UNDERHOOD® 40
AIR COMPRESSORS

Installation Manual for VMAC System

V400033

With Advanced Digital Controls

2023+ Mercedes Sprinter

2.0 L Diesel

VMACAIR.com

Table of Contents

Revision	Revision Details	Revised by	Checked by				Implemented
			Eng.		Tech.	Qual.	
			Mech.	Elec.			
C	ECN: 24-178 Update foot pedal harness warning.	MSP	N/A	SRD	BDJ	TPK	29 Oct. 2024

Additional Application Information

- Use of an air receiver tank (minimum 6 USG) is required with this application.
- 2023+ Mercedes Sprinter 2.0 L Diesel, L4 OM654.
- Ideally, the vehicle will come equipped with either prep option code N62 (preferred) or N63 (This will equip the vehicle with the Mercedes OEM dual row pulley).
- Vehicles equipped with single row crank pulley will need to install the VMAC auxiliary pulley (supplied in kit).
- No other Mercedes-Benz auxiliary alternator or A/C kits can be installed.

Registered Trademarks

All trademarks mentioned in this manual are the property of their respective owners. VMAC's use of manufacturers' trademarks in this manual is for identification of the products only and does not imply any affiliation to, or endorsement of said companies.

Loctite®, **Loctite® 242** and **Loctite® 567** are registered trademarks of Henkel AG & Company KGaA.
Eaton Aeroquip® is a registered trademark of EATON AEROQUIP INC.
Torx® is a registered trademark of Acument Intellectual Properties, LLC
Mercedes® and **Sprinter®** are registered trademark of DAIMLER AG.

Important Information

The information in this manual is intended for certified VMAC installers who have been trained in installation and service procedures and/or for anyone with mechanical trade certification who has the tools and equipment to properly and safely perform the installation or service. Do not attempt installation or service without the appropriate mechanical training, knowledge and experience.

Follow all safety precautions. Any fabrication for correct fit in modified vehicles must follow industry standard "best practices".

Notice

Printed in Canada

Safety

Important Safety Notice

The information contained in this manual is based on sound engineering principles, research, extensive field experience and technical information. Information is constantly changing with the addition of new models, assemblies, service techniques and running OEM changes. If a discrepancy is found in this manual, contact VMAC Technical Support prior to initiating or proceeding with installation, service or repair. Current information may clarify the issue. Anyone with knowledge of such discrepancies, who proceeds to perform service and repair, assumes all risks.

Only proven service procedures are recommended. Anyone who departs from the specific instructions provided in this manual must first ensure that their safety and that of others is not being compromised, and that there will be no adverse effects on the operational safety or performance of the equipment.

VMAC will not be held responsible for any liability, consequential damages, injuries, loss or damage to individuals or to equipment as a result of the failure of anyone to properly adhere to the procedures set out in this manual or standard safety practices.

Safety should be the first consideration when performing any service operations. If there are any questions concerning the procedures in this manual, or more information is required, please contact VMAC Technical Support prior to beginning work.

Safety Messages

This manual contains various warnings, cautions and notices that must be observed to reduce the risk of personal injury during installation, service or repair and the possibility that improper installation, service or repair may damage the equipment or render it unsafe.

This symbol is used to call attention to instructions concerning personal safety. Watch for this symbol; it points out important safety precautions, it means, "Attention, become alert! Your personal safety is involved". Read the message that follows and be aware of the possibility of personal injury or death. As it is impossible to warn of every conceivable hazard, common sense and industry standard safety practices must be observed.

This symbol is used to call attention to instructions on a specific procedure that if not followed may damage or reduce the useful life of the compressor or other equipment.

This symbol is used to call attention to additional instructions or special emphasis on a specific procedure.

Warranty

VMAC Standard Warranty (Limited)

For complete warranty information, including both VMAC Standard Warranty (Limited) and VMAC Lifetime Warranty (Limited) requirements, please refer to our current published warranty located at: **www.vmacair.com/warranty**

If you do not have access to a computer, please contact us and we will be happy to send you our warranty.

VMAC's warranty is subject to change without notice.

VMAC Lifetime Warranty (Limited)

A VMAC Lifetime Limited Warranty is offered on the base air compressor only and only on UNDERHOOD, Hydraulic Driven, Transmission Mounted, Gas and Gas Engine Driven Air Compressors, Multifunction Power Systems, and other products as defined by VMAC, provided that (i) the purchaser fully completes and submits a warranty registration form within 3 months of purchase, or 200 hours of operation, whichever occurs first; (ii) services are completed in accordance with the Owner's Manual; (iii) proof of purchase of applicable service kits are made available to VMAC upon request.

The VMAC Lifetime Warranty is applicable to new products shipped on or after 1 October, 2015.

Warranty Registration

The VMAC warranty registration form is located near the back of this manual. This warranty registration form must be completed and sent to VMAC at the time of installation for any subsequent warranty claim to be considered valid.

There are 4 ways the warranty can be registered with VMAC:

www.vmacair.com/warranty

warranty@vmacair.com

(877) 740-3202

VMAC - Vehicle Mounted Air Compressors
1333 Kipp Road, Nanaimo, BC, Canada V9X 1R3

VMAC Warranty Claim Process

VMAC warranty work must be pre-authorized by VMAC. Claims are processed via our dealer network. If you are not a VMAC dealer, please select one to work with via our Dealer Locator:
https://www.vmacair.com/dealer-locator/

1) Communicate with VMAC Technical Support at 1-888-241-2289 or tech@vmacair.com to help diagnose/troubleshoot the problem prior to repair. VMAC technical support will require the VMAC System ID, and hours on the compressor.
2) VMAC will provide direction for repair or replacement of the failed components.
3) If requested, failed parts must be returned to VMAC for evaluation.
4) Dealers may login to the VMAC website to view the "VMAC Labour Time Guide" (under "Agreements") to see the allowable warranty labour times.
5) Warranty invoices must include the Service Ticket number, VMAC System ID#, hours on the compressor, and a detailed description of the work performed.
6) VMAC Warranty does not cover consequential damages, loss of income, overtime charges, mileage, travel time, towing/recovery, cleaning or shop supplies.
7) Dealers submit warranty claims on behalf of the Vehicle Owner/End User affected by the defective part(s). The dealer ensures that all warranty credits are refunded back to the Vehicle Owner/End User who made the initial warranty claim.

In order to qualify for Lifetime Warranty (Limited), the completed warranty registration form must be received by VMAC within 3 months of the buyer receiving the Product(s), or 200 hours of operation, whichever occurs first.

If the completed warranty registration form has not been received by VMAC within 3 months of the buyer receiving the Product(s), or 200 hours of operation, the "Standard" warranty period will be deemed to commence 30 days from the date of shipment from VMAC.

Failure to follow the warranty claim process may result in denial of the warranty claim.

VMAC Product Warranty Policies & Warranty Registration can be found on the VMAC website (see previous page for URL).

General Information

Optional Equipment Compatibility

While VMAC strives to design systems compatible with optional OEM equipment (such as running boards), it is impractical to develop systems that accommodate every OEM and aftermarket option or add-on. Whenever possible, VMAC endeavors to advise of compatibility issues in the "Additional Application Information" section of the manual. Even when specific optional equipment is determined by VMAC to be incompatible, it does not preclude the vehicle upfitter or end user from modifying the optional equipment to make it compatible with the installed VMAC system. VMAC does not warranty or accept responsibility or liability for the fitment, function or safety of any products modified in any way not expressly outlined in the installation manual.

Before Starting

Note and label all parts that are removed from the vehicle as many of the OEM parts will be reused during the installation of the VMAC system.

Read this manual prior to beginning the installation to ensure familiarity with the components and how they will fit on the vehicle. Identify any variations from the application list such as vehicle model, engines, or optional equipment (e.g., dual alternator, active steering assist, etc.).

Open the package, unpack the components and identify them using the Illustrated Parts List (IPL) included in the Fastener Pack.

Hose Information

Depending on other installed equipment, it might be necessary to move the air/oil separation tank from its intended location. The hoses used in VMAC compressor systems have a specific inner liner that is compatible with VMAC compressor oil. Use of hoses other than those supplied or recommended by VMAC may cause compressor damage and may void your warranty. Replacement hoses can be ordered from a VMAC dealer or sourced locally. Refer to this Knowledge Base article for compatible hoses: EXT-ALL-010-Required-VMAC-Hoses.pdf

Ordering Parts

To order parts, contact a VMAC dealer. The dealer will ask for the VMAC serial number, part number, description and quantity. Locate the nearest dealer online at www.vmacair.com/dealer-locator or call 1-877-912-6605.

Special Tools and Parts Required

- *Recommended: Right angle impact wrench (such as Milwaukee M12, P/N: 2565-20).*
- Pulley Counter Rotation Tool:
  - Mercedes P/N: 654-589-00-40-00.
    or
  - VMAC P/N: 5900444
- Pulley Holder (Used for holding the VMAC crank pulley while torquing the fasteners, compatible with most VMAC crank pulleys) P/N: 5900443:
- Internal and external Torx socket sets.
- Trim Removal Tool (such as Harbor Freight Tools® 67021).

Torque Specifications

All fasteners must be torqued to specifications. Use manufacturers' torque values for OEM fasteners.

The torque values supplied in Table 1 are intended for VMAC supplied components, or for use as a guide in the absence of a torque value provided by an OEM.

Apply Loctite 242 (blue) to all fasteners (except nylon lock nuts) unless otherwise stated.

Torque values are with Loctite applied unless otherwise specified.

Standard Grade 8 National Coarse Thread								
Size (in)	**1/4**	**5/16**	**3/8**	**7/16**	**1/2**	**9/16**	**5/8**	**3/4**
Foot pounds (ft•lb)	9	18	35	55	80	110	170	280
Newton meter (N•m)	12	24	47	74	108	149	230	379

Standard Grade 8 National Fine Thread					
Size (in)	**3/8**	**7/16**	**1/2**	**5/8**	**3/4**
Foot pounds (ft•lb)	40	60	90	180	320
Newton meter (N•m)	54	81	122	244	434

Metric Class 10.9						
Size (mm)	**M6**	**M8**	**M10**	**M12**	**M14**	**M16**
Foot pounds (ft•lb)	4.5	19	41	69	104	174
Newton meter (N•m)	6	25	55	93	141	236

Table 1 — Torque Table

Component Identification and Overview

Electrical Modules

- The Digital Throttle Control (DTC) and Control Module (Controller) will be mounted in the cab on the driver side.
- The display box is not weather proof; ensure it is mounted where it will be protected from rain, snow, mud, direct sunlight, etc. (e.g. inside the cab, service body or cabinet).
- Keep the rear of the display box protected.
- Ensure the control module and DTC are mounted away from the pedals, park brake mechanism, or where they could be inadvertently knocked by occupants.

Control Components Overview

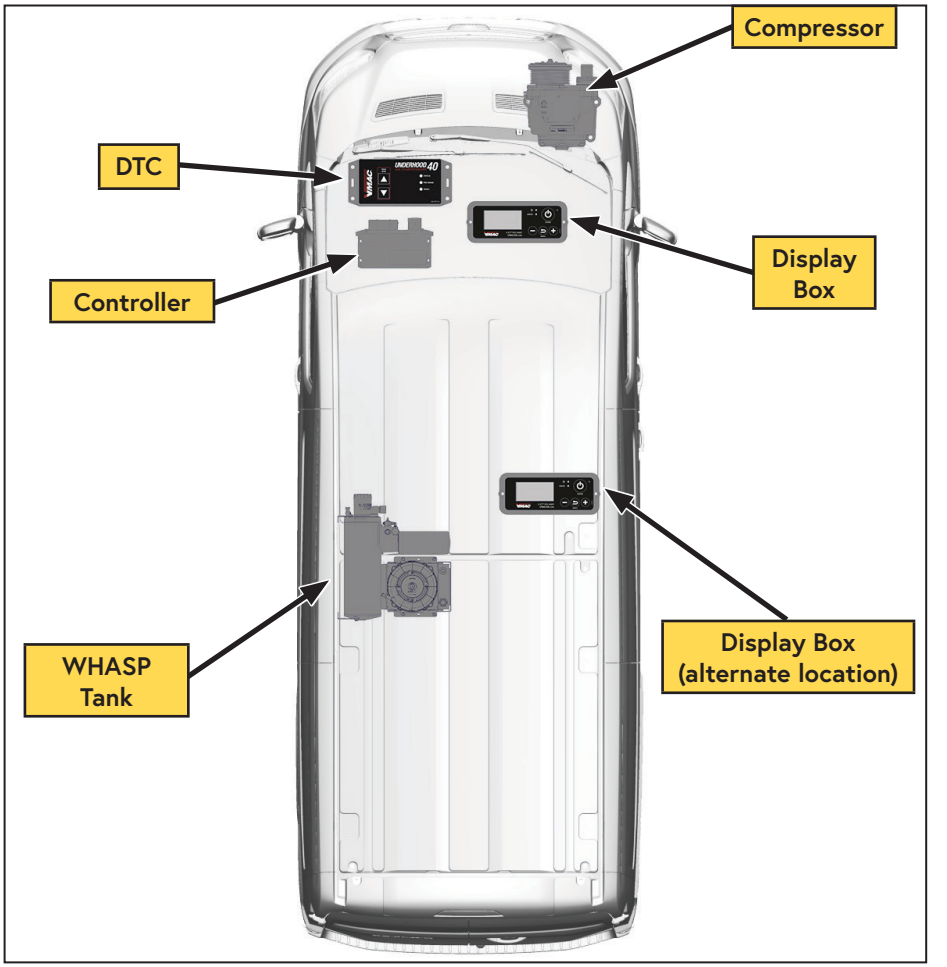


Figure 1 — General component overview
(Actual installation locations may vary)

Control Module (Controller) (Figure 2)

The control module serves as the primary input/output interface between the vehicle and the various VMAC components (compressor, DTC, WHASP Tank, Display Box, etc.).

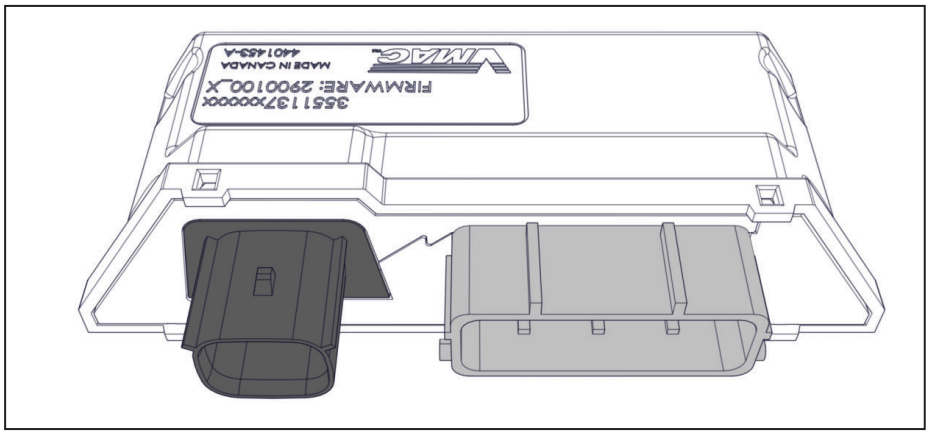


Figure 2 — Control module

Display Box (Figure 3)

The display box serves as the operator's control panel and contains the "ENTER" (compressor on/off), "–" (decrease), "MENU", and "+" (increase) buttons, power and "ERROR" indicator LEDs, and the screen, The screen includes information such as compressor hours, service reminders, warning messages, error codes, access to the advanced settings, and diagnostic information.

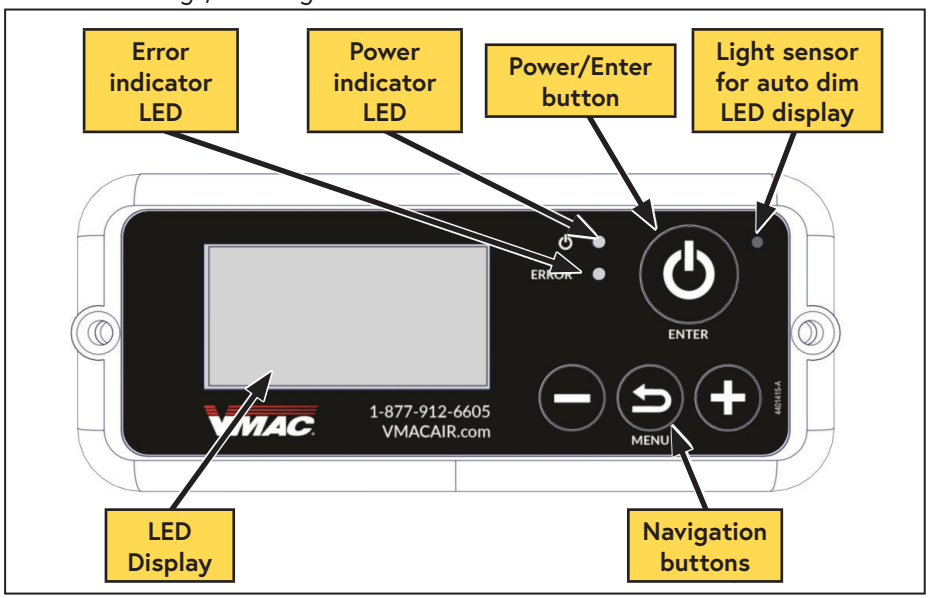


Figure 3 — Display box

Digital Throttle Control (DTC) (Figure 4)

The DTC responds to signals from the control module and commands the vehicle's throttle to increase or decrease engine speed in response to air demand.

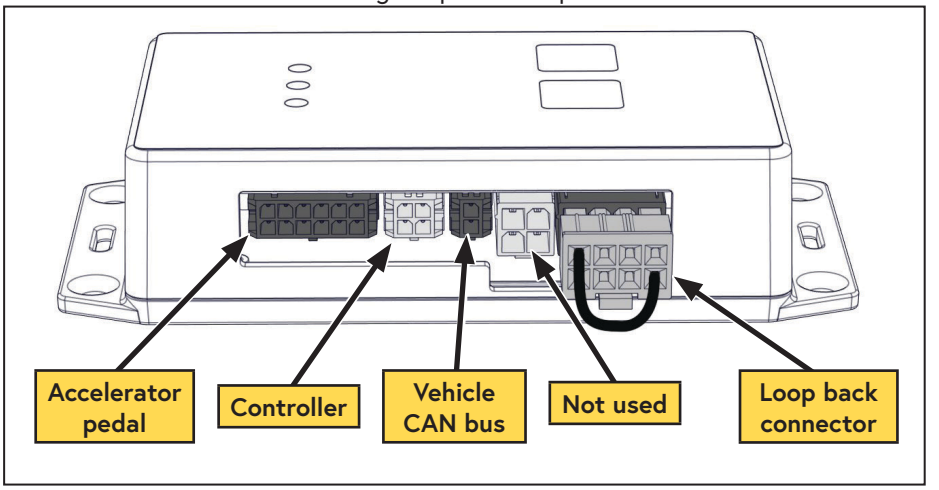


Figure 4 — VMAC DTC

Pressure Sensor (Figure 5)

The system pressure sensor is mounted on the side of the WHASP tank and measures the system pressure. The clutch will disengage once system pressure is achieved.

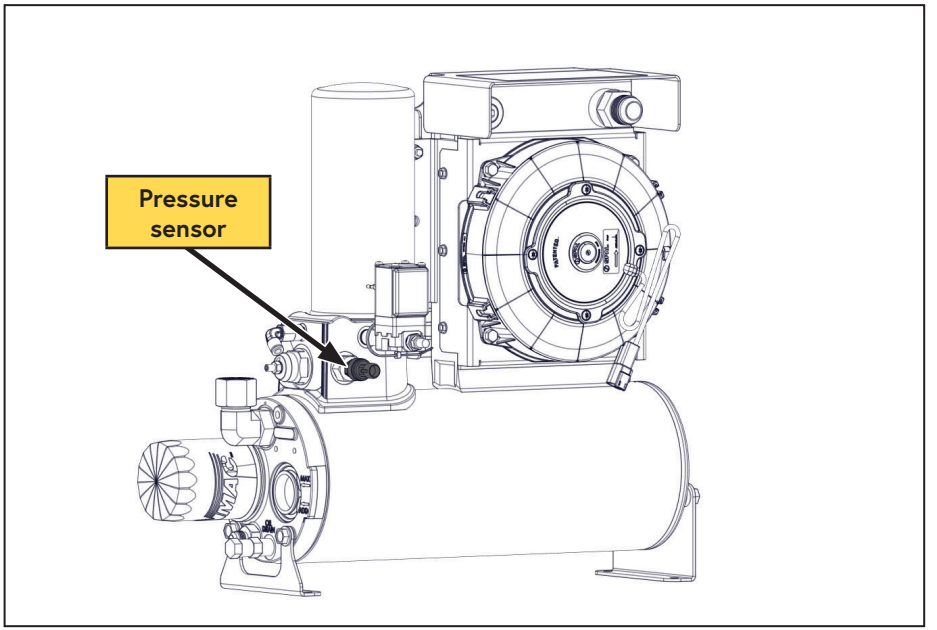


Figure 5 — WHASP Tank pressure sensor

Preparing for Installation

Preparation for installation is very important. Missing a step or an item can cause problems in the installation or damage to components.

☑ ***Check off each item as it is completed so that no steps are missed.***

☐ Review the contents of the system using the illustrated parts list to ensure all components are present and in the correct quantity. If any components are missing, have the system ID ready and call VMAC Technical Support.

☐ Remove the driver side step cover and floor mat (Figure 6).

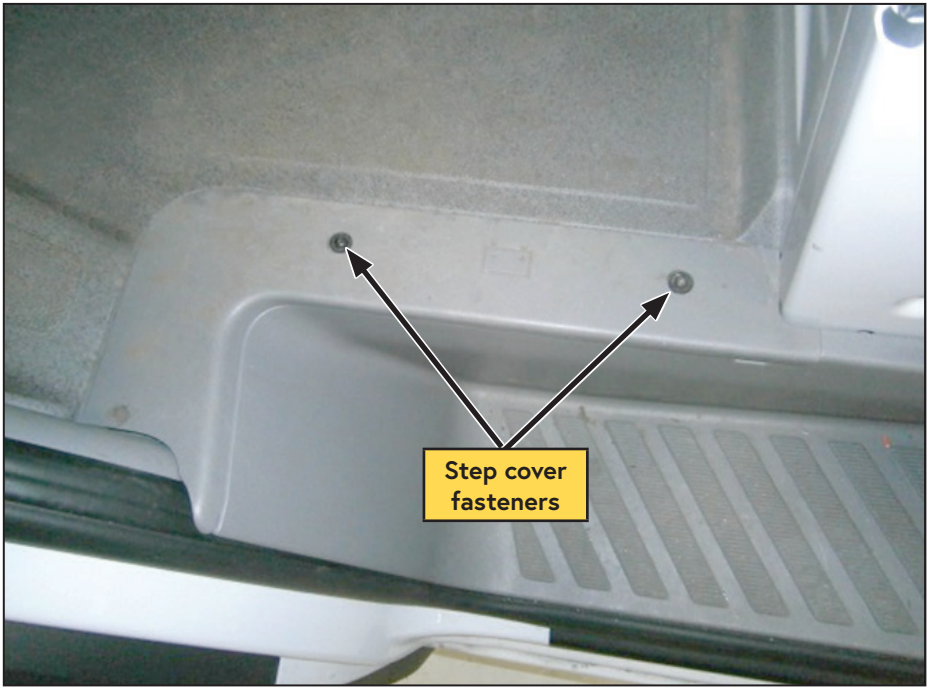


Figure 6 — Remove step cover and mat

The driver seat is heavy, use care when lifting it to prevent injury.

- ☐ Remove the driver seat.
- ☐ Remove the hatch from the driver side floorboard (Figure 7).

Figure 7 — Remove driver side hatch

- ☐ Disconnect the battery(ies).
- ☐ Determine whether the vehicle is equipped with the dual row crank pulley (Figure 8).

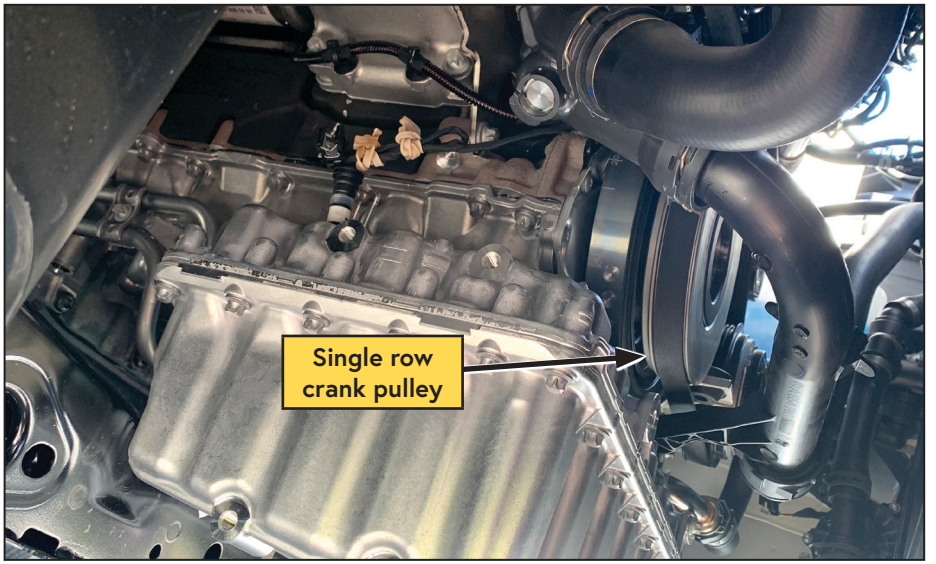


Figure 8 — Identify crank pulley

Vehicles equipped with the OEM dual row crank pulley, turn to "Main Bracket and Compressor Installation" on page 14.

VMAC Pulley Installation

This chapter applies only to vehicles equipped with the OEM single row crank pulley. If the vehicle is equipped with a dual row crank pulley, turn to "Main Bracket and Compressor Installation" on page 14).

Refer to page 7 for a list of tools that will aid pulley removal and installation.

- ☐ Remove tension from OEM FEAD belt.
- ☐ Using a right angle impact wrench, or counter rotating tool, remove the crank pulley bolts (E12 Torx) and discard the fasteners.

Do not reuse the OEM fasteners as they are "torque to yield".

- ☐ Apply Loctite 242 (blue) to (×4) supplied crank pulley fasteners.

Using the supplied fasteners and washers, install the VMAC crank pulley:*

- ☐ *Step 1: Install (×2) fasteners and washers in the counterbored holes.
- ☐ *Torque the fasteners to 43 ft•lb.
- ☐ *Step 2: Install (×2) fasteners and washers in the non-counterbored holes.
- ☐ *Torque the fasteners to 43 ft•lb.

- ☐ Re-tension the OEM FEAD belt (on the rear row of crank pulley).

Main Bracket and Compressor Installation

☐ Using the supplied fasteners, install the main bracket onto the passenger side of the oil pan (Figure 9, Figure 10).

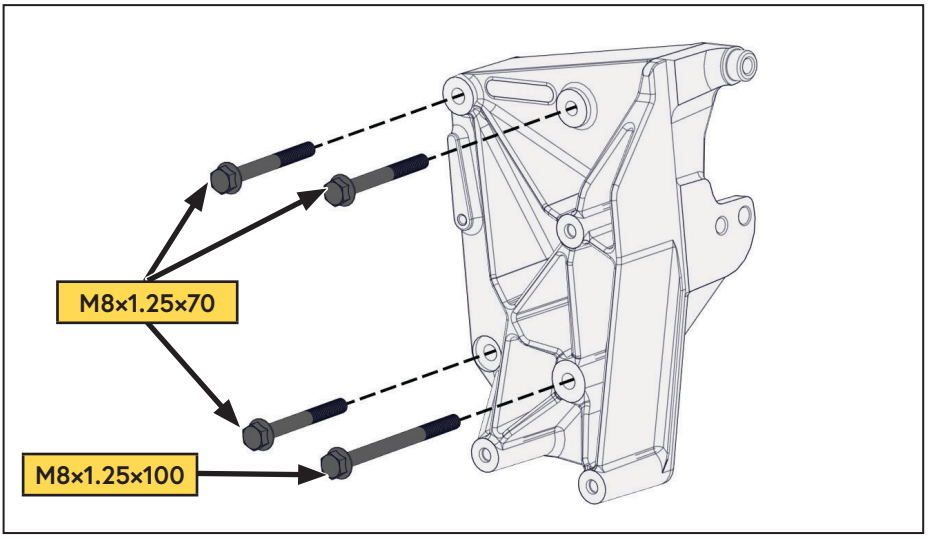


Figure 9 — VMAC Main bracket mount location

Figure 10 — VMAC main bracket installed
(idler installed in later step)

☐ Remove the tensioner, apply Loctite 242 (blue), and reinstall the tensioner (Figure 11).

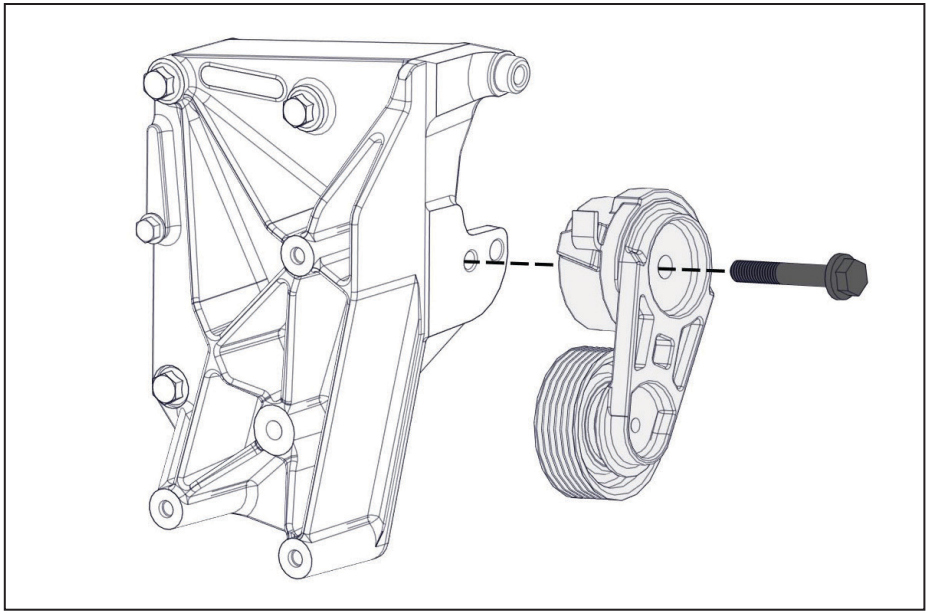


Figure 11 — Install tensioner

☐ Install one of the supplied idlers onto the VMAC main bracket (Figure 12).

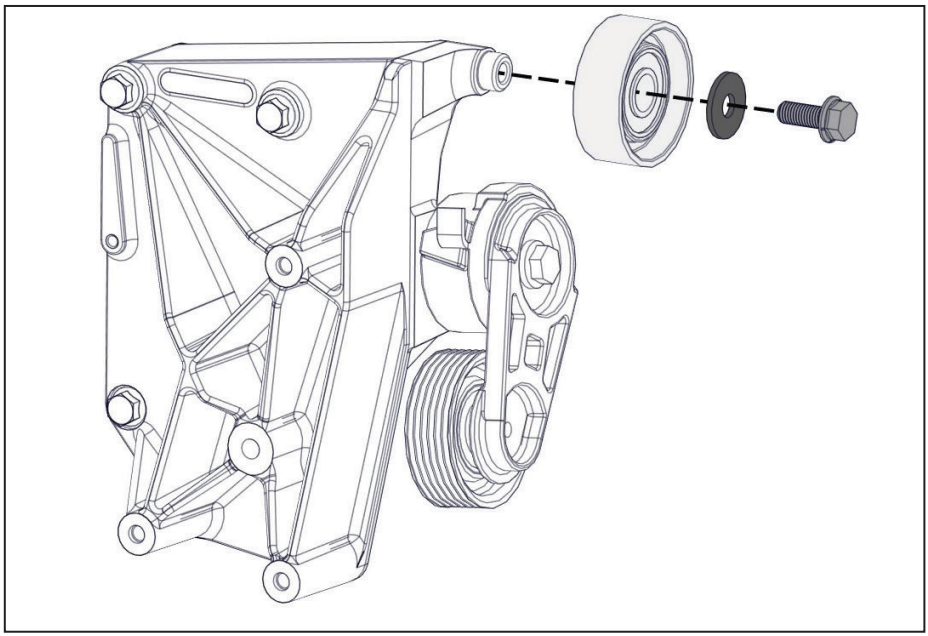


Figure 12 — Install main bracket idler

☐ Slide the pressure sensor assembly into the P-clip and mount it to the bracket using the supplied M6 × 1.0 × 14 mm fastener (Figure 13).

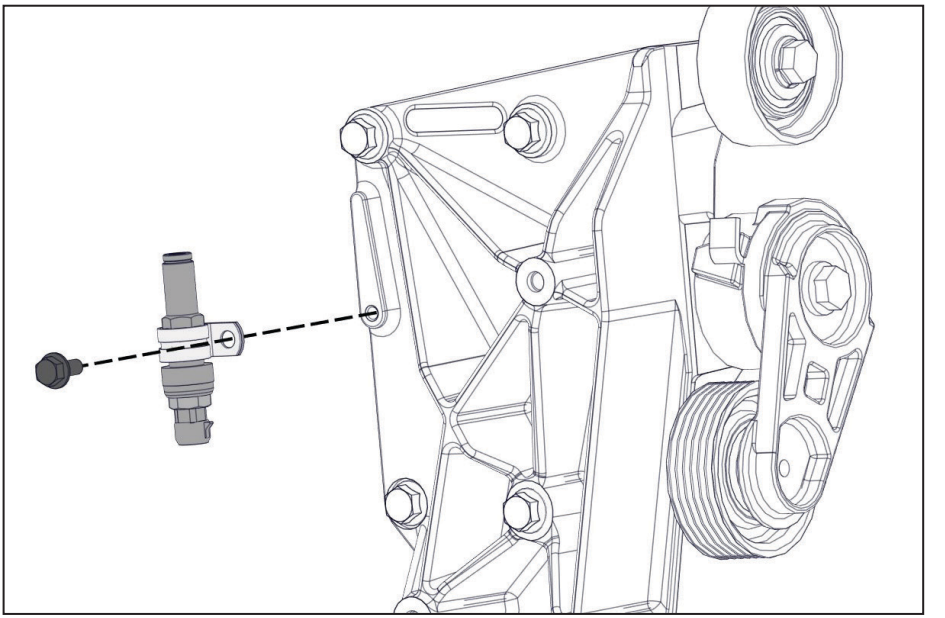


Figure 13 — Install pressure switch

☐ Using (×3) M8 × 1.25 × 35 mm bolts, mount the compressor assembly, and pressure switch assembly (in the orientation shown) onto the main bracket (Figure 14).

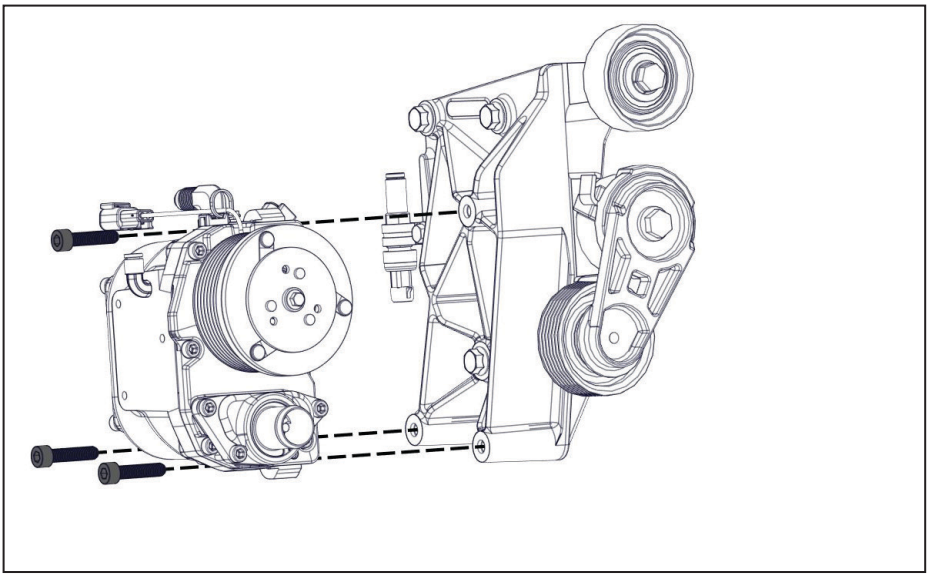


Figure 14 — Mount compressor

☐ Using the supplied bolt, washer, and spacer, Install the remaining idler into the tapped hole in the oil pan (Figure 15).

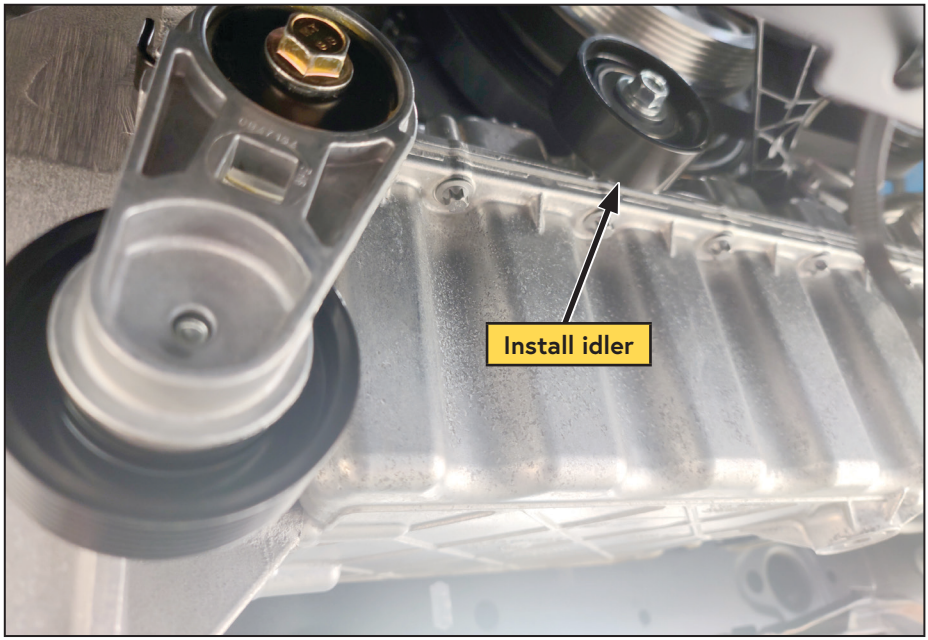


Figure 15 — Install oil pan idler

☐ Install and tension the VMAC belt (Figure 16).

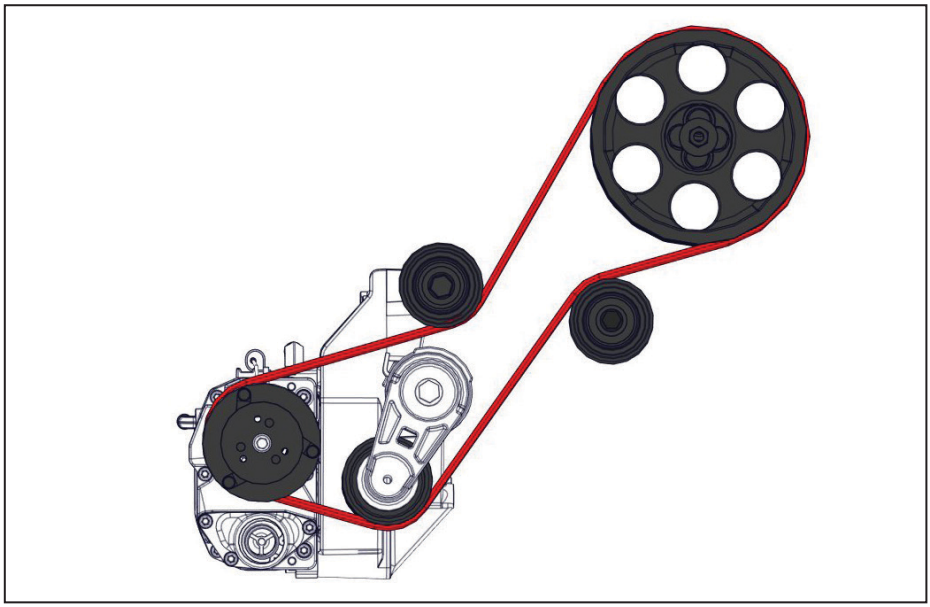


Figure 16 — VMAC belt routing

☐ Verify the belt is properly seated on all of the pulleys.

☐ Ensure the 6 rib belt is centered on the 8 rib compressor clutch. One clutch rib should be visible on each side of the belt (Figure 17).

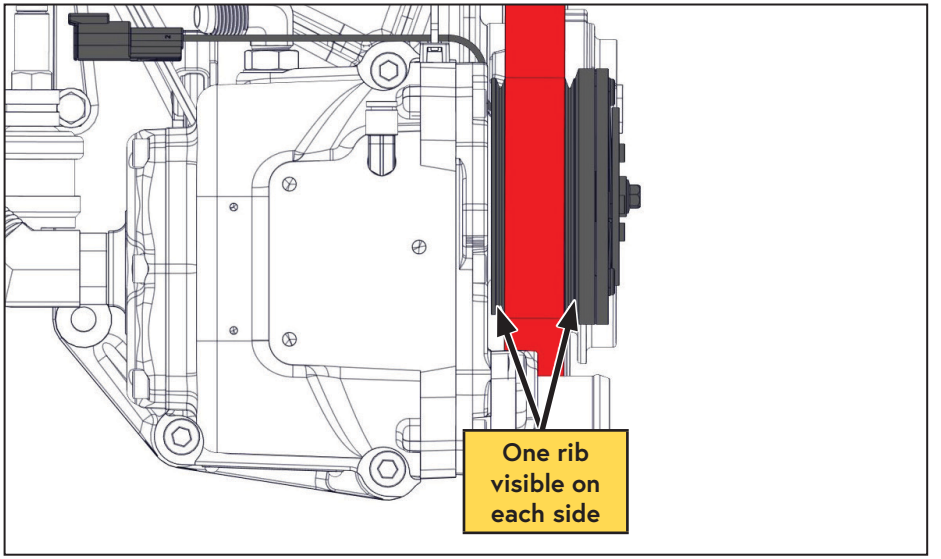


Figure 17 — Align belt on clutch

This kit includes (×2) air filter mounting options to accommodate various installed OEM equipment. Select the bracket that provides the best clearance to OEM components, or the preferred filter location.

☐ The air filter will mount to the driver side bumper mount (located in the void beneath the driver side headlight) (Figure 18).

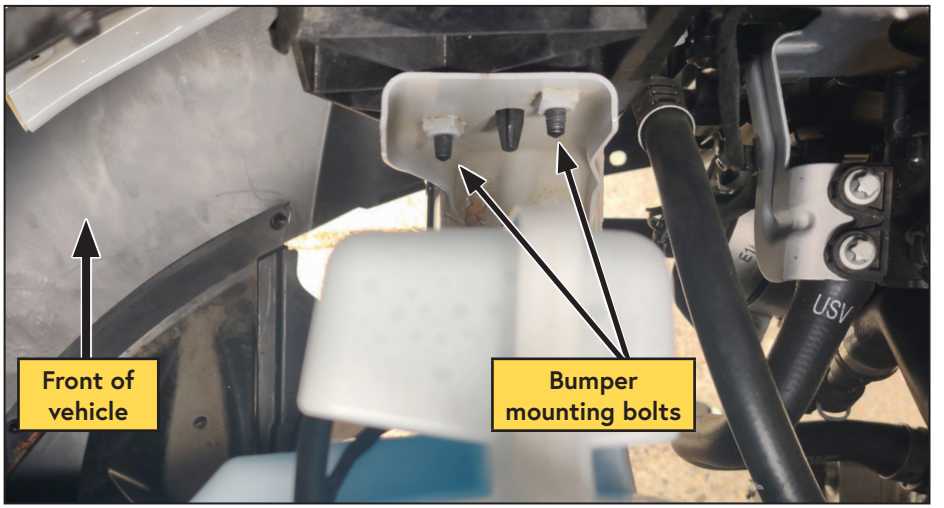


Figure 18 — Install compressor air filter bracket

☐ Using the supplied M8 lock nuts, secure the air filter bracket to the driver side bumper mounting bolts (Figure 19).

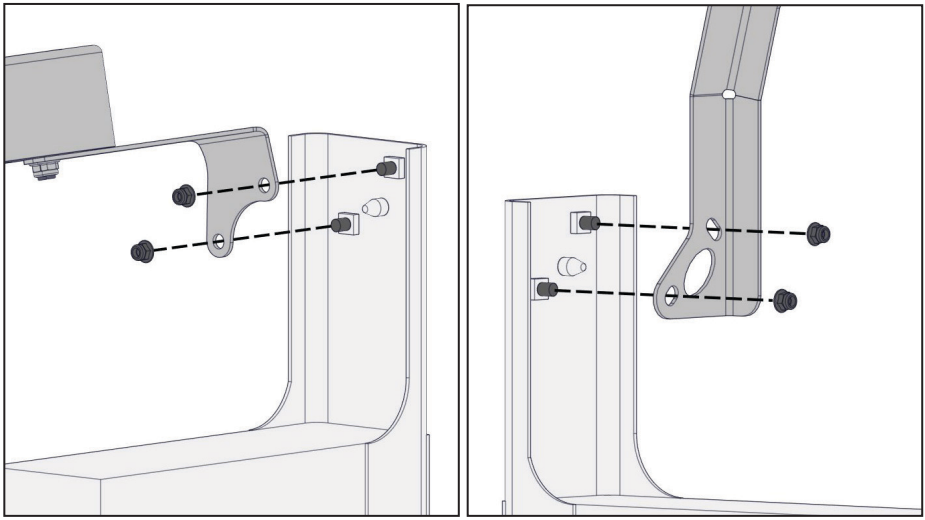


Figure 19 — Install compressor air filter bracket

☐ Using the supplied gear clamps, secure the air intake hose to the compressor (Figure 20).

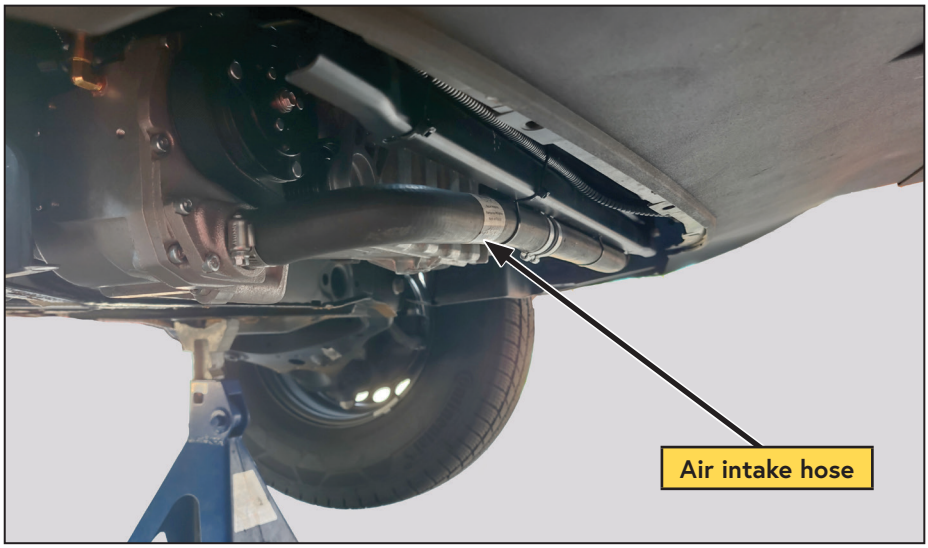


Figure 20 — Install remote intake hose

☐ Route the air intake hose along the cross member below the radiator, up to the VMAC air filter assembly (Figure 20).

☐ Trim hose to length (if required).

☐ Secure inlet hose to the to the filter assembly.

Waste Heat Air Separator Package (WHASP) Tank Installation

WHASP Tank location guidelines

When determining a mounting location for the WHASP Tank, ensure the following conditions are met:

- Adequate supply of fresh air and venting for the cooling fan.
- Minimum of 12 in of clearance at the front (exhaust side) of the cooling fan.
- Minimum of 6 in clearance at the rear of the unit.
- Hose connections and wiring are accessible.
- Mounted on a level surface.
- Impact protection.
- The oil level sight glass is easily accessible.
- The oil fill, drain port, and filters are accessible for servicing.
- Minimize the hose lengths to maximize performance.

Mounting the WHASP Tank

Refer to (Figure 21) for mounting dimensions.

Special consideration must be made to ensure the WHASP Tank will be protected from damage and to ensure that it has adequate ventilation.

In some cases, it may be necessary to fabricate a mounting bracket to position the tank in an appropriate location.

Secure the WHASP Tank by bolting the mounting feet to the installation surface, use M8 or 5/16 in fasteners (not supplied).

Mounting in an Enclosure or Body

Mounting the WHASP Tank in an enclosure will limit access to cooling air or restrict the escape of hot air from around the unit and will have an adverse effect on cooling.

Ensure adequate ventilation is provided for the cooling system to function properly.

It is not possible to make absolute recommendations regarding ventilation because of the widely differing configurations that are possible. Duty cycle, ambient temperature and enclosure shape are some of the important variables that need to be taken into account when determining the suitability of enclosure mounting.

Cool air ducted to the cooler and installing an exhaust fan to remove hot air is recommended.

Confirm the hose lengths included in this kit when determining the location of the WHASP Tank and bulkhead fittings. Hose lengths can be found in the Illustrated Parts List (IPL). If the WHASP Tank or bulkhead fitting location requires longer hoses, contact a local VMAC dealer. See page 6 for ordering information.

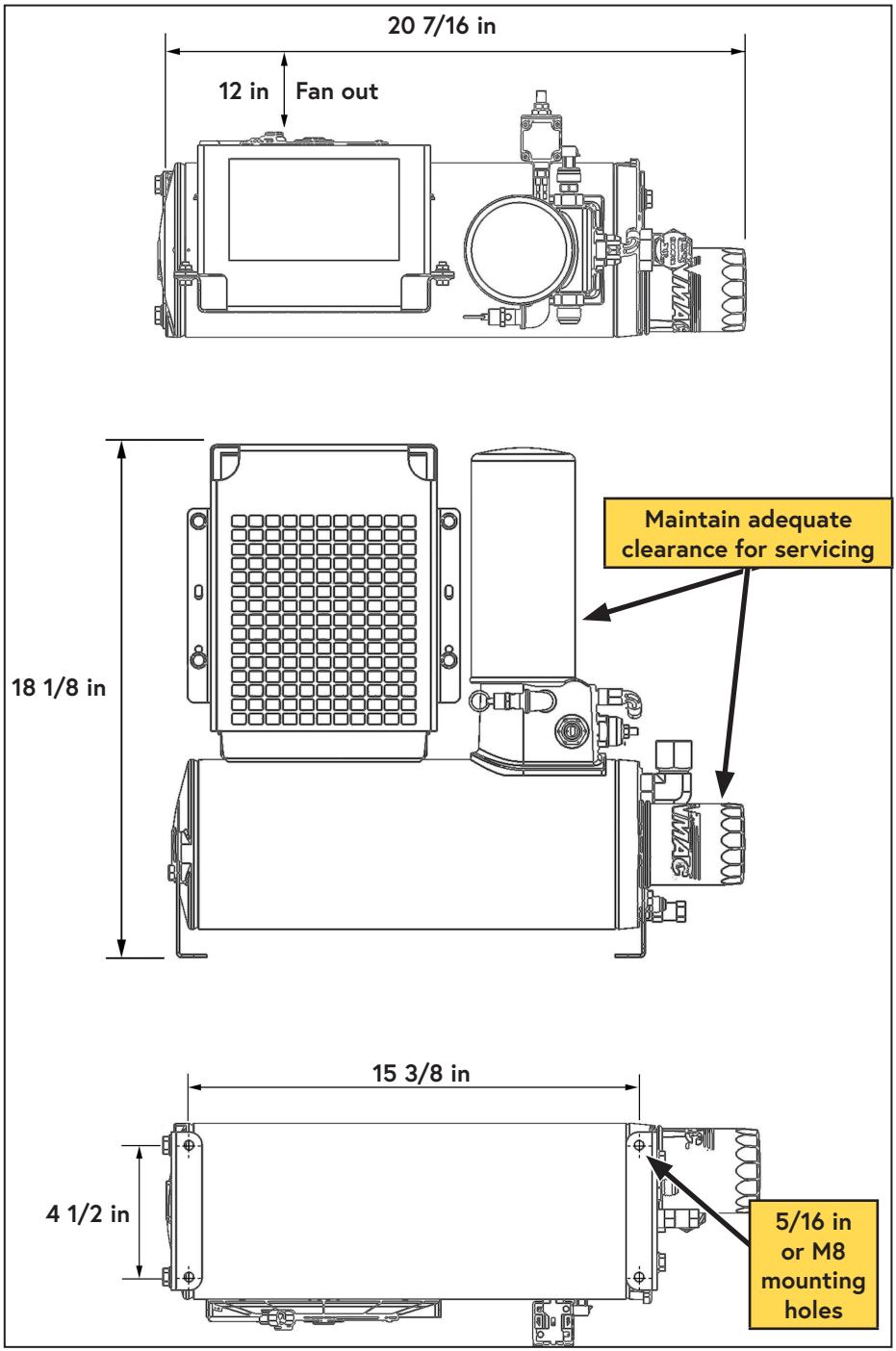


Figure 21 — Minimum WHASP Tank mounting clearances

Mounting the WHASP Tank

If mounting the WHASP Tank above the vehicle's floor, installation of the oil return check valve (P/N: A700308) is required.

Provide ample space to check the oil level, as well as access to the filters and compressor oil drain to facilitate servicing.

The WHASP Tank uses a "puller" fan to cool the air/oil mixture. Position the WHASP Tank to ensure there is adequate air flow and so that the fan is blowing out toward the cargo door. During operation, the door should be kept open to ensure there is a constant supply of cool air to prevent the system from overheating (Figure 22).

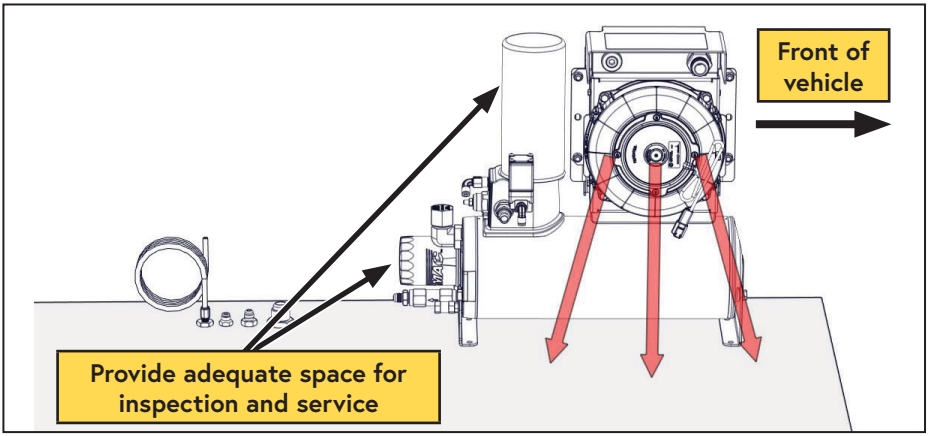


Figure 22 — WHASP ventilation

A minimum of 6 in of clearance is recommended around the radiator (intake) side of the WHASP Tank to allow fresh, cool air to circulate into the cooler and fan (Figure 23).

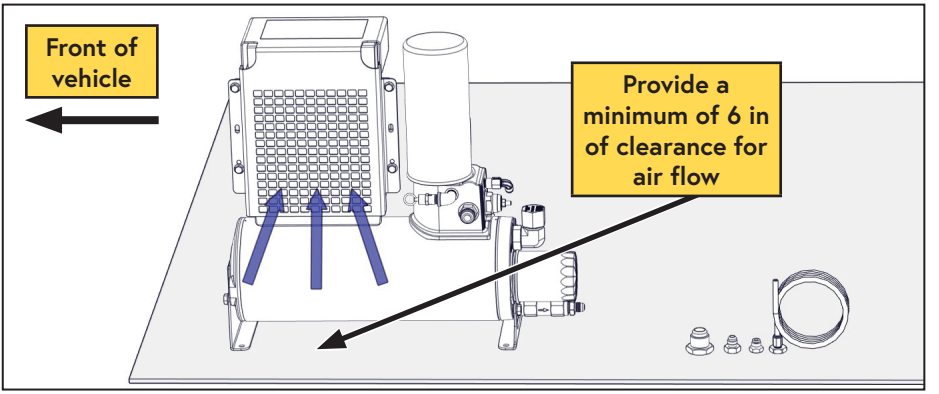


Figure 23 — WHASP ventilation

Bulkhead Fittings Installation

Good judgement must be used during installation. Prior to drilling any holes in the vehicle, confirm the installation location of the WHASP Tank and the bulkhead fittings. Confirm that the supplied hoses will reach from the compressor to the bulkhead fittings, and from the bulkhead fittings to the WHASP Tank. Also ensure that there are no wires, hoses, or other components on the other side of the panel that may be damaged when drilling holes.

((x4) bulkhead fittings are supplied with the system (Figure 24):

- 3 bulkhead fittings are used to pass the system discharge, oil, and scavenge hoses/tubes into the body of the vehicle.
- 1 bulkhead fitting is used to relocate the blowdown muffler outside of the vehicle.

This kit includes hoses of a fixed length to run from the compressor to the bulkhead fittings, and from the fittings to the WHASP Tank.

To maximize compressor performance, hose lengths should be kept as short as possible; if longer hoses are required please follow the hose requirements listed on page 26 of this manual.

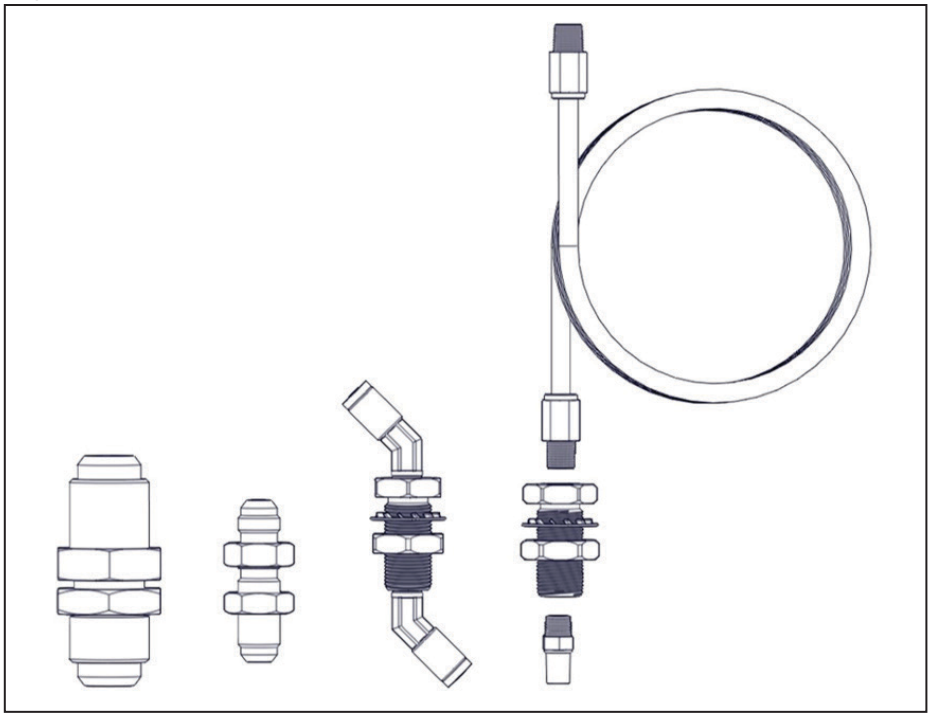


Figure 24 — Bulkhead fittings
(A700224 Remote Muffler accessory shown)

If installing the bulkhead fittings in an alternate location, ensure the remote blowdown muffler is located where road debris (e.g. mud, ice, etc.) will not accumulate and prevent proper blowdown.

This kit includes hoses of an adequate length to connect to the location specified in this manual.

If installing in an alternate location:

- ***Contact a VMAC dealer to order hose extensions.***

Or

- ***If sourcing custom length hoses locally, Refer to this Knowledge Base article for compatible hoses: EXT-ALL-010-Required-VMAC-Hoses.pdf.***
- ***As individual installation locations may vary, ensure the bulkhead fittings are centered on the top of the structural ribs (where applicable).***

☐ Drill the bulkhead fitting holes using a drill, step drill or hole saw. Leave enough room between the fittings to allow access for a wrench (Figure 25, Figure 26, Figure 27):

- Discharge from the compressor: ø1 1/8 in.
- Oil return: ø9/16 in.
- Oil scavenge: ø5/8 in.
- Remote blowdown: ø5/8 in.

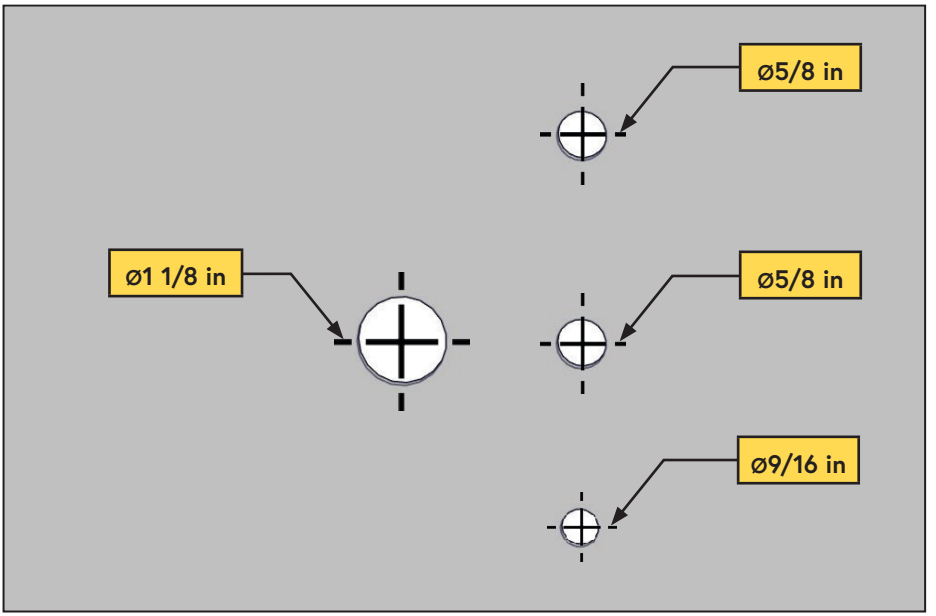


Figure 25 — Hole diameter

☐ Fit the bulkhead fittings through the top of the hole and secure from the bottom with the supplied nuts. Apply Loctite 567 (thread sealant) when installing the 1/4 in push-to-connect fittings in the bulkhead fittings (Figure 26, Figure 27).

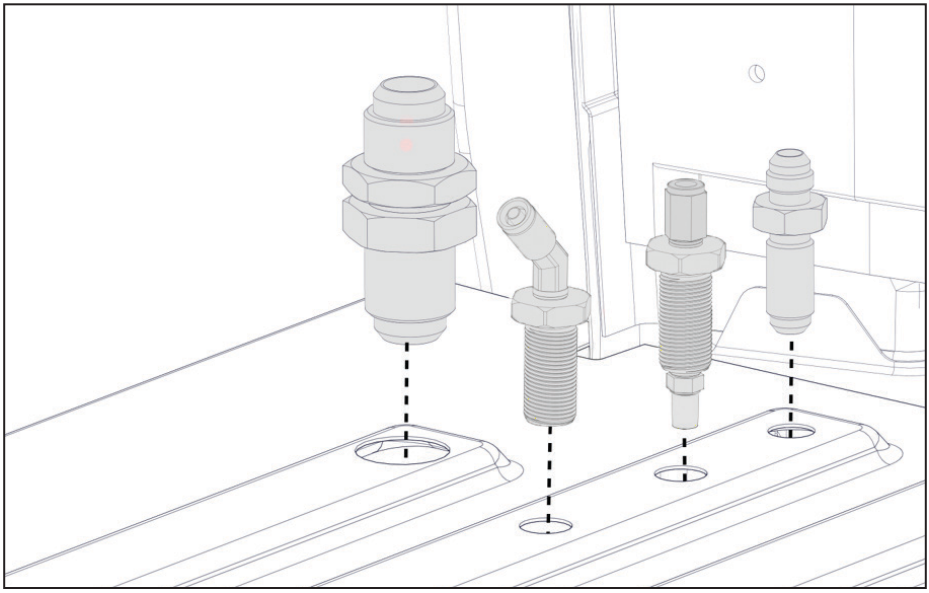


Figure 26 — Interior View

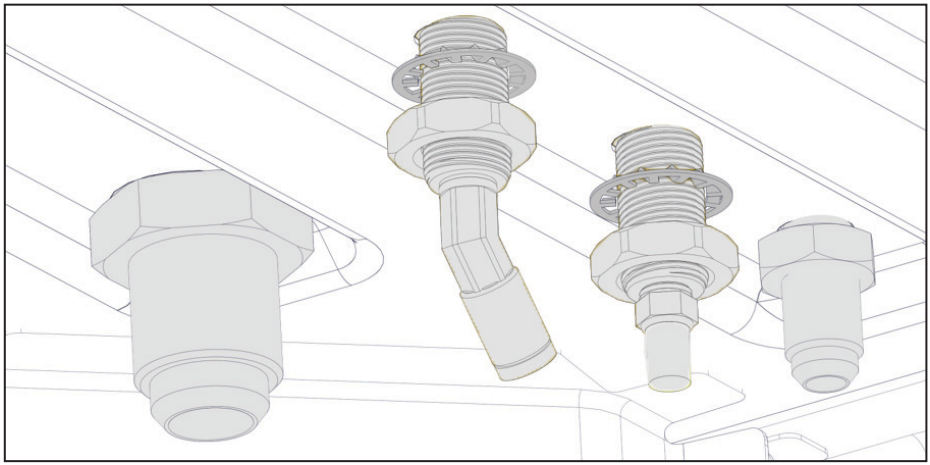


Figure 27 — Exterior View

Hose Requirements

Only attempt to shorten the supplied hose if there is access to the appropriate equipment. Do not attempt to cut the hose and splice it using hose clamps.

VMAC Compressor oil will degrade rubber lined hoses, use only hoses with an AQP elastomer type liner. Refer to this Knowledge Base article for compatible hoses: EXT-ALL-010-Required-VMAC-Hoses.pdf

The 1/4 in PTFE tube, and the 3/8 in and 3/4 in hoses with AQP elastomer liner are specifically designed to work with VMAC compressor oil and at compressor operating temperatures.

Based on the desired location of the WHASP Tank, the hose lengths provided with this system may not be ideal. They can be shortened or replaced as necessary, or hose extenders can be used.

VMAC recommends shortening these hoses as a preferred alternative to coiling up and securing the excess. ***Shorter hose length will maximize system performance.***

Avoid using 90° fittings wherever possible as they cause flow restrictions and negatively impact performance.

The following hoses are included with this compressor kit:

From the compressor to the bulkhead fittings:

- 3/4 in × 122 in.
- 3/8 in × 125 in.
- 1/4 in (PTFE Tube) × 140 in.

From the WHASP Tank to the bulkhead fittings:

- 3/4 in × 96 in.
- 3/8 in × 84 in.
- 1/4 in (PTFE Tube) × 108 in.

If longer hoses are required:

To order parts, contact a VMAC dealer. The dealer will ask for the VMAC serial number, part number, description and quantity. See page 6 for ordering information.

- Refer to this article on the VMAC Knowledge base (https://kb.vmacair.com) for a list of compatible hoses: EXT-ALL-010-Required-VMAC-Hoses.pdf
- OTC fittings are required for the VMAC supplied hose.
- Push-lock fittings are suitable if FC332 hose is used.
- If Push-lock fittings are being used, do not use hose clamps as they will damage the hose and cause leaks. damage the hose and cause leaks.

Hose Installation

When routing hoses, ensure cap plugs are installed so that contaminants do not get in the line. Take care when routing hoses, as a hose failure may damage the compressor and/or cause injury.

All hoses, tubes and wires that are installed, rerouted or shifted during the installation must be secured so that they do not contact any hot, sharp or moving parts. Use rubber coated P-clips wherever possible. Follow the routing suggestions in this manual and cover all hoses with plastic loom.

Use of an air receiver tank (minimum 6 USG) is required with this application.

Follow the instructions on page 50 of this manual to prevent damage to the system.

PTFE Tubing, Loom, and Push-To-Connect Fittings

- PTFE tubing should only be cut using proper tubing cutters. Side cutters, utility knives, etc. will deform the tube, preventing a proper seal (or leave sharp edges which cut the internal O-ring).
- When applying loom to the PTFE tube, leave approximately 1 in between the loom and the fitting.
- Ensure the tube is clean, cut at 90° and that there are not sharp edges.
- Lubricate the tube and, with the collet pushed into the fitting, firmly push he tube into the fitting until the tube is fully seated.
- Slide the collet out, away from the body of the fitting to lock the tubing in place.
- Ensure the tube does not have any "play" to prevent the O-ring from wearing.

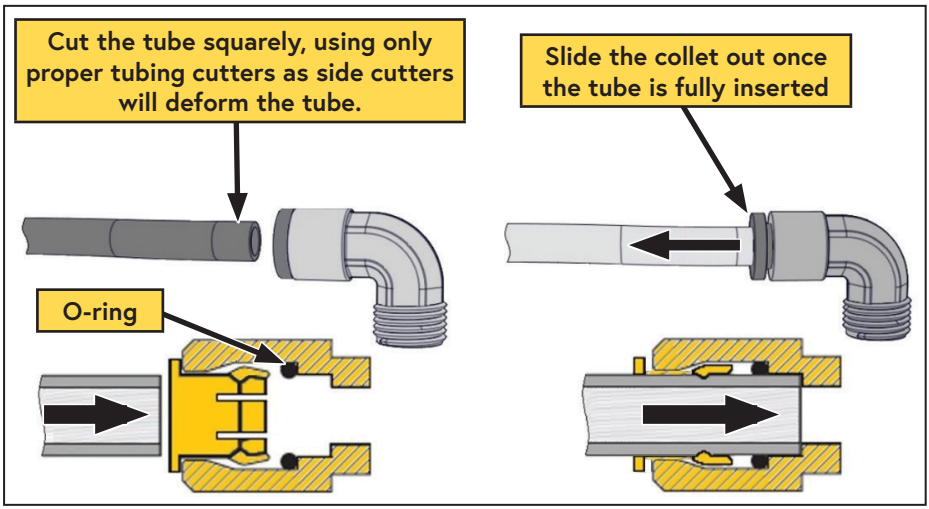


Figure 28 — Push-to-connect fittings

Hose/tube connections

Ensure there is sufficient slack in the hose routing to allow for normal engine/body movement.

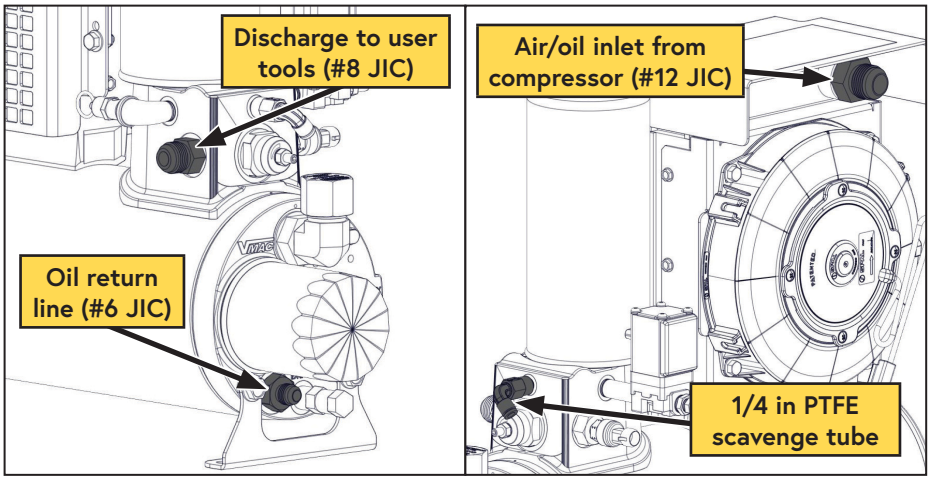


Figure 29 — WHASP Tank connections

Remote Blowdown Muffler Installation

The WHASP Tank automatically depressurizes when the clutch disengages. This prevents damage to the compressor when the clutch engages.

Installing the blowdown muffler outside of the vehicle (enclosed installation applications) will reduce cabin noise during blowdown, and will ensure any oil vapour will be safely discharged outside of the vehicle.

☐ Apply Loctite 567 (thread sealing) compound to the supplied fitting and install it into the blowdown solenoid (Figure 30).

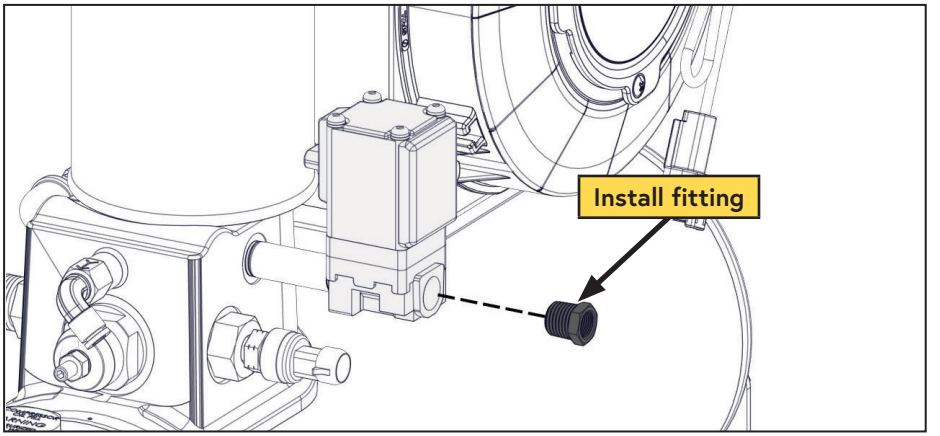


Figure 30 — Install fitting

☐ Separate the PTFE tube from the fittings.

☐ Apply Loctite 567 (thread sealing) compound to the 1/4 in push-to-connect fitting and install it into the fitting on the blowdown solenoid (Figure 31).

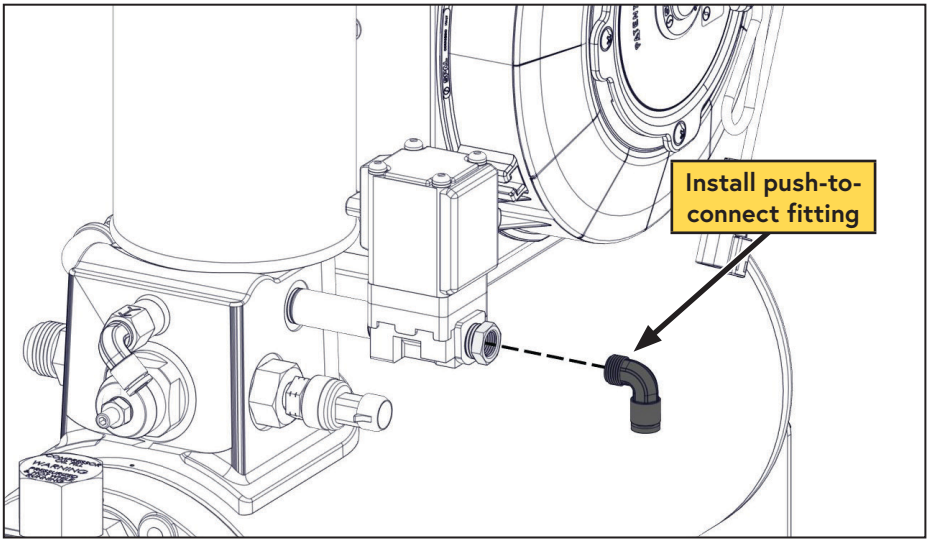


Figure 31 — Install push-to-connect fitting

☐ Apply the supplied 1/4 in split loom to the 1/4 in PTFE tube.

☐ Connect the 1/4 in PTFE tube into the push-to-connect fitting installed in the WHASP Tank (Figure 32).

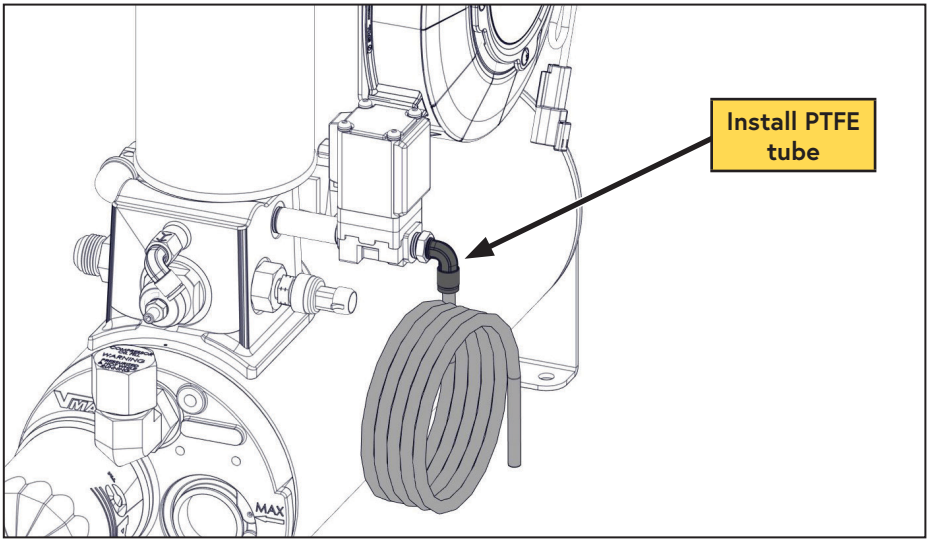


Figure 32 — Tubing Installation

☐ Route the 1/4 in PTFE tube to the bulkhead fitting, ensuring the tube will not kink or be damaged from incidental damage from other operations.

Ensure the PTFE tube is cut square and that there are no sharp edges. Use only a tube cutter or a new unused utility knife blade.

Do not use side cutters as this will deform the tube.

- ☐ Cut the PTFE tube to length.
- ☐ Install the tube into the push-to-connect bulkhead fitting (Figure 32)

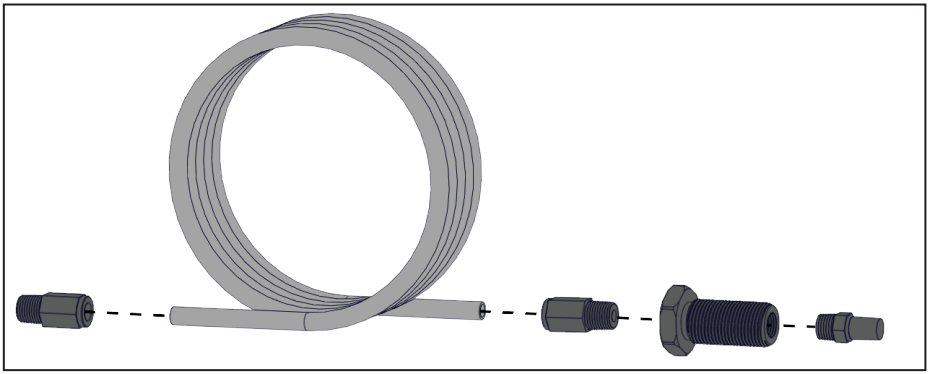


Figure 33 — Tubing Installation Remote Blowdown Muffler assembly

Connecting the Interior Hoses

- ☐ Connect the straight ends of the shorter 3/4 in and 3/8 in hoses to the top side of the bulkhead fittings.
- ☐ Connect the shorter 1/4 in PTFE tube to the top side of the bulkhead fitting.
- ☐ Bundle the PTFE tube and hoses together and route them to the WHASP Tank.
- ☐ Connect the 90° fitting on the 3/4 in hose to the #12 JIC fitting (air/oil inlet) on the cooler above the fan.
- ☐ Connect the 90° fitting on the 3/8 hose to the #6 JIC fitting (oil return fitting) beneath the oil filter on the tank.
- ☐ Connect the 1/4 in PTFE tube to the 1/4 in push-to-connect (oil scavenge) fitting near the coalescing filter.
- ☐ Connect the discharge fitting (#8 male JIC) to the customer's air system (hose not supplied).
- ☐ Secure all hoses, tubes, and wires with P-clips and/or cable ties.

Connect the Exterior Hoses

Ensure the union Tee is installed within 6 in of the compressor.
Install the pressure sensor within 48 in of the union Tee.

☐ From the 48 in spool of 1/4 in PTFE tubing, connect the scavenge tube to the compressor, pressure switch assembly, and Union Tee (Figure 34).

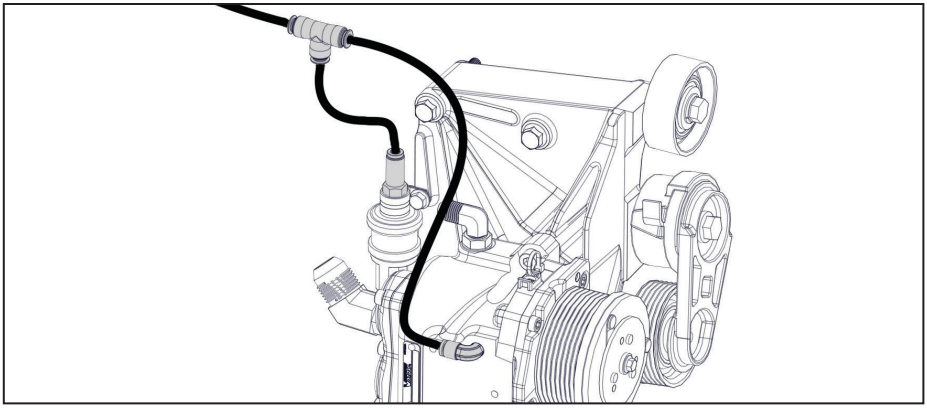


Figure 34 — Install pressure switch

☐ Apply loom (not supplied) to the longer 3/4 in and 3/8 in hoses, and 1/4 in PTFE tube.

☐ Connect the 3/4 in and 3/8 in hoses to the compressor.

☐ Route the 3/4 in and 3/8 in hoses, as well as the 1/4 in PTFE tube, over the frame crossmembers and steering rack (Figure 35).

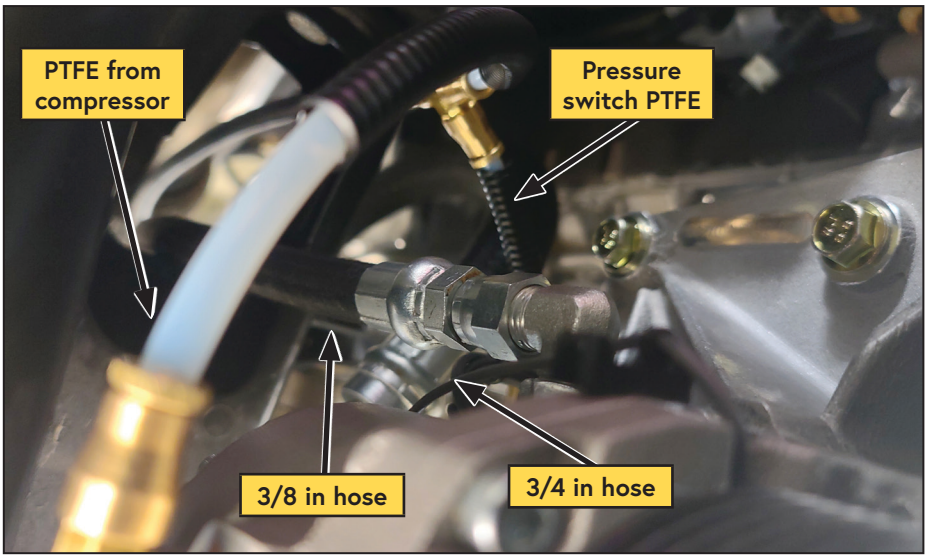


Figure 35 — Install hoses

☐ Route the hoses and PTFE tube along the rear edge of crossmember, behind suspension, and over to the driver side of the vehicle (Figure 36).

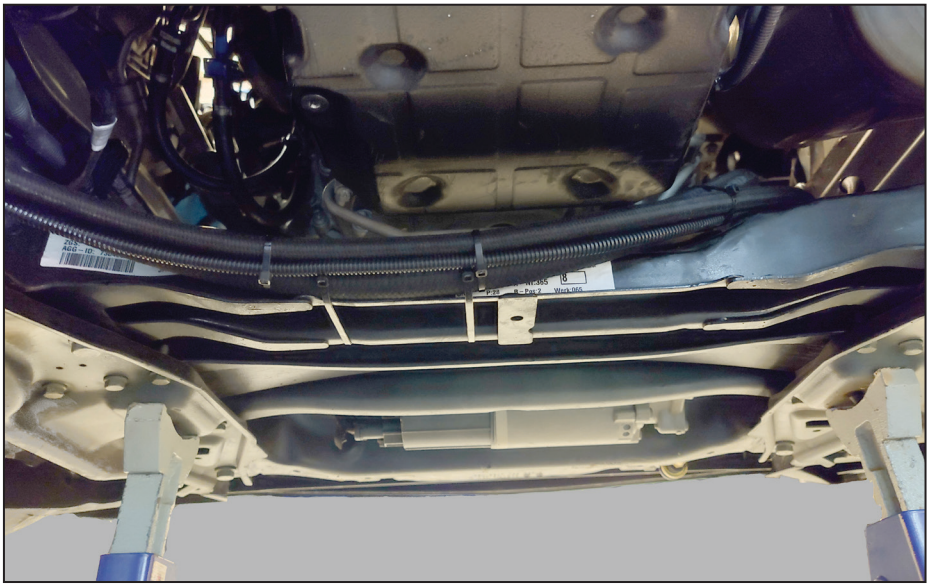


Figure 36 — Route hoses

Supplemental HVAC components may, or may not be present along the hose routing.

☐ Route the hoses along the base of the frame/body, and up to the bulkhead fittings installed earlier (Figure 37, Figure 38, and Figure 39).

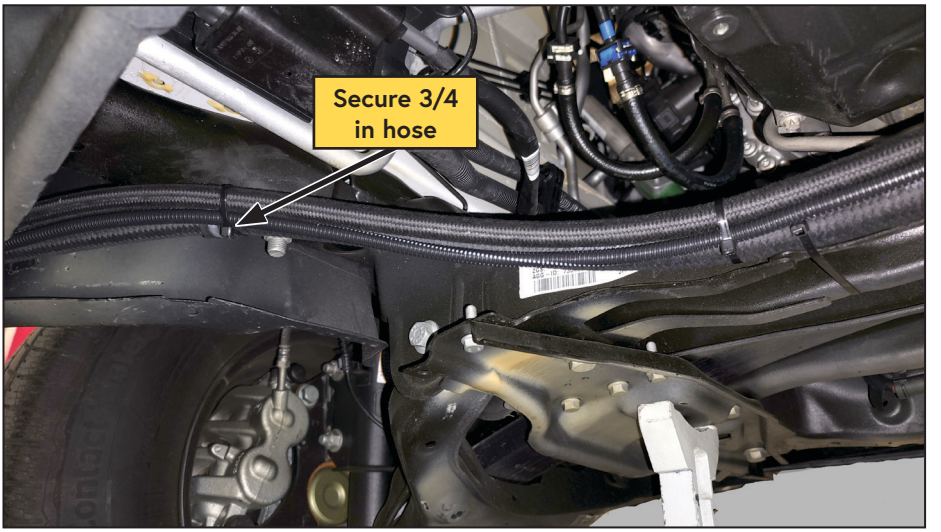


Figure 37 — Route hoses

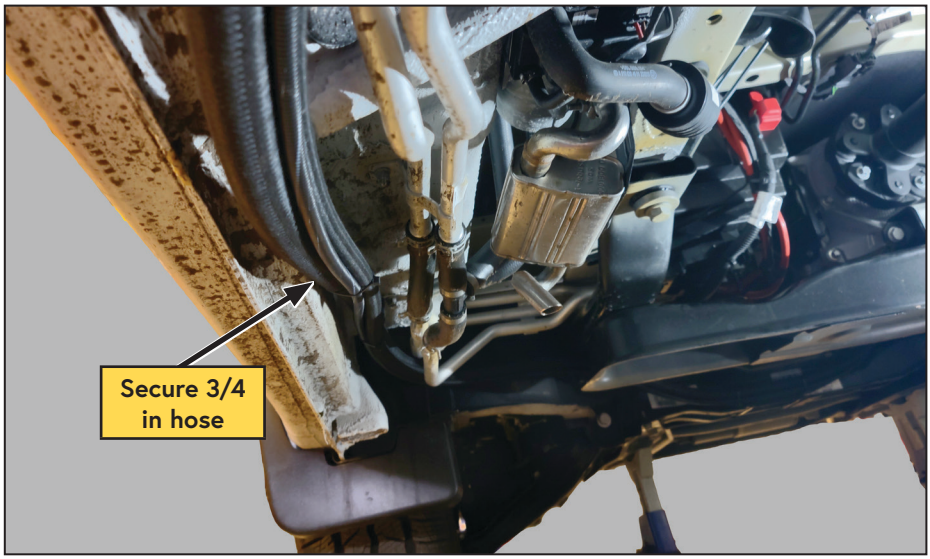


Figure 38 — Route hoses

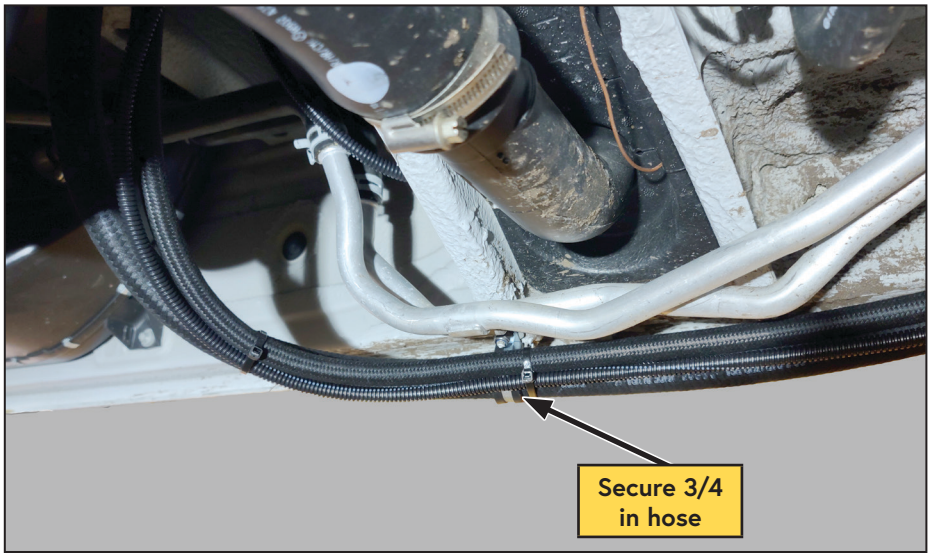


Figure 39 — Route hoses

When securing the hoses, ensure there is sufficient slack in the hose routing to allow for normal engine and body movement.

- ☐ Connect the hoses and PTFE tube to the bulkhead fittings.
- ☐ Using the supplied P-clips and fasteners, secure the 3/4 in hose to the 6 mm studs on the body (Figure 37, Figure 38, and Figure 39).
- ☐ Using cable ties, secure the 3/8 in hose and 1/4 in PTFE tube to the 3/4 in hose.

Adding Oil to the System

The VMAC supplied and approved compressor oil must be used in this system. Failure to use this special oil will result in damage to the compressor and will void warranty.

Do not overfill the system. Overfilling the system with oil can flood the sight glass window and make the system appear empty.

- ☐ Remove the fill cap on the WHASP Tank (above the sight glass) (Figure 40).
- ☐ Using a funnel, pour oil into the tank until the oil level in the sight glass reaches the "MAX" line. **The system capacity is 4 L** (Figure 40).
- ☐ Reinstall the fill cap and tighten it securely. Ensure the fill port remains accessible as it will be necessary to check and top up the oil after the first compressor start.

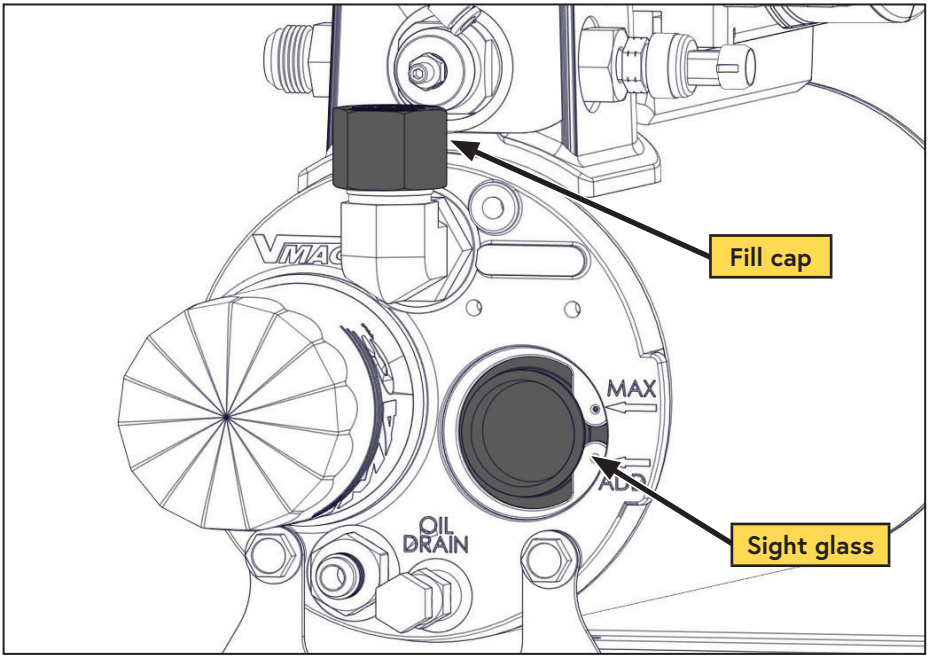


Figure 40 — Filling the WHASP Tank

Electrical Schematic

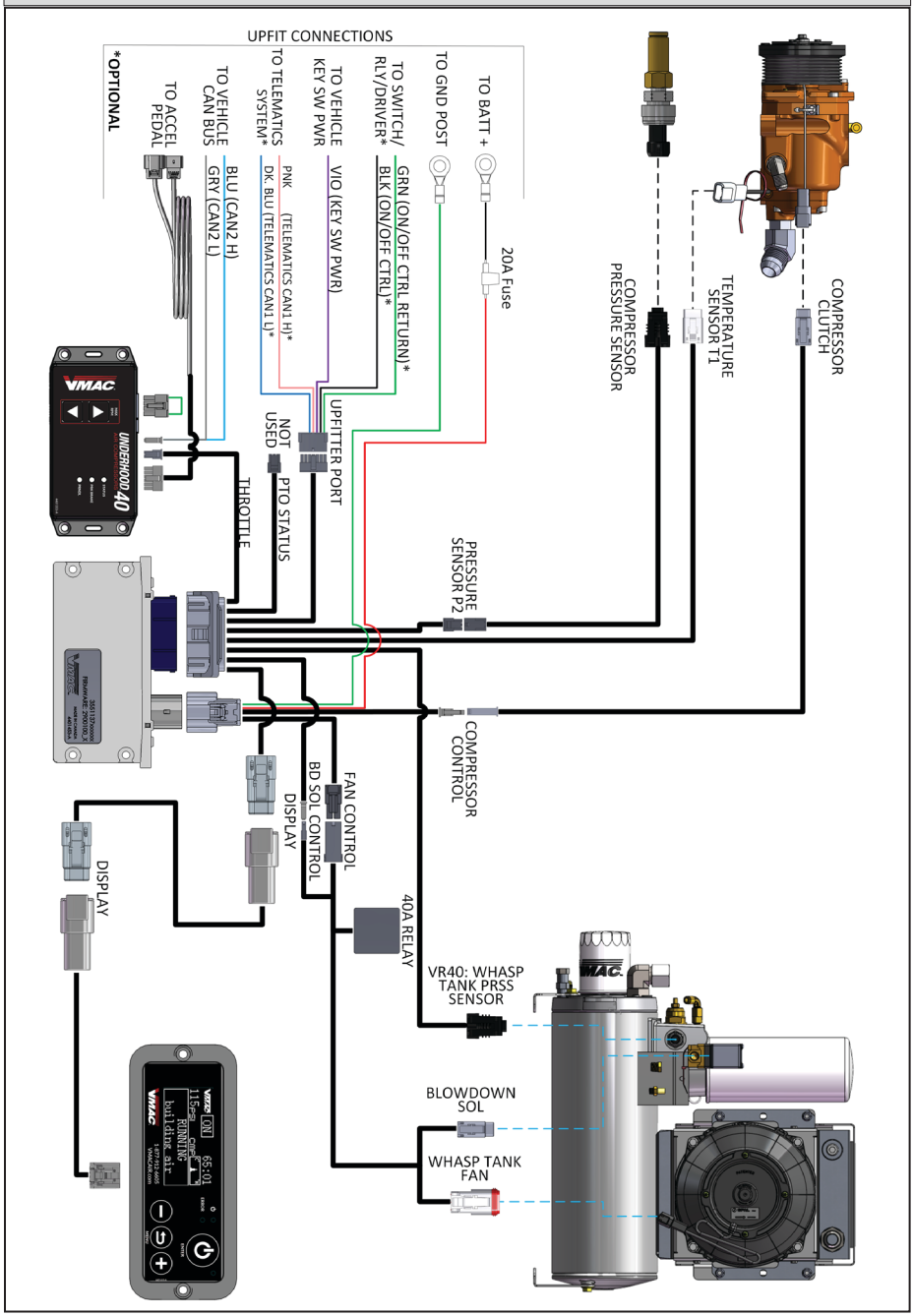


Figure 41 — Electrical schematic

Harness Reference

All references to "12 V" refer to the voltage supplied by the vehicle battery. This voltage can range from 9 V to 14.4 V dependent upon battery health, the alternator, and whether the engine is running.

Upfitter Port (16-pin black microfit connector)			
Colour	**Pin**	**Function**	**Notes**
Green	3	ON/OFF CTRL return (GND)	*Optional:* Connect a momentary switch between these wires. See "Remote Start Integration (Optional)" on page 47.
Black	10	ON/OFF CTRL signal input	
Violet	13	KEY SW PWR signal input	Connect to vehicle 12 V key switched power.
Pink	9	TELEMATICS + (CAN H)	J1939 compatible telematics interface. See VMAC for PGN documentation.
D. Blue	2	TELEMATICS – (CAN L)	

Fan Relay (40A 12V relay)			
Colour	**Pin**	**Function**	**Notes**
Red	86	Relay coil +	12V constant.
Red	30	12 V power	—
Brown	85	Relay coil -	Switched GND from Controller. 0 Ω to GND when fan is ON, High Ω when OFF.
Yellow	87	12 V power output from relay (Activate Fan)	Switched power from relay. 12 V when fan is ON, 0 V otherwise.

Chassis GND (Ring terminal)			
Colour	**Pin**	**Function**	**Notes**
Green	—	VMAC System ground	Connect to dedicated chassis ground point or battery "-" terminal.

Batt "+" (Ring terminal)			
Colour	**Pin**	**Function**	**Notes**
Red	—	VMAC System 12 V power	Connect to battery "+" terminal. Power supply for VMAC system. Protected with 20 A inline fuse.

Display (4-pin grey Deutsch DTM connector)			
Colour	**Pin**	**Function**	**Notes**
Green	1	Ground	System power.
Red	2	12 V	
Pink	3	TELEMATICS + (CAN H)	VMAC internal CAN bus. This bus is internally connected to TELEMATICS +/- in the Upfitter Port.
D. Blue	4	TELEMATICS – (CAN L)	

Display (4-pin black connector)			
Colour	**Pin**	**Function**	**Notes**
Green	3	Ground	System power.
Red	4	12 V	
Pink	1	TELEMATICS + (CAN H)	VMAC internal CAN bus. This bus is internally connected to TELEMATICS +/- in the Upfitter Port.
D. Blue	2	TELEMATICS – (CAN L)	

Pressure Sensor P2 (3-pin black microfit connector)			
Colour	**Pin**	**Function**	**Notes**
Green	1	Ground	—
Red	2	5 V power	—
White	3	Sensor signal input	Linear 0.5 V (0 psi) to 4.5 V (200 psi) signal.

Compressor Pressure Sensor (3-pin black MP150 connector)			
Colour	**Pin**	**Function**	**Notes**
Green	A	Ground	—
Red	B	5 V power	—
White	C	Sensor signal input	Linear 0.5 V (0 psi) to 4.5V (200 psi) signal.

Compressor Control (2-pin minifit connector)			
Colour	**Pin**	**Function**	**Notes**
Green	1	Ground	—
Yellow	2	12 V power output from Controller (Activate Compressor)	Switched power from Controller. 12 V when compressor clutch is engaged, 0 V otherwise.

Throttle (DTC) (4-pin black microfit connector)			
Colour	**Pin**	**Function**	**Notes**
Yellow	3	12V power output from Controller (activate throttle (DTC))	Switched power from Controller. 12 V when system is ON (to monitor interlocks), 0 V otherwise.
Pink	4	TELEMATICS + (CAN H)	VMAC internal CAN bus. This bus is internally connected to TELEMATICS +/- in the Upfitter Port.
D. Blue	2	TELEMATICS – (CAN L)	

Temperature Sensor T1 (3-pin grey Deutsch DTM connector)			
Colour	**Pin**	**Function**	**Notes**
Green	1	Sensor return (GND)	Non-linear type K thermistor.
White	3	Sensor signal input	

WHASP Tank Fan (2-pin grey Deutsch DT connector)			
Colour	**Pin**	**Function**	**Notes**
Yellow	1	12 V power output from relay (activate fan)	Switched power from relay. 12 V when fan is ON, 0 V otherwise.
Green	2	Ground	—

WHASP Tank Pressure Sensor (3-pin black MP150 connector)			
Colour	**Pin**	**Function**	**Notes**
Green	A	Ground	—
Red	B	5 V power	—
White	C	Sensor signal input	Linear 0.5 V (0 psi) to 4.5 V (200 psi) signal.

Blowdown Sol (2-pin grey Deutsch DTM connector)			
Colour	**Pin**	**Function**	**Notes**
Green	1	Ground	—
Yellow	2	12 V power output from Controller (activate blowdown solenoid).	12 V when blowdown solenoid is engaged, 0 V otherwise.

Electronics and Control Component Installation

Best Practices

- Ensure the system ground is connected to the VMAC recommended ground locations whenever possible. These locations are designed to be used as a ground point and can handle high currents while providing a low resistance connection. Do not use any bolt as a ground location as the increased resistance could cause system brown-out when the high current fan kicks on.
- Route all wires to ensure they will not contact hot, sharp or moving parts (including the park brake mechanism, steering column, and pedals).
- Before drilling any holes ensure there are no OEM wires, hoses, or components that may be damaged.
- Do not use a test light to probe for power on vehicle circuits, the increased current draw of the test light may damage components.
- VMAC recommends using only sealed crimp connectors for all electrical connections (unless otherwise specified).
- To ensure a durable connection, use only good quality crimping tools.
- Harness protection. High temperature loom is used on all supplied harnesses. If loom is to be added to harnesses:
    - Use high temperature loom where high temperatures may be expected.
    - Use spiral loom in areas with high vibration.

Inline Butt Splice Connections

- Cut the wire approximately 2 in from the connector.
- Strip approximately 3/8 in from the end of both sides of the cut wire, as well as from the end of the wire being spliced inline.
- Twist the wire to be spliced inline, together with the "live" side of the wire (not the wire attached to the connector).
- Slide the butt connector onto the twisted wires and crimp it.
- Insert the "connector side" of the wire into the butt connector and crimp it.
- Lightly tug the wires to ensure they are properly crimped.
- Using a heat gun, carefully apply heat to the butt connectors to seal the connection.

OEM Wire Colours

The OEM wire colours referenced in this manual are correct at the time of writing. OEMs may make running changes to the wire colours on their production line as needed, and without notice.

In the case of a wire colour discrepancy, the described location (e.g. pin number in a specific connector) will be considered to be definitive. If there are any questions or concerns, please contact VMAC Technical Support.

Posi-Tap Connectors

- Slide the OEM (live) wire into the slot on the large cap as far as it will go. ***Note:*** It is imperative that the OEM wire is straight. Make this connection first.
- Thread the tap (barrel with pin) over the slotted cap, ensuring the pin is centered on the wire.
- Tighten the tap firmly but do not over tighten it as over tightening will cause the wire to twist.
- Unscrew the small cap but leave the last few threads engaged.
- Strip approximately 3/8 in from the end of wire.
- Twist the wires to be Teed in together and insert the wire into the cap. Some resistance will be felt until the wire bottoms out.
- Firmly tighten the cap.
- Ensure all of the connections are firmly tightened by hand (overtightening will cause the threads to strip).
- Confirm the connection by giving a light tug to the Teed in wire (5 lb – 10 lb) to ensure it does not release from the connection.

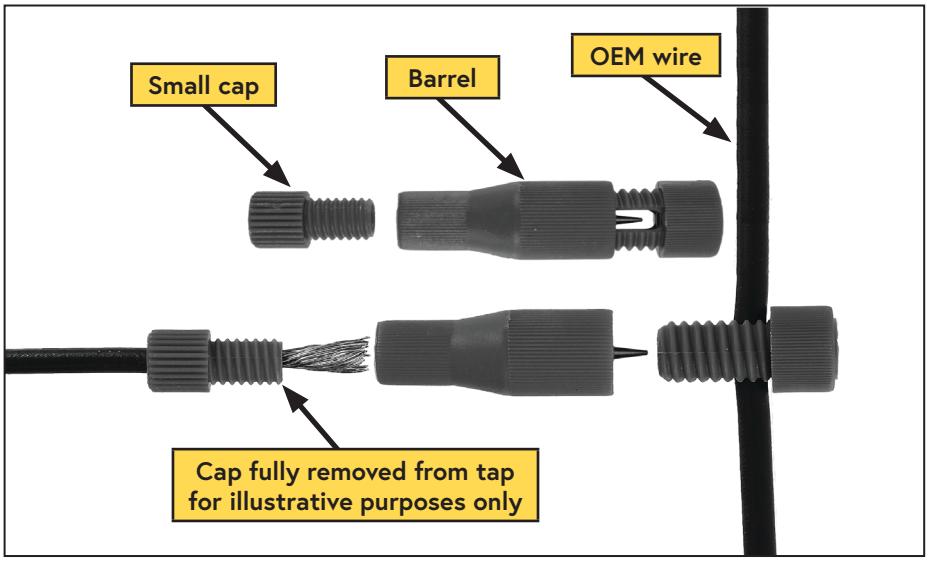


Figure 42 — Posi-Tap wire connector

Upfitter Electrical Requirements

The VMAC power harness includes a 14 ft (4.25 m) power wire and a 6 ft (1.8 m) ground wire. VMAC does not recommend modifying the length of this harness. Coil any excess harness and secure it safely out of the way.

If lengths greater than this are required, consult VMAC Technical Support prior to installation.

VMAC's UNDERHOOD 40 Air Compressor systems require up to 20 A at 12 V dc (nominal) to operate. A 20 A inline fuse is included on the red power supply line.

Power Connection

Power should be supplied directly from the battery. If this is not possible, the main power must be supplied from a source that is capable of 20 A constant.

Ground Connection

To ensure an uninterrupted supply of power to the VMAC system, the ground wire should be routed to either a dedicated vehicle chassis ground post, or to the negative terminal of the battery (preference given to the dedicated chassis ground post).

Confirm the desired ground location is acceptable by using an ohm meter to measure the resistance between the ground point and the negative battery terminal. Resistance should be less than 1 Ω.

The violet wire on the Upfitter Interface harness (labeled "KEY SW PWR") requires connection to a key switched 12 V source. The default location is indicated later in this manual.

Controller, DTC and Display Box Installation

Display Box

The display can be mounted in any covered area. The display is not waterproof and should not be directly exposed to the weather.

- If mounting in the cab, omit the 10-foot display extension and mount where convenient.
- If mounting near the back of the vehicle, attach the 10-foot display extension and run the display harness to the rear of the vehicle.

Controller

Mount on the driver side, up under the dashboard or under the driver seat. Ensure the Controller is out of the way of pedals, steering column, and park brake mechanism, or under the driver seat.

DTC

Ensure the DTC is mounted within reach of the supplied pedal harness, normally the DTC is mounted near the accelerator pedal)

When determining harness routing, consider the relative motion of the engine, cab, and the chassis. Ensure the harnesses are adequately protected from abrasion, and are secured away from any hot, sharp or moving parts.

In Cab Wiring

- ☐ Remove the plastic trim panel from the driver side door sill, and the kick panel.
- ☐ Remove the lower dashboard panel (below the steering wheel).
- ☐ Plug all supplied harnesses into the Controller, DTC, and display.
- ☐ Mount the Controller.
- ☐ Mount the display box.
- ☐ Mount the DTC.

Do not modify the throttle pedal harnesses!

Unauthorized modification of the pedal harness could result in injury or death.

- ☐ Unplug the OEM cable from the accelerator pedal and plug it into the matching connector from the DTC.
- ☐ Plug the cable from the DTC into the matching connector on the accelerator pedal.
- ☐ Connect the green 14 AWG wire to either of the two dedicated GND bolts.*
  - ☐ *A dedicated ground bolt located near the battery box.
  - ☐ *Driver side outside wall behind a panel. The bolt will already have 1 or more thick ground wire connected to it.
- ☐ Bundle the following wires together.*
  - ☐ *Red 14 AWG wire.
  - ☐ *Violet 20 AWG wire "KEY SW PWR".
- ☐ Route this bundle along the door trim, under the paneling, to the underside of the driver seat where the battery connections are located.
- ☐ Locate the (×3) terminal studs that serve as the electrical access point under the driver seat (Figure 43).

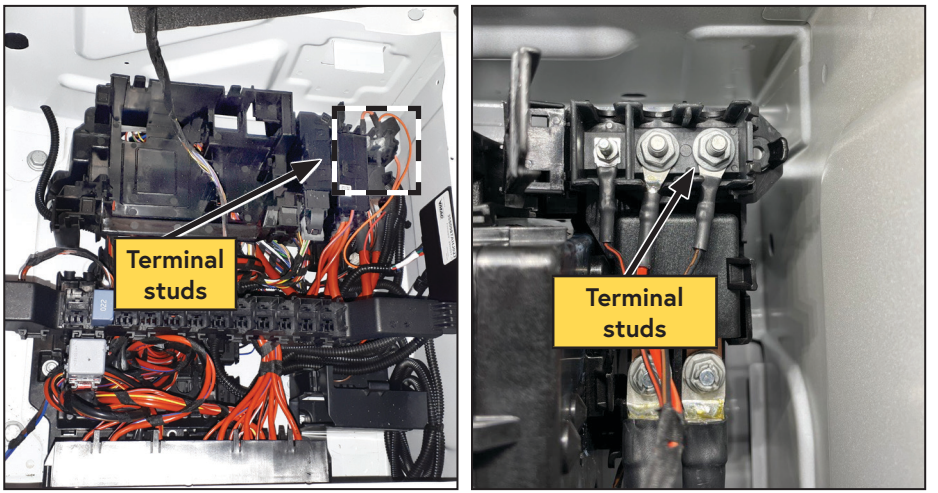


Figure 43 — Electrical access point

☐ Connect the ring terminal on the red wire to the constant 12 V supply post (Figure 44).

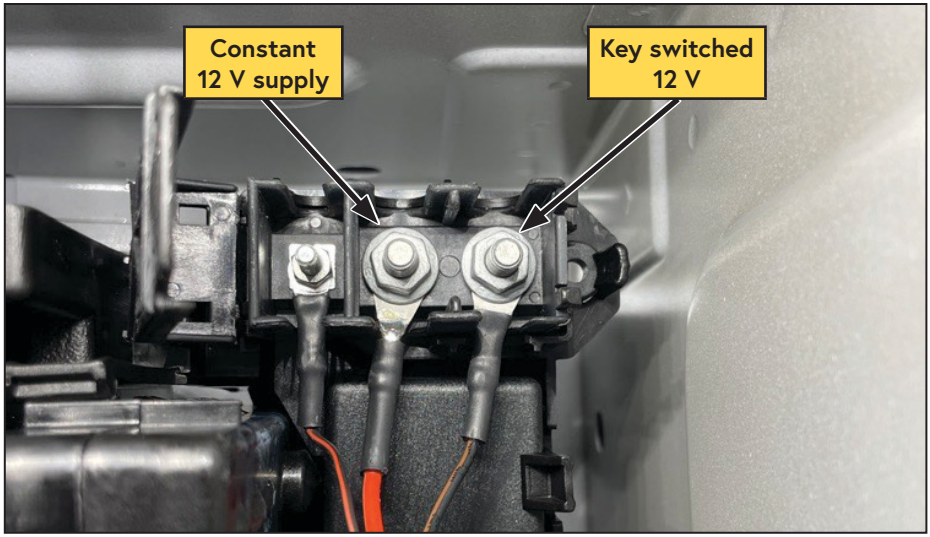


Figure 44 — Tie into vehicle power

☐ Using a ring terminal, connect the violet wire ("KEY SW PWR") to the key switched 12 V post (Figure 44).

☐ Remove the side panel to gain access to the OBD II port (Figure 45).

Figure 45 — Remove side panel

☐ Depress the (×4) clips in the OBD II connector and pull it out from the bottom to gain easier access to the wires.

☐ Peel back the tape on the harness a few inches.

Due to running OEM changes, the OBD II wire colours are subject to change without notice however, pins 6 (CAN high) and 14 (CAN low) are the standard and shall be the definitive method for determining the correct wire connections (the wires will be a twisted pair).

- ☐ Using the supplied Posi-Taps, splice (see page 40 for Posi-Tap instructions) (Figure 46):*
  - ☐ *The blue wire from the DTC to the wire at pin 6 (CAN H).
  - ☐ *The grey wire from the DTC to the wire at pin 14 (CAN L) .

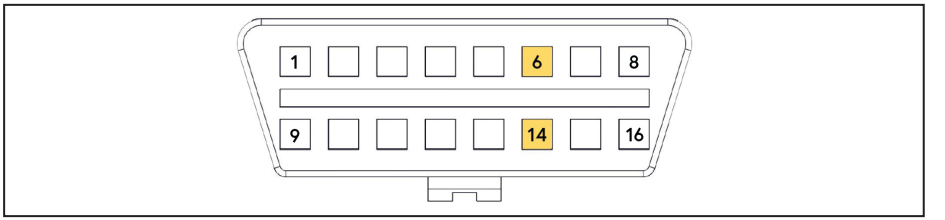


Figure 46 — OBD II connector

Engine Bay Wiring

The compressor and WHASP Tank pressure sensor connectors are identical. Ensure the harness labeled "COMPRESSOR PRESSURE SENSOR" is the one routed through the firewall.

- ☐ Route the following harnesses through the firewall, into the engine bay:*
  - ☐ *TEMPERATURE SENSOR T1.
  - ☐ *COMPRESSOR CLUTCH.
  - ☐ *COMPRESSOR PRESSURE SENSOR.
- ☐ Route the harnesses toward the compressor. Follow the route of the hoses installed earlier and secure the harnesses to the hoses using cable ties.
- ☐ Connect the TEMPERATURE SENSOR T1 harness to the matching connector on the compressor.
- ☐ Connect the COMPRESSOR CLUTCH harnesses to the matching connector on the compressor.
- ☐ Connect the COMPRESSOR PRESSURE SENSOR harness into the pressure sensor on the "T" fitting located near the compressor.
- ☐ Pull any excess harness into the cab, coil it, and secure it safely out of the way.
- ☐ Using cable ties and/or rubber coated P-clips, secure the harnesses.

WHASP Tank Wiring

- ☐ Route the following harnesses to the rear of the vehicle to where the WHASP Tank is located:*
  - ☐ *WHASP TANK FAN & BLOWDOWN SOL.
  - ☐ *VR40: WHASP TANK PRSS SENSOR.
- ☐ Plug the "VR40: WHASP TANK PRSS SENSOR" harness into the pressure sensor on the WHASP tank.
- ☐ Plug the "WHASP TANK FAN" harness into the fan on the WHASP tank.
- ☐ Plug the "BLOWDOWN SOL" harness into the solenoid on the WHASP tank.
- ☐ Coil any excess harness and secure it safely out of the way.
- ☐ Using cable ties and/or rubber coated P-clips, secure the harnesses.

Telematics Integration (Optional)

VMAC's advanced digital controls include an Upfitter harness connection for 3rd party telematics systems to read CAN data from the VMAC system.

Telematics System Requirements:

- CAN 2.0 running at 500 kbps baud.
- J1939.
- Integration of PGNs from VMAC's VCAN protocol.
  Note: *VMAC's VCAN protocol is available to telematics integration engineers upon request, please contact VMAC Technical Support.*

  If additional support is required, contact VMAC sales to book an initial consultation with a member of our engineering team.
  Phone: *(877) 912-6605*
  Email*: sales@vmacair.com*
- The supplied VMAC display box contains the 120 Ω termination resistor and has CAN packet acknowledgment.
- If the supplied VMAC display box is not used the following are required:
  - 120 Ω termination resistor across CAN signal lines.
  - CAN packet acknowledgement.
  - The 3rd party telematics system must support CAN message acknowledgment (must not operate in silent mode).

Telematics Integration

1) Connect the 3rd party telematics system (not supplied) to the VMAC system via the Upfitter harness (see "Upfitter Port (16-pin black microfit connector)" on page 36).
   Connect the 3rd party telematics system within 36 in of the Controller. If this is not possible, contact VMAC tech support for assistance.
   If the supplied Display is NOT used, add 120 Ω resistor between CAN H and CAN L near the 3rd party telematics system.
2) Ensure both systems share a good ground.
3) Program the 3rd party telematics system with VMAC VCAN PGNs (interpretation of VMAC CAN messages). Refer to the 3rd party telematics documentation.
4) Apply power to the system by turning the vehicle key to the "ON" position. Observe telematics data on the telematics system (regardless of whether the VMAC system is running or not).

Remote Start Integration (Optional)

The "system on" command is registered after 3 seconds. VMAC recommends programing 3rd party controls or relay actuation for 4 seconds to allow sufficient time for the command to register.

A remote start/stop option is available on a signal line provided in the upfitter harness. This signal line can be connected to a momentary switch, a low-side driver output of a 3rd party controller, or a relay.

Momentary switch

Connect a momentary switch between the green and black wires labeled "ON/OFF CTRL" on the Upfitter Interface harness. Press and hold the switch for 3 seconds to start the system. Press and release the switch to stop the system.

3rd Party Controller

Connect the black wire labeled "ON/OFF CTRL" on the Upfitter Interface harness to a low-side driver output of a 3rd party controller. To start the system, use the output to pull the signal line low for 4 seconds. To stop the system, use the output to pull the signal line low momentarily.

Relay

Connect the black wire labeled "ON/OFF CTRL" on the Upfitter Interface harness to a relay contact. Connect the other relay contact to ground. To start the system, activate the relay to pull the signal line low for 4 seconds. To stop the system, activate the relay to pull the signal line low momentarily.

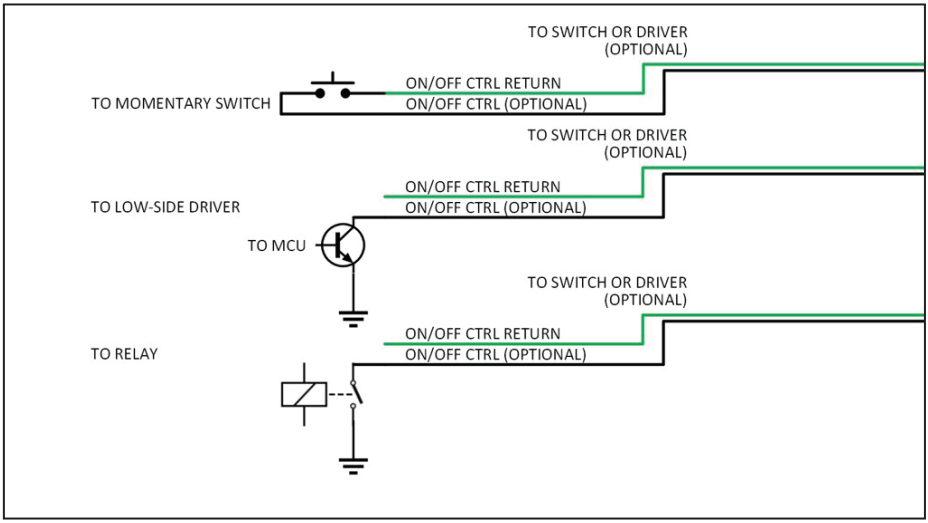


Figure 47 — Remote start integration

Completing the Installation

- ☐ Check all VMAC and OEM wiring to ensure that it will not contact any hot, sharp or moving components and will not interfere with the operation of the vehicle. Secure all wiring with rubber coated P-clips, cable ties and loom as required.
- ☐ Check all VMAC and OEM hoses and tubes to ensure that they will not contact any hot, sharp or moving components and will not interfere with the operation of the vehicle. Secure all hoses and tubes with rubber coated P-clips, cable ties and loom as required.
- ☐ Replace all dashboard panels.
- ☐ Replace the driver seat.
- ☐ Reconnect the battery(s).

The System Identification Plate must be attached to the vehicle at the time of installation. This plate provides information that allows VMAC to assist with parts and repairs.

- ☐ Locate a conspicuous area in the engine bay (where the tag will be easily noticed) to install the System ID plate.
- ☐ Mark and drill (x2) 7/64 in holes and secure the plate with the supplied self tapping screws (Figure 48).

Figure 48 — System Identification Plate

- ☐ To alert any technicians that may service the vehicle, affix the servicing caution/ contact decal in the engine compartment near the hood latch in a visible location (Figure 49).

Figure 49 — Advisory decal

☐ Install the VMAC belt routing decal in a suitable location under the hood (Figure 50).

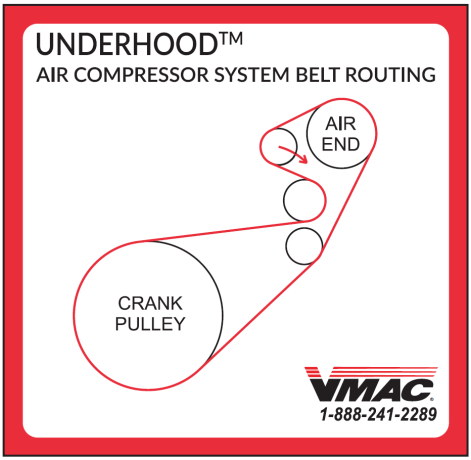


Figure 50 — Belt routing decal
(actual belt routing decal may differ)

☐ As part of the installation process, ensure that the safety and operational instruction decal is affixed in an obvious location so that it can be seen by vehicle operators. A good spot for this is usually on the inside of the door or on the panel underneath the steering wheel (Figure 51).

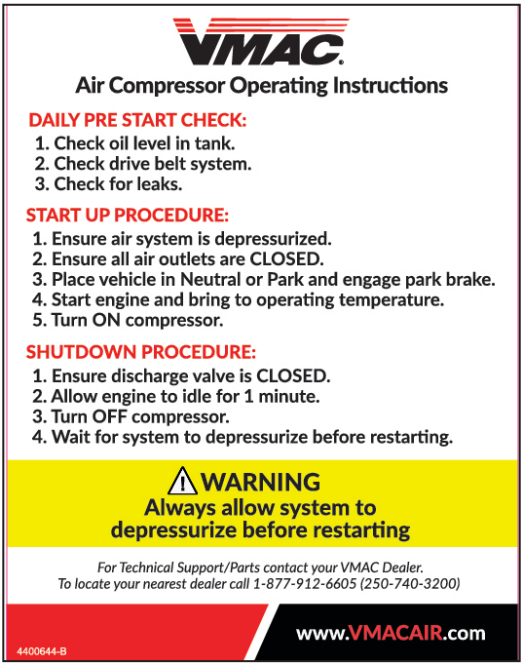


Figure 51 — Operating Instruction decal

Air Receiver Tank

Pressure in the air receiver tank will not be relieved when the compressor system blows down. This is normal operation. Prior to performing any service work on the system, discharge any stored air in the air receiver tank.

The VMAC WHASP Tank has a built-in check valve. Use of an additional check valve is not required and may cause erratic performance.

If an air receiver tank will be used with this system, the following installation procedure must be used to prevent damage to the system.

The VMAC compressor system will automatically depressurize when it is shutdown. The WHASP Tank has a built in check valve which prevents blow back and moisture from the receiver tank entering the WHASP Tank. Installation of an additional check valve will cause erratic performance.

While the air receiver tank can be installed at any height in relation to the WHASP, the discharge hose running from the WHASP must be installed as high as possible on the air receiver tank to prevent problems with condensation that may have accumulated in the receiver tank (Figure 52).

Drain the condensed water from the receiver tank daily.

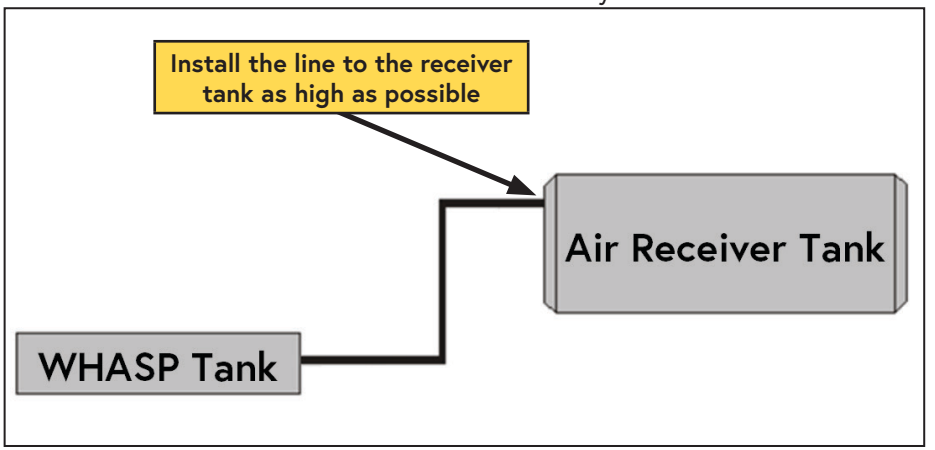


Figure 52 — Air receiver tank

Recommended Accessories

While the compressor system will function without the following accessories, VMAC strongly recommends their use for optimal performance.

See the "Accessory Product" section of this manual on page 60 for a list of products available for purchase through VMAC.

Receiver Tank

An air receiver tank provides a buffer as it gives the compressor time to react by increasing the engine speed and producing air before the tool stalls. It also has the advantage of lowering the duty cycle of the compressor system.

(This application requires a minimum air receiver tank size of 6 USG).

Pressure Gauge

While the VMAC display box displays the system pressure, installing a mechanical gauge closer to the tool can be helpful for fine tuning the system and simplifies any potential troubleshooting.
Install a 200 psi pressure gauge downstream of the air discharge valve.

Pressure Regulator and/or Lubricator or FRL

The compressor can produce air pressures up to approximately 150 psi

(1035 kPa). It is the responsibility of the user to know the pressure and air flow requirements of the tools powered by the air compressor system.

An appropriate air pressure regulator and lubricator can be installed downstream of the air discharge valve. Failure to regulate the air pressure may cause damage to the tool.

Testing the Installation

Lift the vehicle, ensuring the driven wheels are off of the ground. Support the vehicle securely with appropriately rated jack stands. Ensure there are no people around the vehicle before beginning the test.

If the vehicle fails the test, verify all of the connections are correct and secure. If additional assistance is required, contact VMAC Technical Support.

The "Product Registration" message is directed at the end user as a reminder to register their warranty with VMAC.

This message should not be cleared by an Upfitter or third party installer!

Refer to the UNDERHOOD 40 Owner's Manual for instructions on how to clear this reminder.

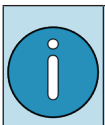
For an overview of the display box and basic operating instructions turn to "Basic Operation" on page 56.

Control System Testing

- ☐ Turn the ignition to "ACC":*
  - ☐ ***Key Switch:** Turn the key two clicks.
  - ☐ ***Push button Start:** Without depressing the service brake, push the START button twice.
- ☐ Press "MENU" and use the navigation buttons ("-" and "+") to navigate to "Sys Status".
- ☐ Navigate to "Controller Test Mode" and press "ENTER" to set the value to "ON". ***Note:** While in "Controller Test Mode", the system will not run until TEST mode has been disabled.*
- ☐ Navigate back to the main menu.
- ☐ Navigate to "DTC Status".
- ☐ Scroll to "Park Brake Signal".*
  - ☐ *While observing the display, engage and disengage the park brake several times.
  - ☐ *When engaged, the display should indicate "ON", when disengaged, the display should indicate "OFF".
- ☐ Navigate back to the main menu. Navigate to "Sys Status".
- ☐ Navigate to "Output Status".

- ☐ Scroll to "Comp" (this test will only work with the vehicle off).*
  - ☐ *With the hood open, press "ENTER" to toggle the clutch on.
  - ☐ *Verify the clutch is engaged. The clutch engagement is audible though it may be necessary to have an assistant listen while performing this test. Alternatively, clutch engagement can be verified by attempting to rotate the center of the clutch by hand (the compressor should turn over by hand when the clutch is not engaged).
  - ☐ *Verify the measurement on the display box is between 3,000 mA and 5,000 mA.
  - ☐ *Press "ENTER" to toggle the clutch off. Verify the measurement on the display box is between 0 mA and 100 mA.
- ☐ Scroll to "Fan".*
  - ☐ *Press "ENTER" to toggle the WHASP Tank fan ON. Verify the WHASP tank fan turns ON. ***Note:*** *The display will always show 0 mA as this sensor is not currently used.*
  - ☐ *Press "ENTER" to toggle the fan OFF. Verify the WHASP tank fan turns OFF.
- ☐ Scroll to "BD Sol".*
  - ☐ *Press "ENTER" to toggle the WHASP Tank blowdown solenoid ON.
  - ☐ *Verify the WHASP tank solenoid activates. The solenoid engagement is audible though it may be necessary to have an assistant listen while performing this test.
  - ☐ *Verify the measurement on the display box is between 530 mA and 880 mA.
  - ☐ *Press "ENTER" to toggle the WHASP Tank blowdown solenoid OFF. Verify the measurement on the display box is between 0 mA and 100 mA.
- ☐ With the vehicle drive wheels safely off the ground, start the engine.
- ☐ Scroll to "PRNDL Signal".*
  - ☐ *While observing the display, shift the vehicle into all gear positions several times.
  - ☐ *The display should indicate "Not in Park" when the gear selector is in reverse, drive, or low. The display should indicate "Park" only when the gear selector is in park.
    Note: *Neutral is vehicle dependent and could display either "Park" or "Not in Park". The VMAC system is safe to operate provided the vehicle is not in gear.*
- ☐ Navigate back to the main menu.
- ☐ Navigate to "Sys Status".
- ☐ Navigate to "Controller Test Mode" and set the value to "OFF".
- ☐ Check that the compressor oil level at the WHASP Tank sight glass is correct.
- ☐ Perform a final inspection of the installation to ensure everything has been completed.
- ☐ Perform a final belt alignment check.

- ☐ Check all wiring for security and protection. Ensure nothing is touching the compressor body.
- ☐ Ensure all of the compressor outlets are closed.
- ☐ Ensure the parking brake is engaged and the transmission is in "PARK".
- ☐ Start the engine.
- ☐ Allow the vehicle to reach operating temperature.
- ☐ Press and hold the "ENTER"/Power button for 3 seconds to power the system on (the power indicator on the display should change from "OFF to "ON").*
  - ☐ ***Remote Start:*** Refer to page 47, or the documentation provided by the Upfitter for remote start instructions.



The first time the VMAC system is run, the DTC will perform an auto-calibration as it adjusts to the vehicle's tune, this process can take up to 3 minutes. During this time, "DTC calibrating" will appear on the display box.

- ☐ Once the system is turned on, the DTC will enter its auto-calibration mode and "DTC calibrating" will appear on the display box.*
  - ☐ *Open the ball valve.
  - ☐ *Wait for the DTC calibration to complete and the display box to indicate "RUNNING".
  - ☐ *Close the ball valve.
- ☐ Observe the compressor while it is operating to ensure the belts rotate properly, pulleys rotate smoothly and nothing is rubbing or contacting hot parts.
- ☐ Check the system for leaks.
- ☐ Once the system has reached full system pressure (150 psi):*
  - ☐ *The engine speed should reduce to OEM base idle.
  - ☐ *The clutch should disengage.
  - ☐ *"STANDBY" should appear on the display box.
- ☐ Press and release the "ENTER"/Power.*
  - ☐ *The display box will change to "OFF".
- ☐ Shut down the engine.
- ☐ Ensure the VMAC system blows down.
- ☐ Check the compressor oil level after the engine has been shut down and the oil level has had time to stabilize.

Ensure any stored air is drained from the system prior to adding oil.

- ☐ Add oil as necessary to bring the level to the "FULL" line in the sight glass and check for leaks.

Final Testing

Ensure the following has been completed:

☐ Operate the system with an air tool (or the VMAC Air Test Tool with the appropriate orifice installed) for at least 1/2 hour (1 hour preferred).

The WHASP Tank cooling fan is thermostatically controlled, and may start or stop without warning.

☐ Observe the compressor while it is operating to ensure the belts rotate properly, pulleys rotate smoothly and nothing is rubbing or contacting hot parts.

☐ Check the system for leaks.

☐ Road test the vehicle for approximately 20 km (14 miles).

☐ Perform final check to ensure the belts rotate properly, pulleys rotate smoothly and nothing is rubbing or contacting hot parts and check for any leaks.

Once the engine is turned off and the system has cooled:*

☐ *Check all components, connections and fasteners.

☐ *Check the compressor oil level.

Basic Operation

This information is intended to assist the installer with system testing, which takes place in the following chapter.

Refer to the UNDERHOOD 40 "with Advanced Digital Controls" Owner's Manual for in depth operating instructions including a description of the various menus, diagnostic information, and adjustable parameters.

- The display box will light up when the vehicle ignition is "ON" or "ACC".
- Use the navigation buttons to scroll through the menus.
- Press and release the "ENTER" button to make a selection.
- Press and hold the "ENTER"/Power button for 3 seconds to power the VMAC system on.
    - The power indicator on the display should change from "OFF to "ON".
- Press and release the "ENTER"/Power to shut the system down.

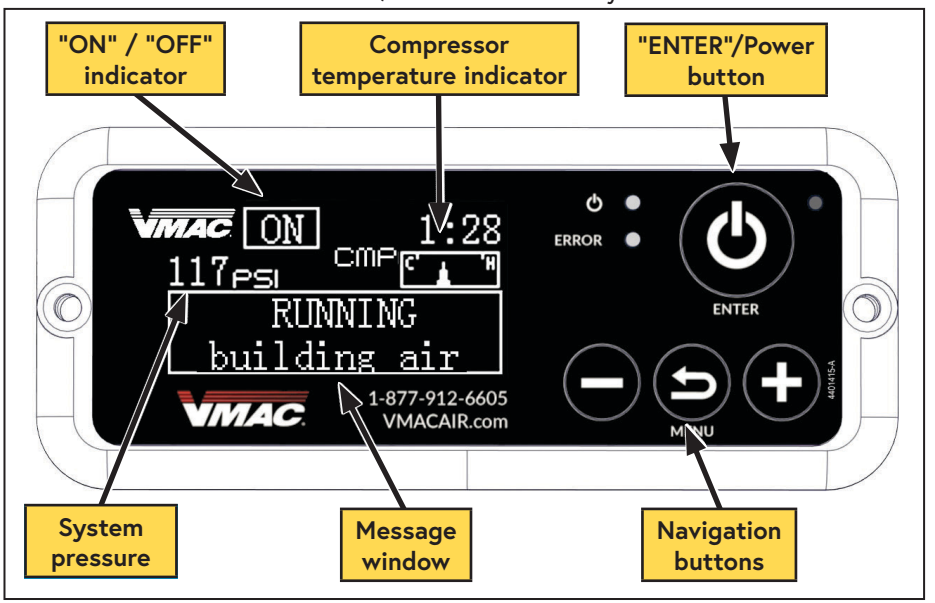


Figure 53 — Display box

Normal operating messages

Figure 54 — Display box messages

Starting the compressor / Normal Operation

- To start the system, press and hold the "ENTER"/Power button for 3 seconds to power the system on.*
    - ***Remote Start:** Refer to page 47, or the documentation provided by the Upfitter for remote start instructions.
- Once the system is on, the system will either build air (if system pressure is low) or will enter standby (if already at system pressure).
- When the system is building air, the system will first go through a start routine to ensure the compressor starts under optimal conditions.
    - The engine speed will elevate to the programmed "Starting RPM" (usually in the range of 800 rpm to 1,200 rpm). This parameter is located in the DTC status menu.
    - The blowdown pressure sensor is checked to ensure pressure in the compressor is less than 10 psi.
- Once the above conditions are confirmed, the compressor clutch will engage and the system will start building air.
- Engine speed will elevate to "maxRPM" (this is defined by the VMAC system specific to the vehicle application). See "System Adjustment, Optimization, and Basic Parameters" on page 59.
- Air may be heard to escape from the blowdown muffler on the WHASP Tank for up to 20 seconds as internal pressure is built.
- The system will continue to build air until system pressure is achieved (150 psi by default) and the system will enter Standby mode.

Standby

When the system is in Standby:

- Engine speed will drop to base idle.
- The compressor clutch will disengage.
- The WHASP Tank will blow down.
- The Controller will monitor the system air pressure. If the air pressure drops below 120 psi, the system will repeat the process above to build air.

Shutting Down the Compressor

- Close all open air valves/tools and allow the system to build to full system pressure (factory default 150 psi).
- Ensure engine speed has dropped to base idle for at least 10 seconds.
- Press and release the "ENTER"/Power button.*
    - ***Remote Start** (see page 47): Actuate and release the Remote Start switch.

Performance Testing

System operation can be tested using the tools that will be operated by the system or by using the VMAC Test Tool (A700052) with the 40 cfm (5/32 in) orifice in the outlet to simulate tool use (Figure 55).

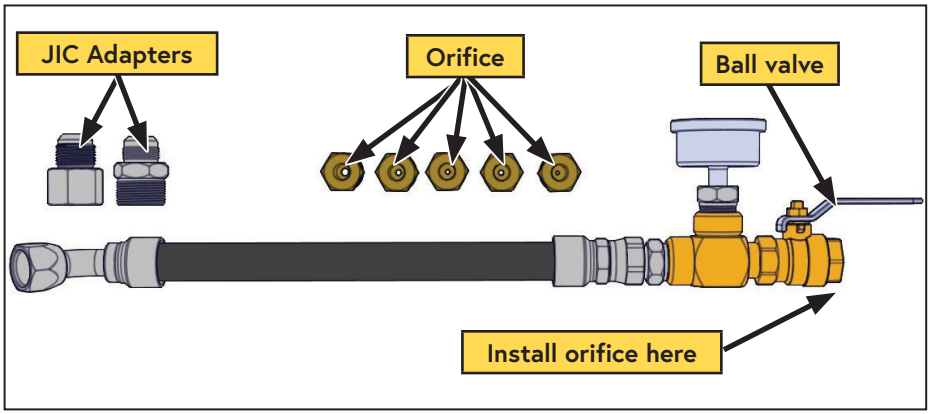


Figure 55 — A700052 VMAC Air Test Tool

Disconnect all downstream equipment (hose reels, etc.) and connect the test tool directly to the discharge fitting on the WHASP Tank.

Ensure there are no leaks in the test tool. The system may not idle down if there are leaks in the lines or fittings.

- ☐ Install the VMAC test tool at the system outlet with the 40 cfm (5/32 in) orifice.
- ☐ Ensure the ball valve is closed.
- ☐ Place the transmission in "PARK" and fully apply the park brake.
- ☐ Allow the engine to run until it is at operating temperature.
- ☐ Turn on the air compressor system and allow it to operate until the oil is warm.
- ☐ Observe the pressure gauge. Pressure should be approximately 150 psi.

Open the ball valve on the test tool and observe the engine tachometer:*

- ☐ Engine speed should increase to the default maximum VMAC rpm (see "System Adjustment, Optimization, and Basic Parameters" on page 59).
- ☐ Close the air valve slowly to allow the system pressure to rise. When the pressure reaches system pressure (default 150 psi), the system will disengage the compressor clutch and reduce the engine speed to base idle.
- ☐ Once the system pressure is at maximum pressure, slowly open the ball valve on the test tool until the pressure on the gauge begins to drop. Engine speed should ramp up to default maximum VMAC rpm when the pressure drops below 120 psi.

System Adjustment, Optimization, and Basic Parameters

This page is provided for the convenience of the Upfitter/installer. For a complete list of parameters and system adjustments, refer to the Refer to the UNDERHOOD 40 "with Advanced Digital Controls" Owner's Manual

The cfm generated by this system is directly related to the vehicle's engine speed.

VMAC configures this system for optimum performance at maximum cfm. In applications where maximum cfm is not required, or noise is a concern, the system can be adjusted to reduce the maximum VMAC rpm.

☐ With the VMAC system running and in "STANDBY", mode, navigate to "Sys Parameters".

☐ Adjust "Max RPM" to the desired value.

If tools are not performing as expected (low performance, tool is stalling, etc.), increase the "Max RPM" and retest.

Parameter	Default	Description
Set System Pressure	150 psi	Adjusts the maximum system pressure.
Restart Pressure	120 psi	Adjusts the system restart pressure.
Min RPM	*Do not adjust*	Adjust the RPM at which the DTC calibration occurs.
Max RPM	3,000 rpm	Adjusts the maximum engine speed used when the compressor is building air. • The default value produces optimal performance and generates maximum cfm. • Lower "Max RPM" values will lower fuel consumption and achieve quieter operation, but will result in reduced cfm output To change: Main menu -> System Parameters -> Max RPM
DTC Factory Reset (Max RPM Reset)	—	To reset: Main menu -> System Parameters -> DTC Factory Reset
Maximum cfm @ default max rpm	40 cfm	—
Normal operating temperature range	104 °C (220) to 127 °C (260° F)	—
Over temperature shut down	143 °C (290 °F)	—
Fan on/off temps:	—	The WHASP Tank cooling fan is thermostatically controlled. The fan turns on at 88 °C (190 °F) and turns off at 66 °C (151 °F).

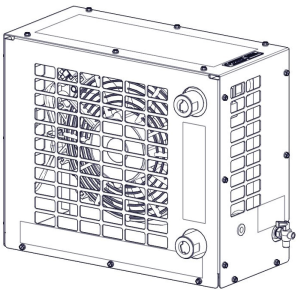
Accessory Products from VMAC

Compressor Service Kits

200 Hour or 6 Month Service Kit -
Part number: A700263
Includes 4 L VMAC high performance compressor oil, oil filter, air filter, and next service due decal.

400 Hour or 1-Year Service Kit -
Part number: A700264
Includes 4 L VMAC high performance compressor oil, oil filter, air filter, spin-on oil separator, safety valve, muffler, and next service due decal.

UNDERHOOD 70 Air Aftercooler

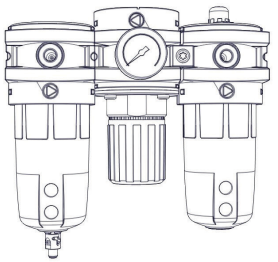


Part number: A800070

Improves tool performance and extends the life of air tools; removes up to 80% of water from compressed air; includes automatic water drain.

- Max air flow: 70 cfm / 175 psi.
- Port size: 3/4 in NPT inlet and outlet.
- Electrical: 12 V.
- Dimensions: 17 in (43.2 cm) L × 8.0 in (20.3 cm) W × 14.5 in (36.8 cm) H .
- Weight: 35 lb (15.8 kg).

Filter Regulator Lubricator (FRL) – 70 cfm

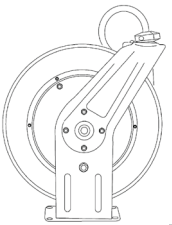


Part number: A700151

Extends the life of air tools; filter removes contaminants from the compressed air, adjustable regulator can reduce air pressure going to tools, lubricator adds atomized tool oil to the air stream to lubricate air tools (Tool oil not included).

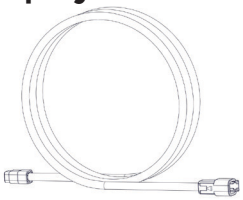
- Max air flow: up to 70 cfm / 150 psi.
- Port size: 3/4 in NPT inlet and outlet.

1/2 in × 50 ft Hose Reel



Part number: A700007
Spring-loaded 1/2 in × 50 ft hose reel; steel construction; full flow shaft and swivel for maximum performance.

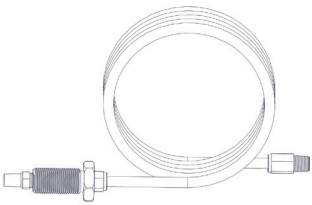
Display Harness Extension



Part number: 3530861

This display harness extension provides an additional 10 ft of cable which allows for greater flexibility in locating the display Panel.

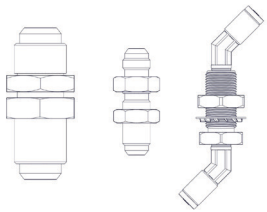
Remote Muffler



Part number: A700224

The A700224 WHASP remote mount muffler kit is designed to relocate the blowdown muffler to an external location. This is recommended for applications where the WHASP Tank will be located inside of a van or service body, the remote mounted muffler will reduce cabin noise when the compressor blowdown operates, and will ensure any oil vapor will be safely discharged outside of the vehicle.

Bulkhead Fittings



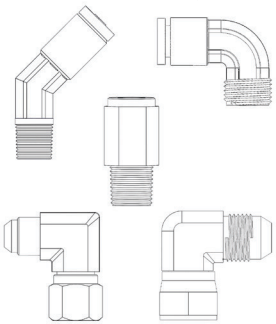
Part number: 3801095

Includes:

Bulkhead fittings are used for passing the system discharge, oil, and scavenge hoses through the floor or body panels.

- 3/4 in JIC bulkhead fitting P/N: 4900170.
- 3/8 in JIC bulkhead fitting P/N: 4900209.
- 1/8 in NPT bulkhead fitting P/N: 5000178.
- 2 × 45° 1/4 push-to-connect fittings P/N: 5000158.

Hose Fittings



45° 1/4 push-to-connect fitting P/N: 5000158.
1/4 in push-to-connect fitting For PTFE scavenge tube.

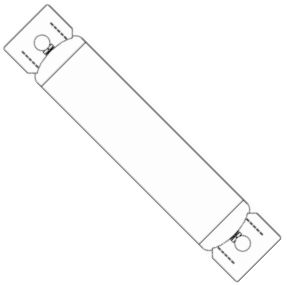
90° 1/4 push-to-connect fitting P/N: 5000020.
1/4 in push-to-connect fitting For PTFE scavenge tube.

Straight 1/4 in push-to-connect fitting P/N: 5000012.
1/4 in push-to-connect fitting For PTFE scavenge tube.

90° 3/8 in hose fitting P/N: 4900117.
3/8 in hose fitting for Oil Return Hose.

90° 3/4 in hose fitting P/N: 4900043.
3/8 in hose fitting for Compressor Discharge Hose.

6 Gallon Air Receiver Wing Tank



Part number: A300056

Air receiver tanks are used for lowering compressor duty cycle and removing water from compressed air; recommended for optimum operation of all VMAC Gas Driven, Diesel Driven, Hydraulic, and UNDERHOOD40 air compressors. Manufactured to FMVSS 121 standard; includes fittings, 170 psi pressure relief valve, and tank drain.

- Max pressure: up to 170 psi.
- Dimensions: 32 in (81.3 cm) L × 8 in (20.3 cm) D.
- Weight: 23 lb (10.4 kg).

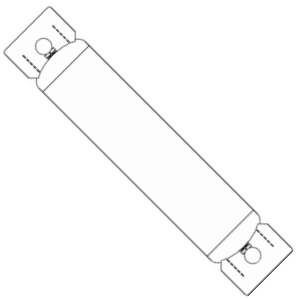
10 Gallon Air Receiver Tank w/ Mounting Feet

Part number: A300047

Air receiver tanks are used for lowering compressor duty cycle and removing water from compressed air. Recommended for optimum operation of VMAC Hydraulic Air Compressors, VMAC Diesel Driven Air Compressors, UNDERHOOD40, UNDERHOOD70 – Green Series Air Compressors, and VMAC Multifunction Power Systems, which include standby mode; ASME certified; includes fittings, 200 psi pressure relief valve, tank drain, and 200 psi pressure gauge.

- Max pressure: up to 200 psi.
- Dimensions: 30 in (76.2 cm) L × 10 in (25.4 cm) D.
- Weight: 33 lb (15 kg).

35 Gallon Air Receiver Wing Tank



Part number: A300010

Air receiver tanks are used for lowering compressor duty cycle and removing water from compressed air. Recommended for optimum operation of VMAC Diesel Air Compressors, Hydraulic Air Compressors, UNDERHOOD40, UNDERHOOD70 – Green Series Air Compressors, and VMAC Multifunction Power Systems, which include standby mode; ASME certified; includes fittings, 200 psi pressure relief value, tank drain, and 200 psi pressure gauge.

- Max pressure: up to 200 psi.
- Dimensions: 73 3/4 in (187.3 cm) L × 14 in (35.6 cm) D.
- Weight: 95 lb (43.1 kg).

Notes

Warranty Registration

This form must be fully completed and returned to VMAC at the time the vehicle is put into service. Warranty may be void if this form is not received by VMAC within 3 months of receiving the vehicle, or 200 hours of operation, whichever occurs first.

VMAC's Warranty policy and registration can be viewed online at:
www.vmacair.com/warranty

Product Information

System Identification Number: **V** _ _ _ _ _ _ _ _ _ _ _ _ _
Compressor Serial Number: **P** _ _ _ _ _ _ _ _ _ _ _ _ _

Owner / End User Information

Company Name: _____

City: _____ State / Province: _____

Phone: (____) _____–_____

Email Address: _____

Date vehicle was put into service: _____/_____/_____
Day / Month / Year

Installer Information

Installer Company Name: _____

City: _____ State / Province: _____

Submitted by

Name: _____ Phone: (____) _____–_____

Email Address: _____

Vehicle Information (Optional)

Unit: _____ Year: _____

Make: _____ Model: _____

Vehicle Identification Number: _____

Manufactured by

888-241-2289
877-740-3202
www.vmacair.com
tech@vmacair.com
warranty@vmacair.com
kb.vmacair.com
1333 Kipp Road, Nanaimo, B.C., V9X 1R3 Canada