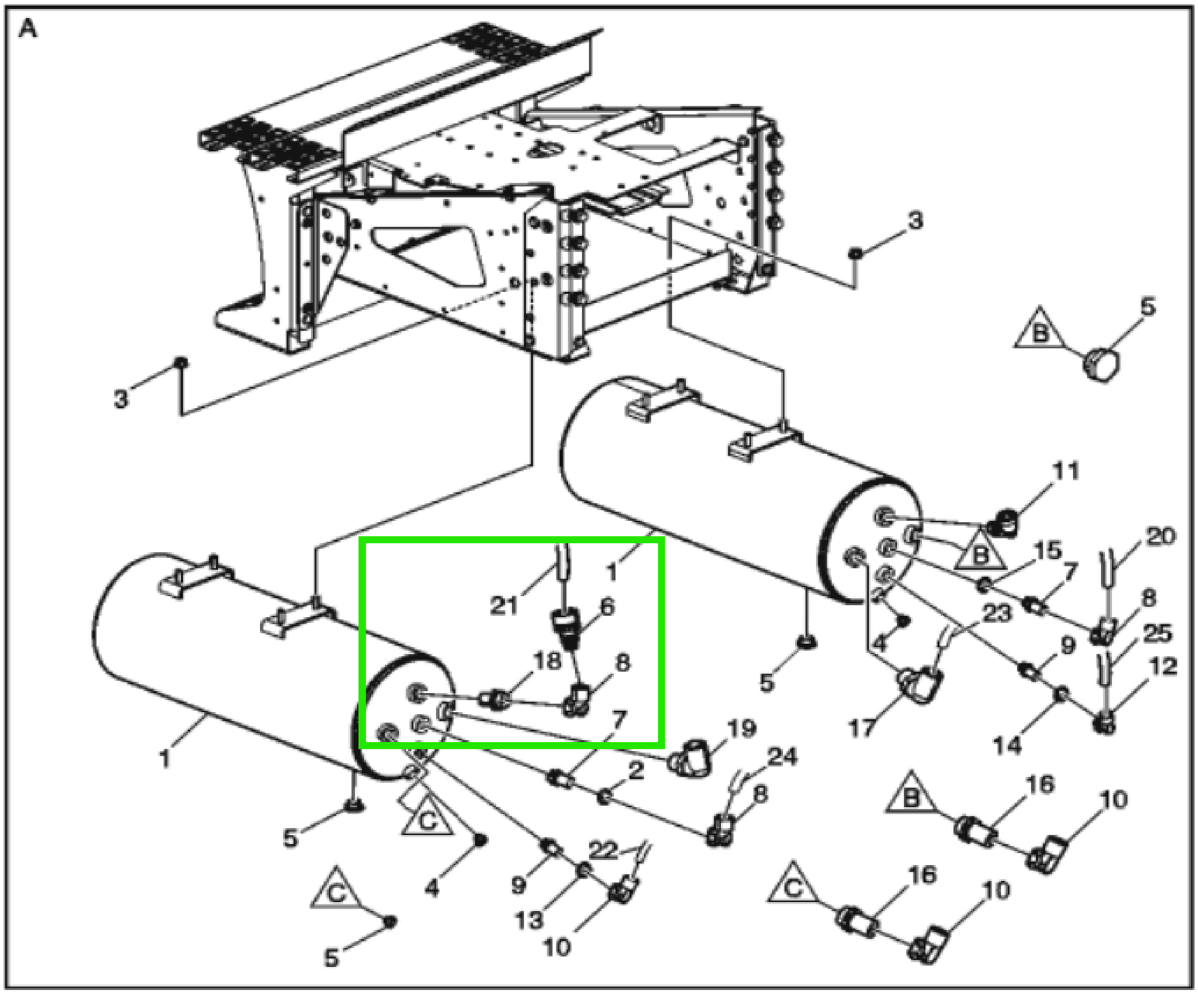


1	Screw air compressor (EVAC (Electric Vehicle Air Compressor))
2	Electric motor (EVAC)
3	Supply air tank
4	Air tank (for gearbox)
5	Secondary air tank

Resolution Procedure

1. **Inspect System Configuration:**
   - Locate the secondary air tank and identify line **3b** connecting it to the wet tank.
   - Check for the presence of a check valve in this line.
2. **Correct Misbuilt Secondary Tank:**
   - If a check valve is installed, remove it.
   - Replace with the appropriate fittings to ensure correct operation.
3. **Verify Correct Fittings:**
   - Consult Identity **TB-152475241-3** in IMPACT (**Under the parts tab**) for the approved fitting specifications and installation instructions.
4. **Test System Performance:**
   - After correcting the configuration, observe the air compressor operation.
   - Confirm the cycling interval aligns with normal operational parameters and that the secondary air tank functions as expected during purge cycles.

Live UI



Pos	Part No.	A	PS	Description	Notes			
1	22945916	2		compressed-air tank				
2	992267	1		angle ring	HEAVYDUTY-28X18			
3	990951	8		flange lock nut; silver				
4	991061	2		plug	M12X1.5*8			
5	991063	4		plug	M22X1.5*9			
6	60113880	1		nipple	1/2-REGULAR			
7	992018	2		swivel	M16x1,5-HeavyDuty			
8	991967	3		elbow nipple	HEAVYDUTY-5/8"			
9	991083	2		swivel	M16X1,5-REGULAR			
10	991966	1		elbow nipple				
11	60114914	1		elbow nipple	M22X1,5-3/4"			
12	991965	1		elbow nipple	REGULAR-3/8"			
13	991983	1		angle ring	REGULAR-HEX.22X18			
14	991984	1		angle ring	REGULAR-HEX.28X18			
15	992266	1		angle ring	HEAVYDUTY-22X18			
16		X	NS		N/A			
17	20560349	1		non-return valve	M22X1.5			
18	991968	1		swivel	M22X1			
19	20378449	1		elbow nipple	M22X1,5			
20	945462	X		tube; black	12.7*1.6			
21	967993	X	OP	tube; orange	12.7*1.6			
22	967977	X	OP	tube; red	12.7*1.6			
23	967974	X	OP	tube; green	15.9*2.3			
24	967994	X		tube; orange	15.9*2.3			
25	967997	X	OP	tube; blue	12.7*1.6			

For further assistance, contact the technical support team.

Tags

mack volvo bev air compressor

Categories *

Vehicle System > Air System

Make and Model > Mack Americas > LR Electric

Make and Model > Volvo > VNR Electric

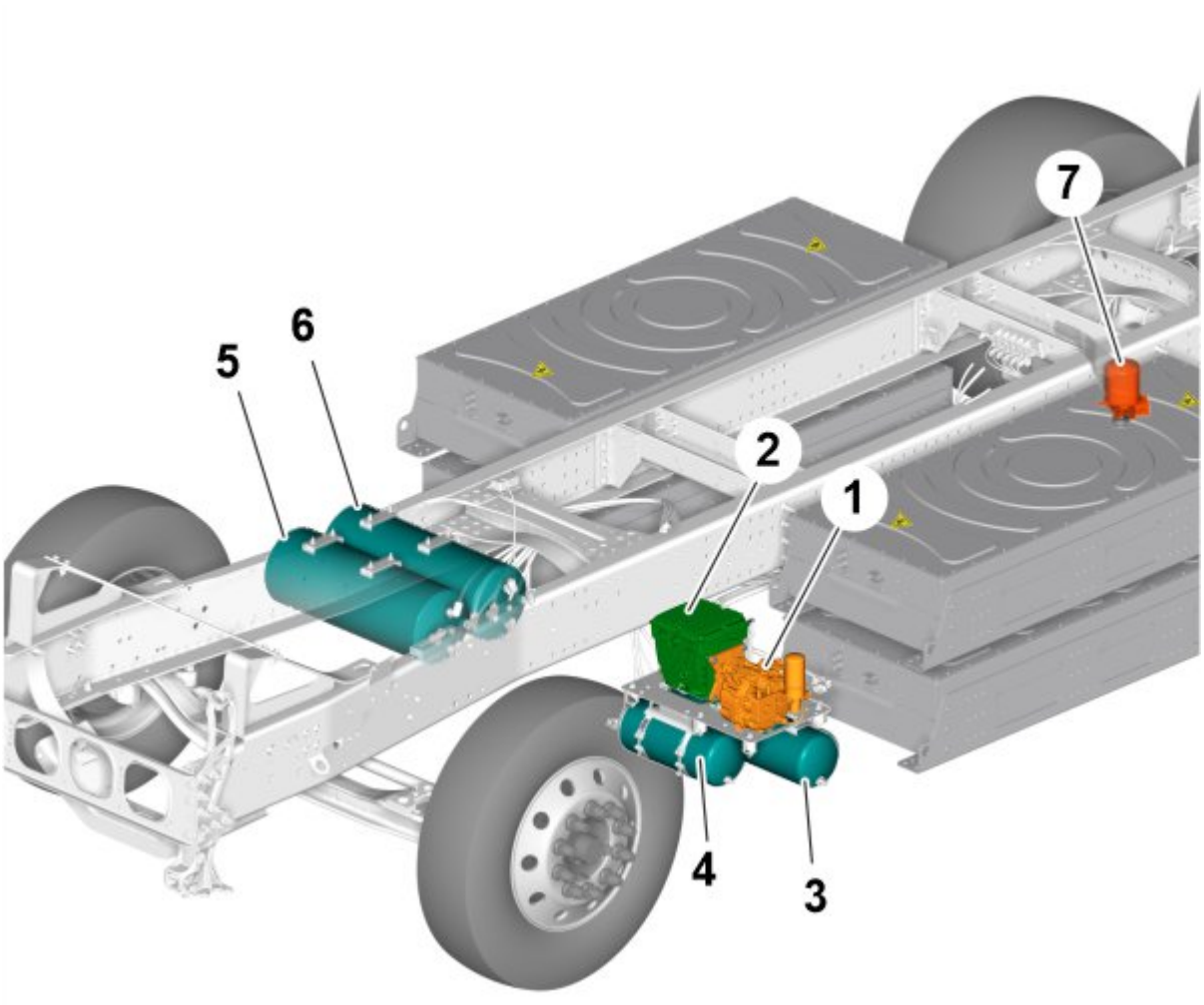
Live UI

Air Supply, System Description

Air supply, system description

Overview

Air supply system, overview



1	Screw air compressor (EVAC (Electric Vehicle Air Compressor))
2	Electric motor (EVAC)
3	Supply air tank
4	Air tank (for transmission)
5	Secondary air tank

6	Primary air tank
7	ECAD (Electrically Controlled Air Drier)

Description

The air supply system generates and stores the compressed air used by the brake and other systems. The electric motor drives the air compressor, which generates the air.

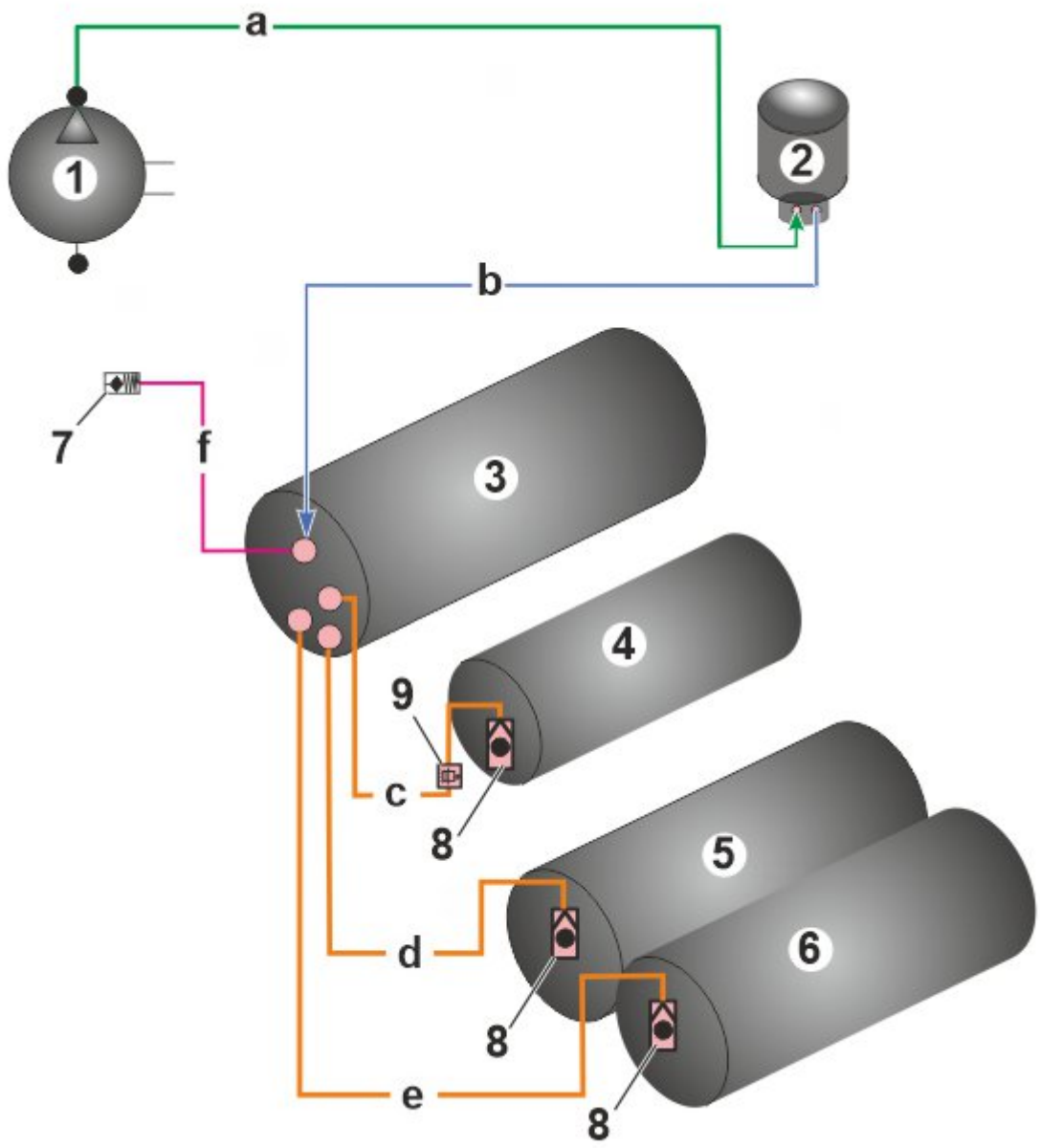
The EVCM (Electromobility Vehicle Control Module) controls the air compressor operation via VECU (Vehicle Electronic Control Unit) communication. The VECU electrically controls the air drier unit, which cleans and distributes the generated air to the compressed-air tanks. This air is stored in the compressed-air tanks and distributed to the pneumatic systems of the truck.

•	If the air pressure in the tank is less than or equal to the cut-in value of 760 kPa (110 psi), the compression phase is started.

•	If the air pressure in the tank is higher than or equal to the cut-off value of 910 kPa (132 psi), the compression phase is stopped.

Air supply system

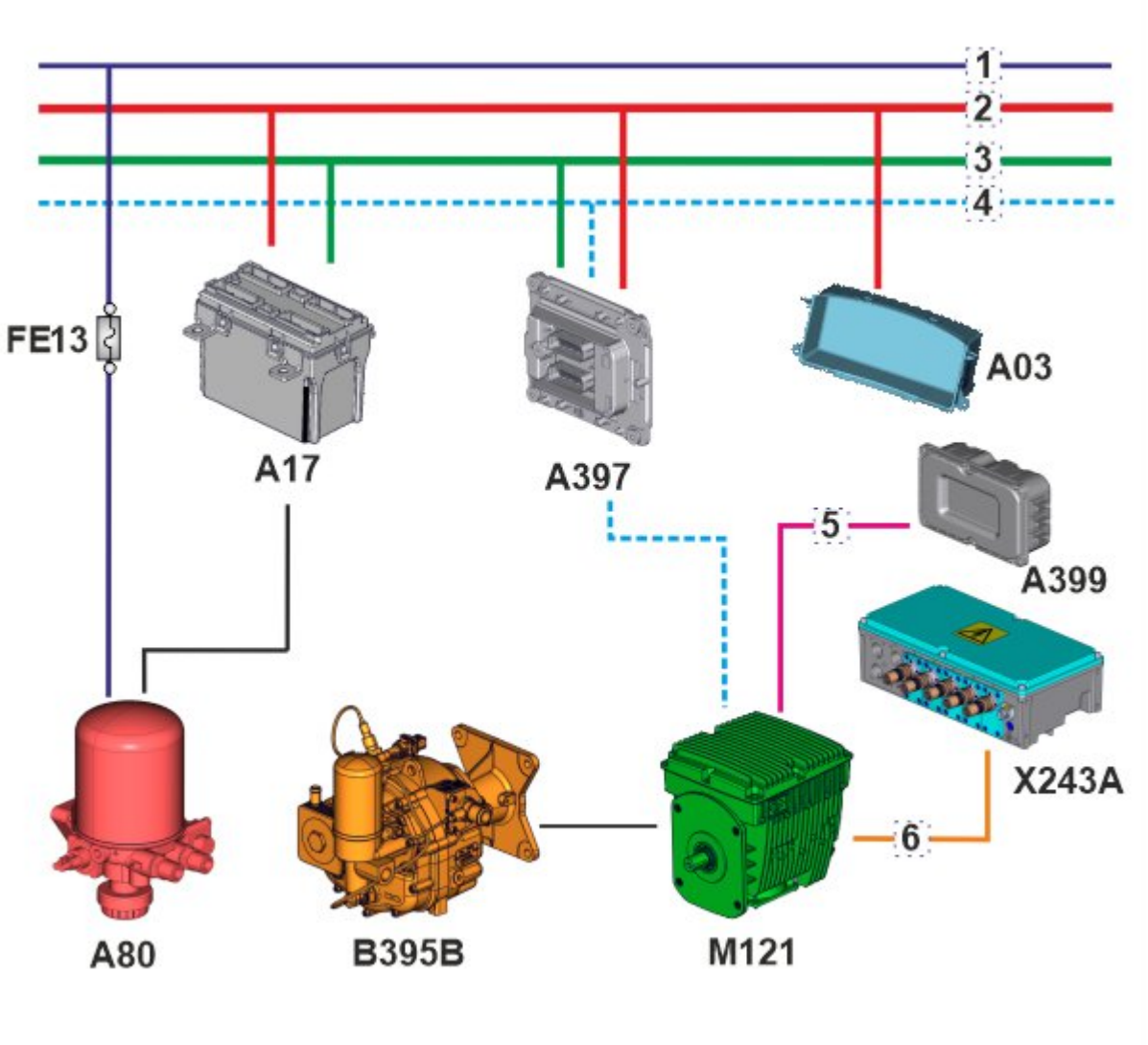
Pneumatic schematics



1	EVAC
2	ECAD
3	Supply air tank
4	Air tank (transmission)
5	Primary air tank
6	Secondary air tank
7	Schrader valve
8	Non-return valve
9	Pressure protection valve
a	Air supply line to air drier
b	Pneumatic supply (from air drier to supply air tank)
c	Pneumatic supply (from supply tank to air tank (transmission))
d	Pneumatic supply (from supply tank to primary air tank)

e	Pneumatic supply (from supply tank to secondary air tank)
f	Pneumatic connection (from supply tank to Schrader valve)

Schematic, air supply system

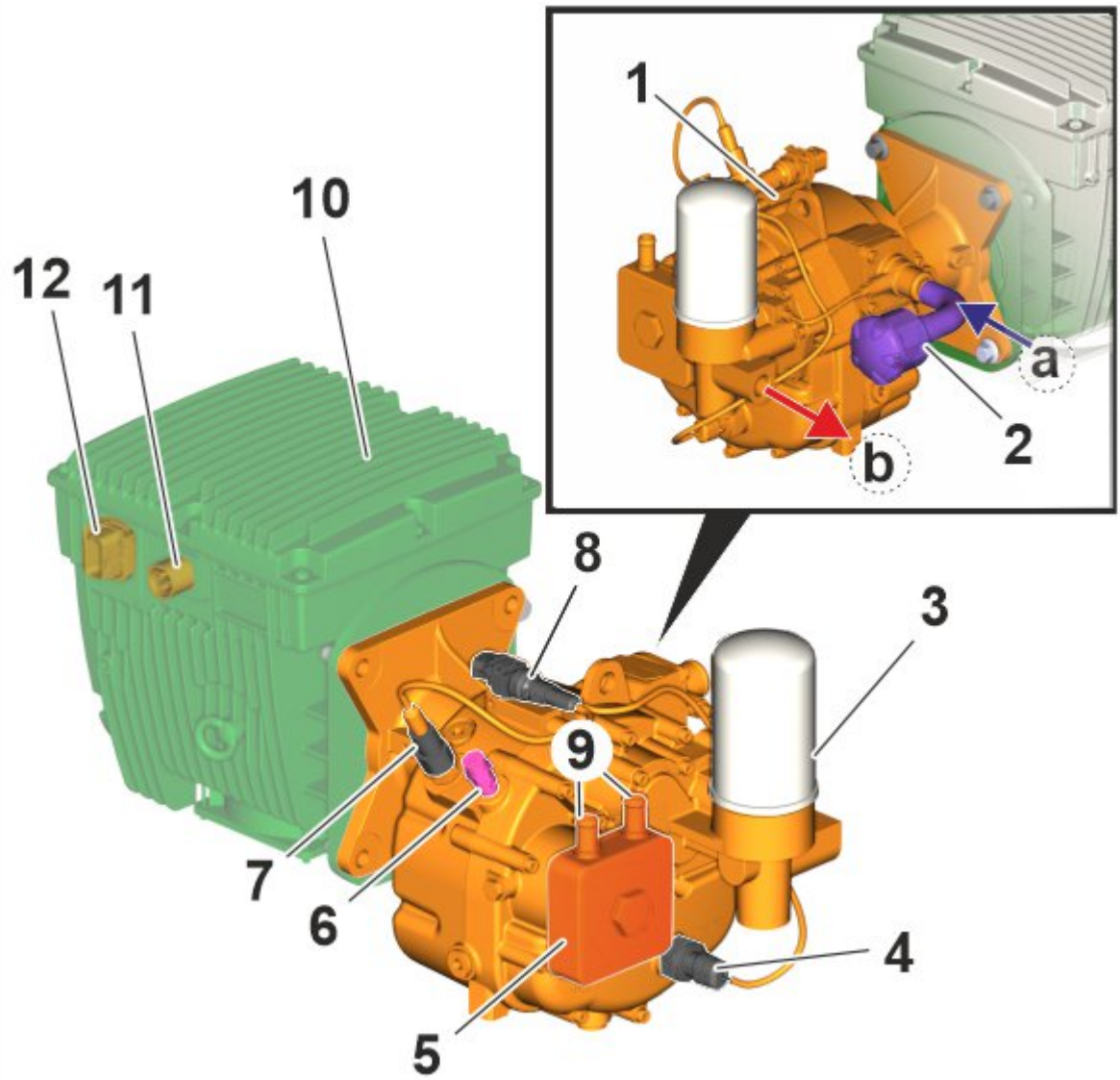


1	12 V supply
2	Data Link 1 (J1939)
3	Data Link 2 (J2284)
4	Data Link 15 vehicle subnet
5	Low voltage 24 V supply
6	Traction voltage 600 V DC (Direct Current) supply
FE13	Fuse (from EFRC (External Fuse and Relay Center) to air drier)
A17	VECU
A397	EVCM
A80	Air drier (ECAD)
A03	Instrument cluster
B395B	Sensor (screw air compressor)

M121	Electric motor
X243A	TVJB (Traction Voltage Junction Box) 1
A399	Fuse and relay center, chassis

EVAC (Electric Vehicle Air Compressor)

EVAC, overview



a	Air inlet
b	Air outlet
1	Screw compressor (EVAC)
2	Air filter
3	Coalescing filter
4	Oil level switch
5	Oil cooler
6	Safety valve
7	Temperature switch

8	Connector
9	Coolant inlet and outlet connection
10	Electric motor (EVAC)
11	Traction voltage connection (600 V)
12	Signal interface

EVAC is a liquid-cooled rotary screw compressor with an air-cooled motor.

The rotary screw compressor uses two very closely meshing helical screws (rotors) to compress the air. Air enters via the air inlet and moves through the threads as the screws rotate. The meshing rotors force the air through the compressor, and directs the air to the end of the screws.

The compressor draws air through the air inlet filter. Then the air is compressed between the rotors, which are rotating in opposite directions. The compressed air is sent to the air drier for cleaning, then to the compressed-air tank and is distributed to the vehicle's pneumatic systems.

The electric motor drives the EVAC with the traction voltage of 600 V DC. The EVCM along with a VECU communication controls the EVAC. The VECU monitors the air pressure in the air tanks and controls the EVAC operation. The sensors (temperature, oil level and unloader valve) in the EVAC communicate to EVCM via the electric motor. A coalescing filter removes oil from the air and the air flows to the air drier for distribution.

Electrically Controlled Air Drier (ECAD)

CAUTION

Risk of material damage.

If the filter cartridge is not replaced according to the recommended interval, the performance of the air dryer may be affected and components in the air system may be damaged.

▸	Replace the air dryer filter cartridge according to the recommended interval.

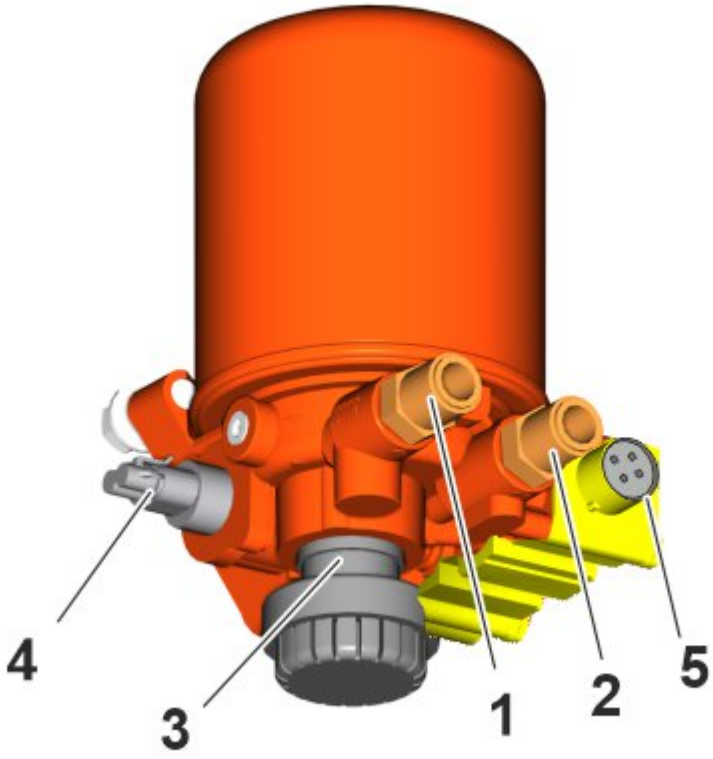
CAUTION

Risk of material damage.

The original equipment filter cartridge has coalescing filters and desiccant to ensure that oil, aerosols, water and other contaminants are removed from the compressed air. Some non-original equipment filter cartridges may provide inadequate filtration and water removal. If filter cartridges that have inadequate filtration and water removal characteristics are used, damage to the air supply system components may occur.

▸	Do not use a filter cartridge with inadequate filtration and water removal characteristics. The use of OEM (Original Equipment Manufacturer) approved filter cartridges is recommended. Damage that is caused by the use of one or more non-OEM Genuine Parts is not covered under warranty.

Air dryer



1	Inlet port (inlet air supply from EVAC)
2	Outlet port (supply tank delivery)
3	Exhaust port with silencer
4	Heater connection
5	Electrical connection (solenoid)

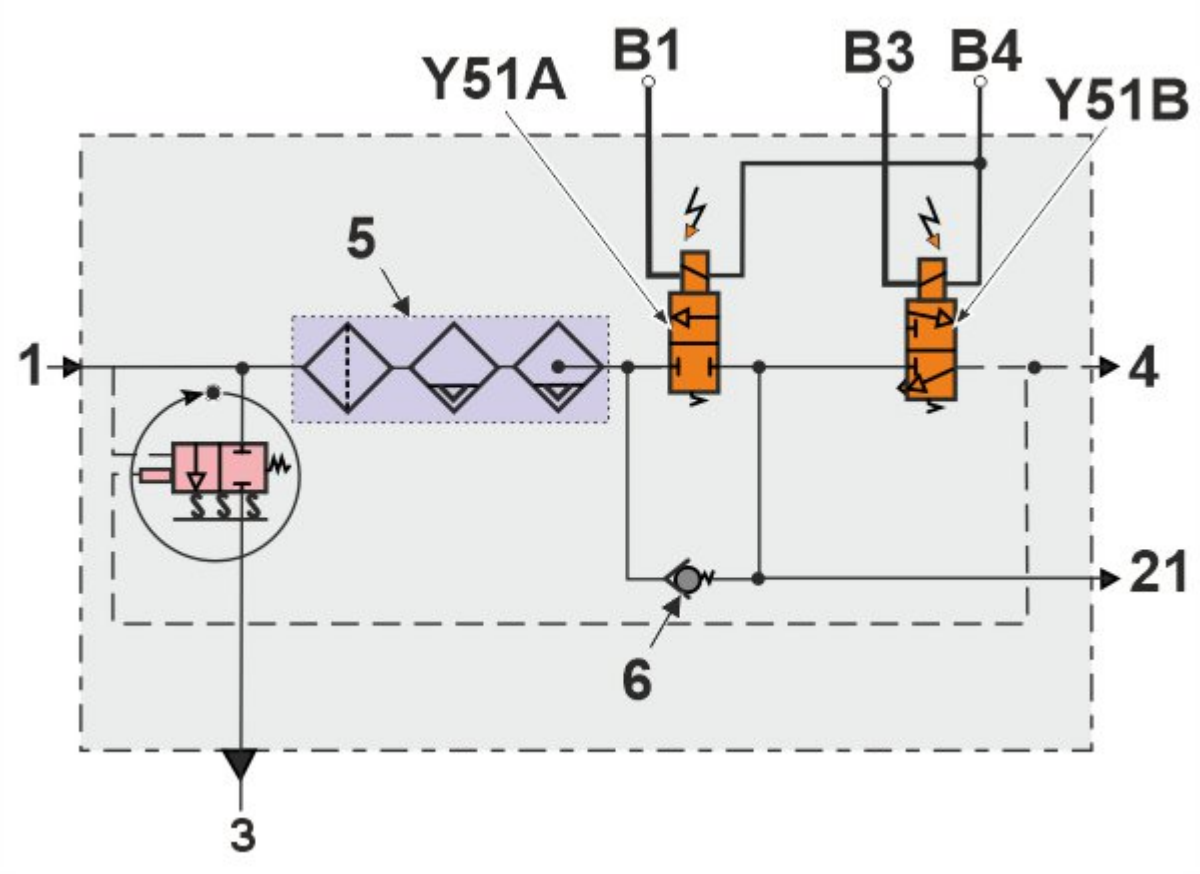
The air supply system is equipped with an air drier unit to clean and dry the compressed air generated by the EVAC. Before reaching the pneumatic system, the compressed air should be free of moisture, oil, and other contaminants. The VECU monitors the vehicle driveline status and pneumatic pressure levels to enable the preferential compressor cycle.

The VECU supplies power to the air drier when the driveline is active and the pneumatic system pressure is above the predefined value. When the driveline is inactive, the VECU cuts the power supply to the air drier.

VECU controls the two integrated solenoid valves that govern desiccant regeneration and compressor control. If for any reason the air drier should have a loss of power, the air drier will cease to function and the desiccant will become wet, while the compressor will continue to charge.

The air drier inlet port **(1)** receives compressed air from the compressor. During the charging phase of operation, the air enters the air drier inlet port **(1)** as moist air. The air circulates through the air drier and returns via the air drier outlet port **(2)** as dry air. A 4-way solenoid connector **(5)** interfaces with the internal solenoid valves integrated in the air drier that are used for compressor unloading and air drier regeneration.

Air drier phases



The air drier has three working phases. The working phases include the following:

- **Charging phase**

  Compressed air enters through the inlet port **(1)** of air drier and air directed through the desiccant bed **(5)** . The moist air is dried and cleaned and directed to the supply tank via the outlet port **(21)** through the non-return valve **(6)** .

- **Purge phase**

  When the system air pressure reaches cut-out pressure, the EVAC stops working. The VECU keeps the EVAC air discharge line pressurized for 15 seconds. During the 15-seconds time, the compressor internal pressure decreases and the VECU unloads the compressor by opening the governor solenoid valve **(Y51B)** and air from the port **(21)** is purged through the exhaust port **(3)** .

- **Regeneration phase**

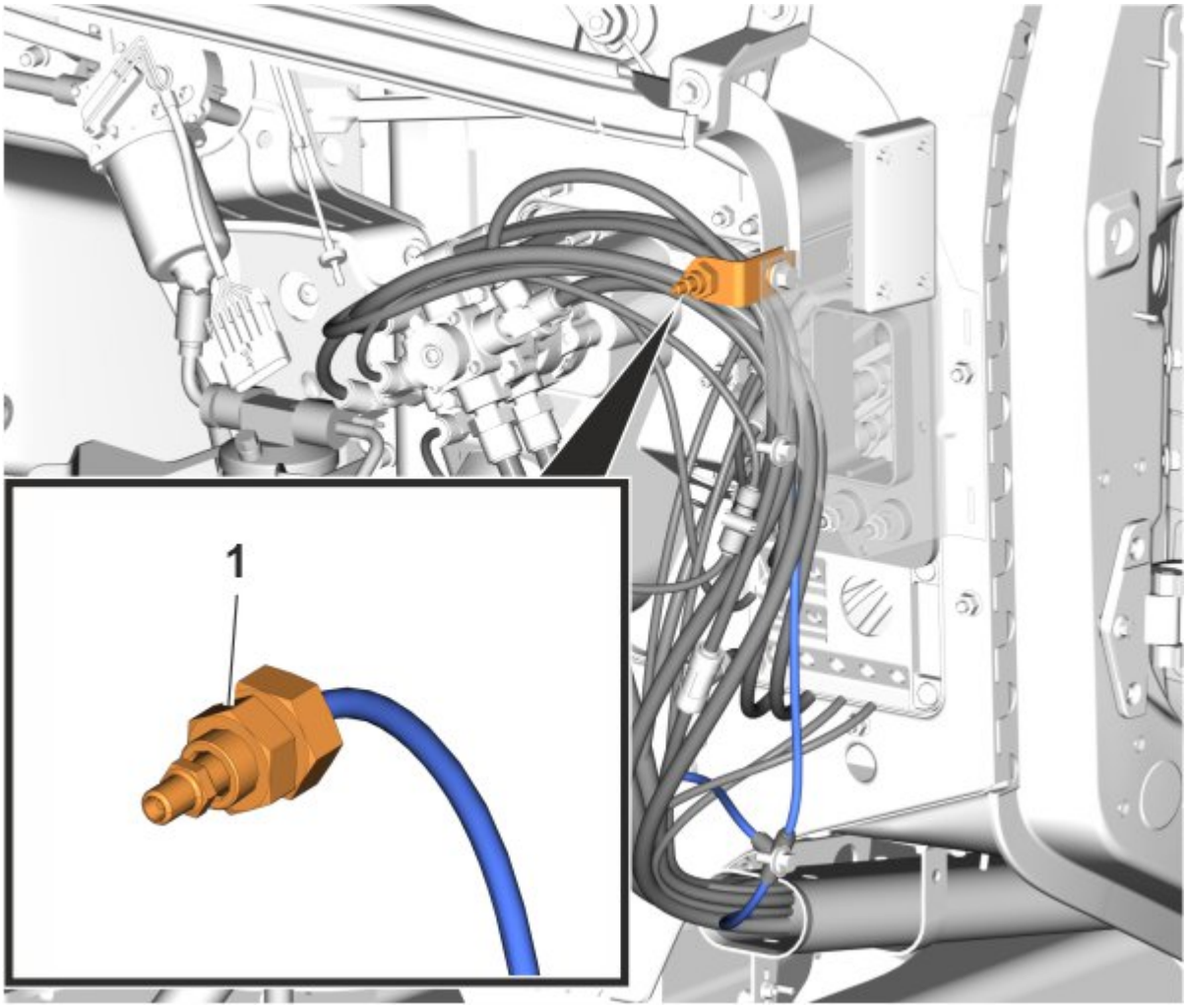
  When VECU opens the regeneration solenoid valve **(Y51A)** and a small flow of system air will flow through the filter cartridge bed **(5)** and out through the purge valve (exhaust port) **(3)** . When regeneration occurs, water is removed from the desiccant in the filter cartridge.

(B1) and **(B3)** are the VECU signals, **(B4)** is the 12 V supply.

Air drier heating function

The heating coil heats the valve inside the air drier. To prevent the functional defects on the unloader valve (exhaust port) during the low temperature conditions, the heater coil heats the valve seat to avoid freezing.

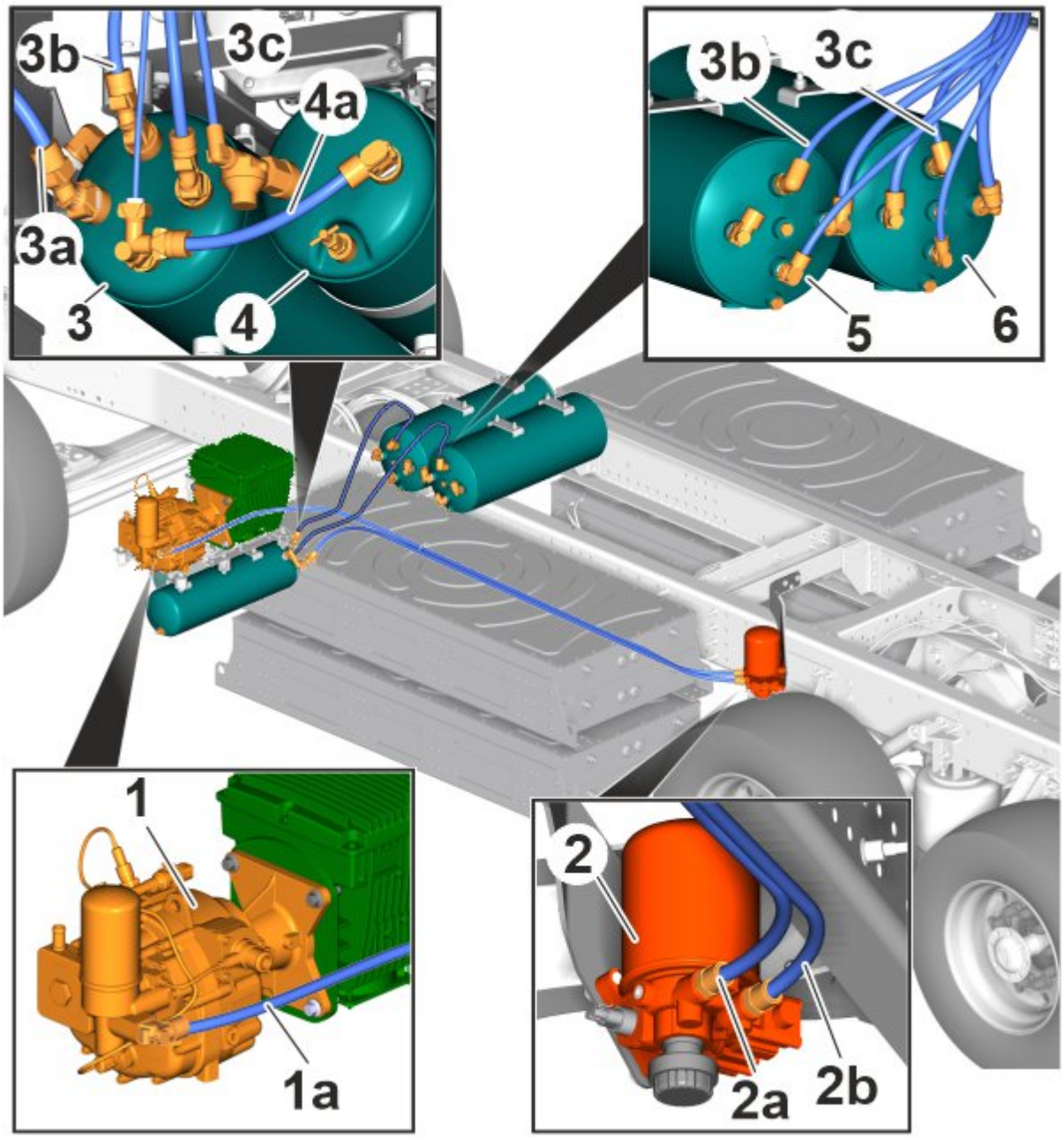
Schrader valve



The air required for tire inflation and body builder application is consumed from the Schrader valve **(1)** connection. It is located on the front of the cab near the footbrake valve pneumatic connection. Schrader valve receives pneumatic supply from the supply air tank.

Air supply system, pneumatic connection overview

Pneumatic connections



1	EVAC
	1a - EVAC air supply pipe to air drier inlet port

2	Electrically Controlled Air Drier (ECAD)
	2a - ECAD inlet connection
	2b - ECAD outlet connection

3	Supply air tank
	3a - Pneumatic pipe connection to supply tank from air drier
	3b - Pneumatic pipe connection to secondary air tank
	3c - Pneumatic pipe connection to primary air tank
4	Air tank for transmission
	4a - Pneumatic pipe connection from supply tank to air tank (transmission)

5	Secondary air tank
6	Primary air tank

Related information

For more information on the electrical architecture, refer to:

Wiring diagram

- Vehicle Electronics Overview, System Description

Related functions

- Service Braking, Function Description

Related systems

- Trailer Brake, System Description
- Parking Brake, System Description
- Air Dryer, System Description

Air Tanks Mounting and Fittings (Battery Box) (Identity: TB-152475241-3)

A:

Pos	Part No.	A	PS	Description	Notes		
1	22945916	2		compressed-air tank			
2	992267	1		angle ring	HEAVYDUTY-28X18		
3	990951	8		flange lock nut; steel			
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5	991063	4		plug	M22X1.5*9		
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8	991967	3		elbow nipple	HEAVYDUTY-5/8"		
9	991083	2		swivel	M16X1,5-REGULAR		
10	991966	1		elbow nipple	TRACTOR		
10	991966	3		elbow nipple	RIGID , REGULAR-1/2"		
11	60114914	1		elbow nipple	M22X1,5-3/4"		
12	991965	1		elbow nipple	REGULAR-3/8"		
13	991983	1		angle ring	REGULAR-HEX.22X18		
14	991984	1		angle ring	REGULAR-HEX.28X18		
15	992266	1		angle ring	HEAVYDUTY-22X18		
16	991084	2		swivel	RIGID , M22X1,5-REGULAR		
16		X	NS		TRACTOR , N/A		
17	20560349	1		check valve	M22X1.5		
18	991968	1		swivel	M22X1		
19	20378449	1		elbow nipple	M22X1,5		
20	945462	X		tube; black	12.7*1.6		
21	967993	X	OP	tube; orange	12.7*1.6		
22	967977	X	OP	tube; red	12.7*1.6		
23	967974	X	OP	tube; green	15.9*2.3		
24	967994	X		tube; orange	15.9*2.3		
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Air Tanks Mounting and Fittings (Battery Box) (Identity: TB-152475241-3)