UNDERHOOD™ 40
AIR COMPRESSORS

UNDERHOOD 40 Truck and Van Series Owner's Manual

www.vmacair.com

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Revision	Revision Details	Revised by	Checked by				Implemented
			Eng.		Tech.	Qual.	
			Mech.	Elec.			
D	ECN: 20-210 Receiver tank requirement	MSP	MRH	N/A	MSP	N/A	6 Nov. 2020
E	ECN: 21-091 Add shut down instructions	MSP	KRM	N/A	MSP	N/A	28 Apr. 2021
F	ECN: 23-095 Update DTC information	MSP	N/A	ASE	MSP	LPH	16 Jun. 2023

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Important Information

The information contained in this manual is based on sound engineering principles, research, and extensive field experience. Information is constantly changing with the addition of new models, assemblies, service techniques and unannounced OEM changes. If a discrepancy is found in this manual, contact VMAC prior to initiating or proceeding with installation, service, repair or operation. Current information may clarify the issue. Any person 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 assure 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 any person to properly adhere to standard safety practices or the procedures set out in this manual. Safety should be the first consideration when operating, or performing any service to the equipment. If there are any questions concerning the procedures in this manual, or more information is required, please contact VMAC before beginning repairs.

Notice

Printed in Canada

General Information

Introduction

This manual provides operating instructions, specifications, adjustment, maintenance and warranty information for VMAC 40 Air Compressor systems. Read this manual prior to servicing or operating the compressor system.
Follow all safety precautions when servicing or operating the VMAC system as moving drive belts, fan blades and other rotating components pose an extreme hazard.

Proper service and repair are important to the safety of the operator and the safe, reliable operation of the equipment. Always use genuine VMAC parts.

The procedures described in this manual are the only approved methods of service and operation.

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 specific installation 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.

Ordering Parts

To order parts, contact a VMAC dealer. The dealer will ask for the VMAC System ID (see page 11), part number, description and quantity. Locate the nearest dealer online at www.vmacair.com/dealer-locator or call 1-877-912-6605.

Additional Support

Additional resources such as installation manuals, illustrated parts lists, the VMAC Knowledge Base, air tool consumption guides, etc. are available at https://www.vmacair.com/support/.

Safety

Safety Messages

This manual contains various warnings, cautions and notices that must be observed to reduce the risk of personal injury during operation or service, and the possibility that improper operation or service 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.

Safety Precautions

As the VMAC compressor system is an industrial grade compressor, it is assumed that the operator has been trained in industry specific safety practices.

Read this information before operating the compressor for the first time. Follow the information and procedures in this manual for operation, maintenance and repair.

Follow all safety precautions for safe operation or service. Moving belts and rotating components are an extreme hazard. Stay clear of all moving parts when the system is operating. Only qualified personnel should perform maintenance and repair on system components and only while the system is properly shut down and depressurized.

Proper service and operation are important to the safety of the operator and the safe, reliable operation of the equipment. Always use genuine VMAC replacement parts.

The procedures described in this manual are effective methods of service and repair. Some procedures may require the use of special tools designed for a specific purpose. Anyone using a replacement part, service procedure or tool must ensure that neither their safety, nor the safe operation of the equipment will be compromised by the replacement part, service procedure or tool selected.

Harmful Vapours

Breathing fuel vapours or engine exhaust can expose you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well ventilated area.
- Do not breathe engine exhaust, internal combustion engines produce carbon monoxide, a poisonous odorless gas which can cause death. Do not start or operate this compressor in an enclosed area.
- If in an enclosed area, vent the exhaust to the outside and ensure there is adequate access to fresh breathable air..

Burn Hazard

- The compressor system gets very hot during operation, contact with the components or the oil can cause serious injury. Allow sufficient time for the system to cool before performing service.
- Never allow any part of your body to contact the engine or compressor components.
- Do not attempt to service the compressor until it has sufficiently cooled.



Personal Safety

- Follow all safe work practices.
- Do not breathe the compressor air. Vaporized oil is a respiratory hazard.
- Service should only be performed by qualified personnel.
- Always use the appropriate personal protective equipment, particularly eye and hearing protection when operating or servicing air powered equipment.
- Do not leave the vehicle unattended.


Fire and Explosion Hazard

- Vaporized oil propelled by high pressure air is a potentially explosive mixture.
- Fire in the compressor can cause an explosion and flame projection. Should this occur, there is potential for serious injury or death.
- Operate the compressor system in a well ventilated area free of flammable vapors, dust, or other combustible materials.
- Never place objects against or near the compressor components.
- Never expose the WHASP Tank or compressor to extreme heat.
- Serious injury or death may result from an air tank explosion.
- Never exceed manufacturer's maximum air pressure rating.
- Do not repair components, only replace with approved parts.
- Do not tamper with or disable factory safety equipment.

Compressor Air and Oil Hazard

- The compressor system is under sufficient pressure that a leak could force the air/oil mixture through the skin directly into the bloodstream. This could cause serious injury or death.
- Ensure the system is completely depressurized before attempting maintenance or repair.
- Do not use compressed air to clean off clothing or skin, compressed air can penetrate the skin causing serious injury or death.
- Do not service the compressor while it is pressurized or operating.
- Components and hoses under pressure could separate suddenly, causing serious injury or death. If equipped, the air receiver tank must be drained before servicing any components in the compressor system.
- Never adjust or attempt to make any repairs to the system while the engine is running.

Moving Parts Hazard

- Before performing service, disconnect the negative battery cable.
- Avoid contact with drive belts and other moving parts while the system is in operation.

General Warnings

- Be attentive for unexplained changes in operation and record any changes.
- Check the compressor oil level and condition before starting the system. Do not add or change oil while the system is running. Use only approved oil.
- The compressor operates anytime the engine is running.
- Keep hoses and wiring away from hot, sharp, or moving components.
- Use only approved hoses and replacement parts.
- Do not modify the equipment.
- Do not operate the air compressor when fatigued or under the influence of alcohol or drugs.
- Know how to operate the compressor, read this manual prior to operation.
- Inspect equipment before every use.
- Never bypass or disable any of the safety equipment.
- Never adjust or attempt to make any repairs to the compressor system while the engine is running or the air system pressurized. Components and hoses under pressure could fail and cause serious injury or death.

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 Diesel 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, 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 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).

System Specifications

Model
- UNDERHOOD 40 Truck/Van Series Air Compressor.

Compressor Type
- Flooded lobe, rotary screw.

Drive System
- Front End Accessory Drive (FEAD).

Control
- Electric on/off 12 V clutch control.

Maximum Air Delivery
- Up to 40 cfm @ 100 psi (dependent upon vehicle installation and engine speed).

Pressure Regulation
- Mechanical pressure switch on the air/oil separation tank signals the compressor clutch to engage/disengage in response to air demand.

Engine Control
- Single speed throttle control (Maximum rpm adjustable by the end user).
- Elevated engine speed in response to air demand.

Safety Features
- 200 psi (1380 kPa) pressure relief valve in the Waste Heat Air Oil Separation Package (WHASP) Tank.
- Thermal monitoring and electronic control.
- Rapid blowdown valve to relieve system pressure on shutdown.

Use only genuine VMAC replacement parts to maintain the system.

Genuine VMAC replacement parts are designed to work with the high pressure and heat generated by the compressor. Substituting genuine VMAC replacement parts may void the warranty and could cause equipment damage, injury, or death.

Lubrication
- VMAC High Performance Compressor Oil.

Filters
- Air filter: Replaceable paper element.
- Oil filter: High pressure spin-on.
- Coalescing filter: High pressure spin-on.

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

Follow the instructions on page 48 of this manual to prevent damage to the system.

Identifying Your System

The System ID will be requested any time that parts are ordered, when calling for technical support or submitting a warranty claim.

The system ID is the preferred method of identifying the system as it serves as a master record of all of the components in the system. The system ID plate is generally found on the radiator cross member, or in some instances, the inner fender or firewall (Figure 1).

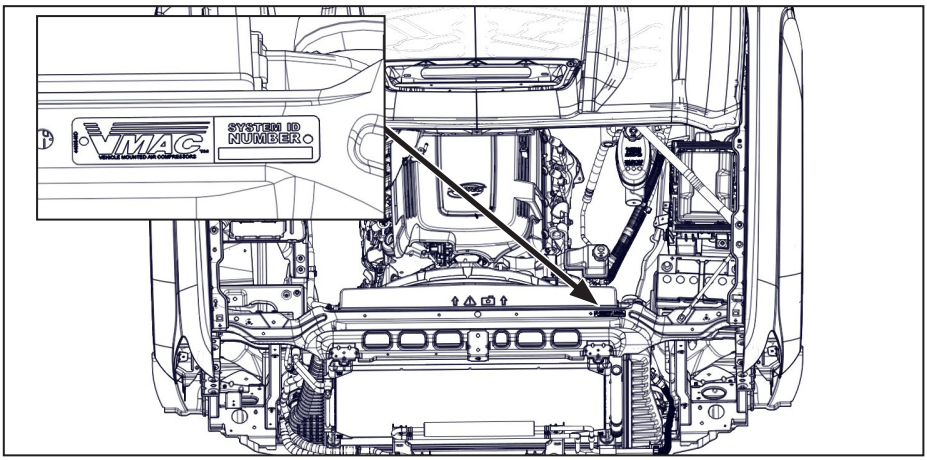


Figure 1 — System ID location

An alternative method of identifying the system is via the compressor serial number which is found on a plate attached to the compressor. This is a less desirable method of identifying the system as it may not link back to the original system if it has been replaced.

System ID breakdown

The system ID provides specific information about the system such as the model, revision, production date and the unique identifier (Figure 2).

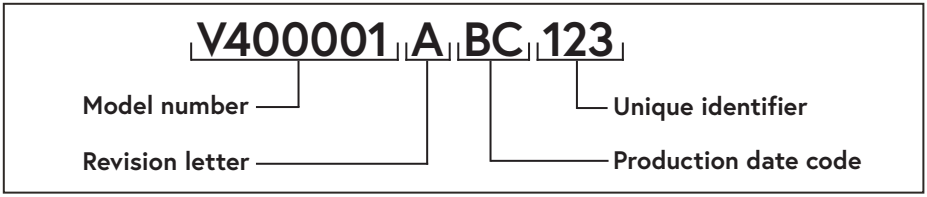


Figure 2 — System ID breakdown

System Components

The UNDERHOOD 40 Air Compressor system consists of the following components:

- Waste Heat Air Separation Package (WHASP) Tank.
- Compressor.
- Oil return, Air/Oil discharge hoses.
- PTFE oil scavenge tube.
- Control module.
- Interface panel.
- Throttle control.

WHASP Tank

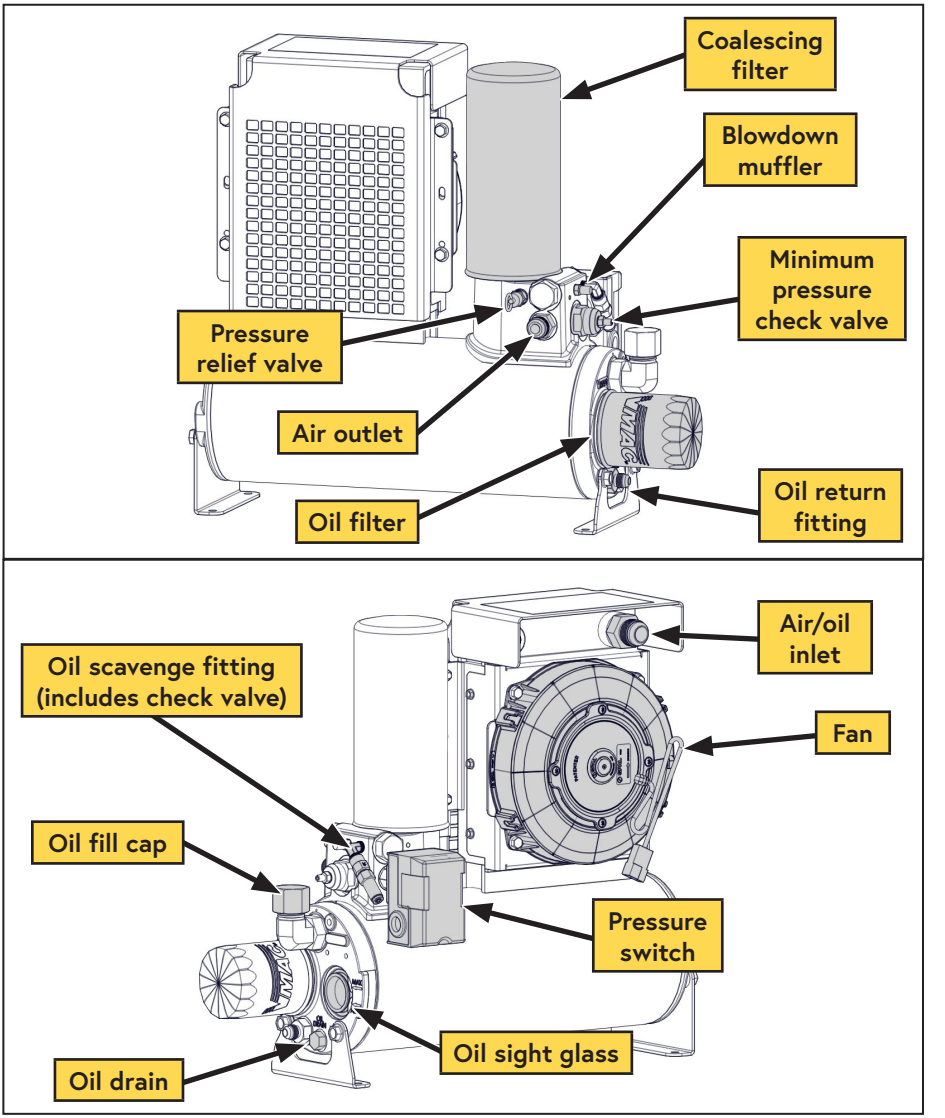


Figure 3 — WHASP Tank

Compressor

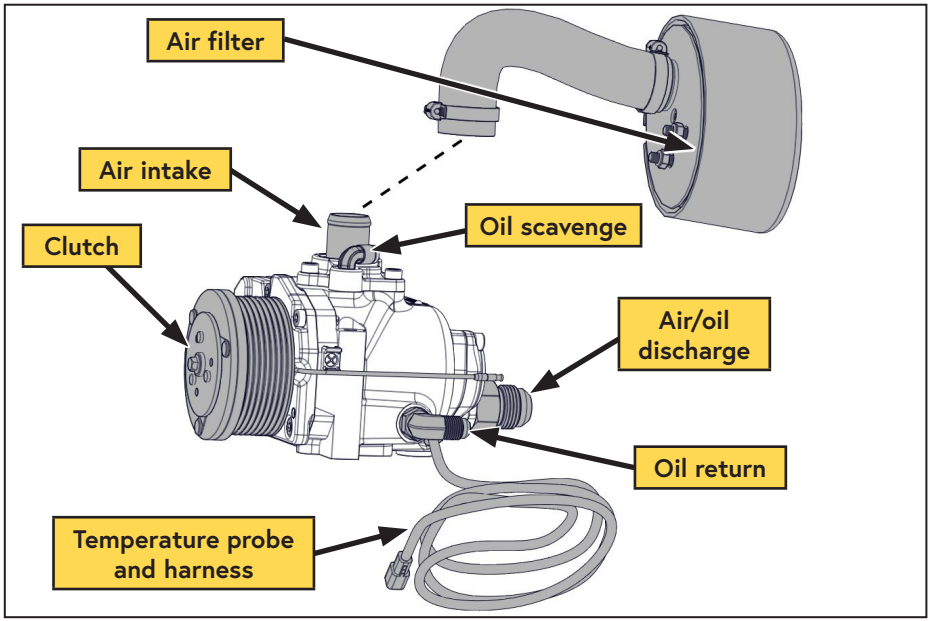


Figure 4 — Compressor
(Top inlet version)

Hoses / Tubes

The hoses used in VMAC compressor systems have an AQP inner liner that is compatible with VMAC compressor oil. The PTFE tube used in VMAC systems is rated for the high temperatures VMAC compressors generate. Use of hoses or tubes other than those supplied or recommended by VMAC may cause compressor damage and may void your warranty. Please contact VMAC for replacement hoses/ tubes or for further information.

- Hoses must have an AQP liner.
- Oil scavenge tubes must be PTFE.

VMAC Compressor oil will degrade rubber lined hoses, use only hoses with an AQP elastomer type liner. Contact VMAC Technical Support at 1-888-241-2289 for further information.

Control Module

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

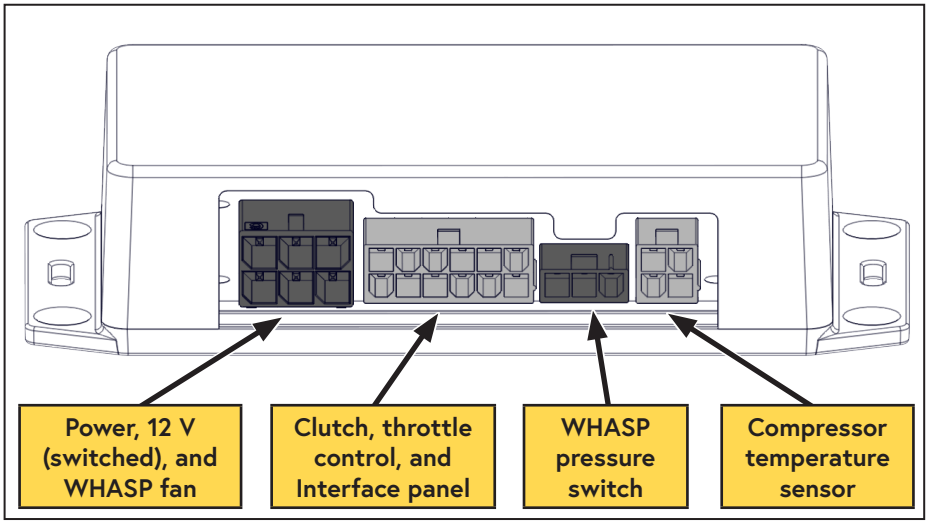


Figure 5 — Control module

Interface Panel

The interface panel serves as the operator's control panel and contains the "ON/OFF" switch, compressor status light, and the compressor hour meter.

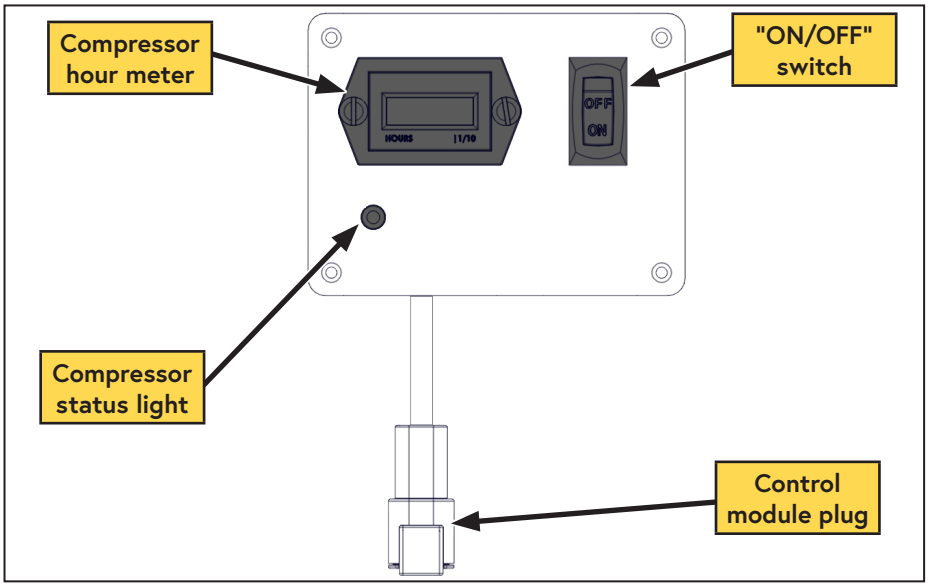


Figure 6 — Interface panel

Throttle Control (Figure 7, Figure 8, Figure 9)

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

The throttle control also allows the operator to configure the vehicle's engine speed (when air is demanded) to their needs (maximum cfm, specific tool requirements, fuel efficiency, or a combination of these factors).

VMAC Digital Throttle Control

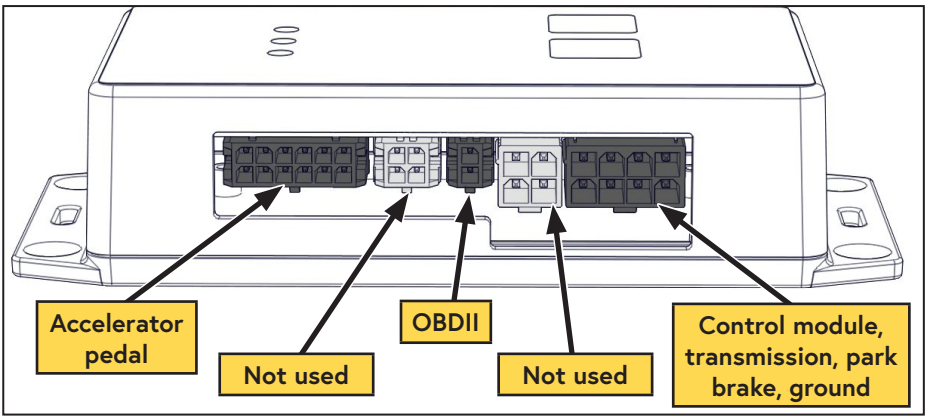


Figure 7 — VMAC digital throttle control

VMAC Analog Throttle Control

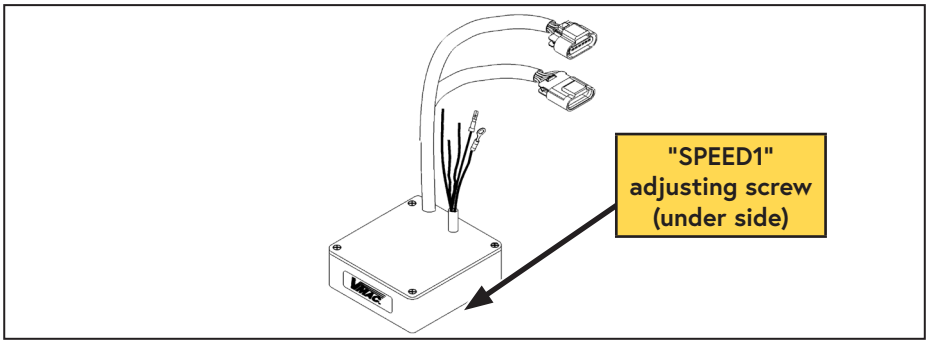


Figure 8 — Analog VMAC throttle

Ford Stationary Elevated Idle Control (SEIC) Compatible Throttle Control

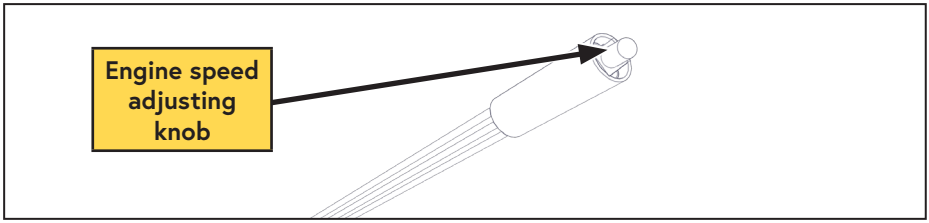


Figure 9 — VMAC throttle control for Ford SIEC systems control

Component Placement Overview

Van Layout

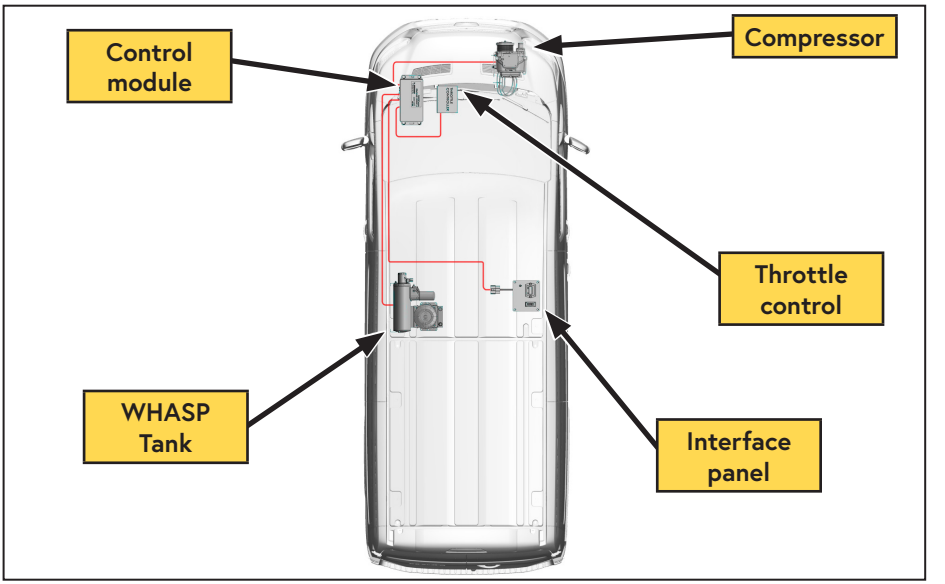


Figure 10 — General component overview
(Actual installation locations may vary)

Pickup layout

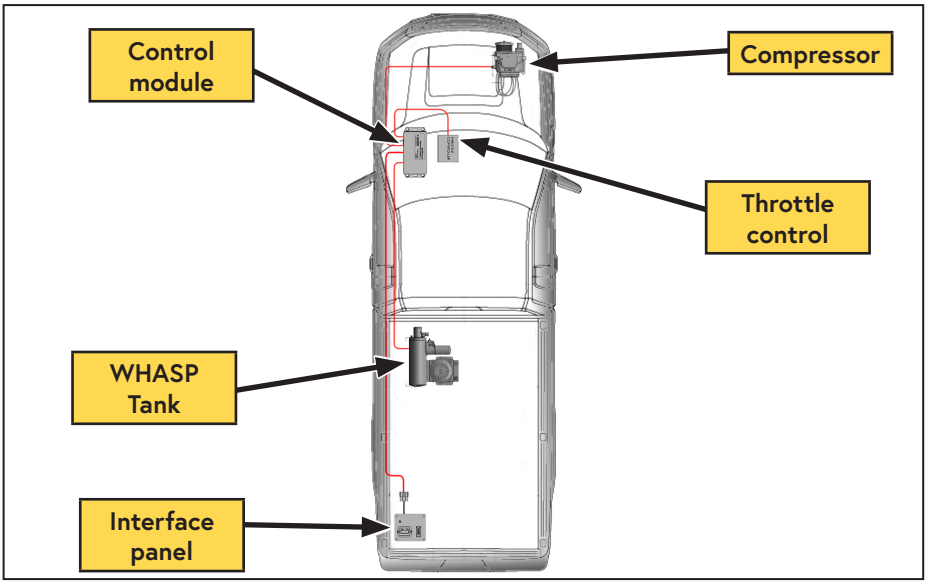


Figure 11 — General component overview
(Actual installation locations may vary)

Operating Principles

Air Compression

At the heart of VMAC's UNDERHOOD 40 Air Compressor systems is a flooded lobe, rotary screw compressor.

Compression occurs when filtered air, at normal atmospheric pressure, enters the chamber where it is trapped between meshing rotor lobes. Cooled oil is injected into the compressor housing during compression to seal the rotor lobes for maximum compression efficiency. The oil also lubricates the rotors and bearings and absorbs some of the heat generated during compression. As the rotors rotate, the meshing lobes compress the volume of air before sending the air/oil mixture down the discharge hose to be separated and cooled by the WHASP Tank.

Oil Separation and Cooling

The system uses a proprietary 2 stage air/oil separator and cooler called a WHASP Tank. The hot air/oil mixture from the compressor enters the cooler on top of the tank where the mixture is cooled and the majority of the oil separates from the air and settles into the tank below the cooler (this is the first separation stage). The cooled oil passes through a high pressure oil filter and is returned to the compressor via the oil return hose.

The cooled air (with any remaining oil) then passes through a coalescing filter which removes the last of the oil from the air stream. Oil from the coalescing filter is returned to the compressor via the 1/4 in PTFE scavenge tube.

The WHASP Tank is manufactured with an integrated minimum pressure check valve (MPCV) to ensure a minimum of 60 psi (415 kPa) is maintained in the tank to ensure proper oil flow while the clutch is engaged and the system is compressing air. Air will not flow out of the WHASP Tank until this pressure is reached. The MPCV is factory set and does not require service or adjustment.

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

Filtration

VMAC rotary screw compressors are designed and machined to exacting standards. Foreign particles entering the compressor can damage components such as rotors, bearings, seals, and the housing resulting in performance and efficiency loss and reduced system life.

The system is equipped with a replaceable paper element air filter as well as high pressure spin-on oil and coalescing filters.

Belt Alignment and Tensioning

Dependent upon the application, the UNDERHOOD 40 Air Compressor system may be driven by either the OEM FEAD belt, or a dedicated FEAD belt. On systems driven by the OEM FEAD belt, the compressor typically mounts in the secondary alternator location.

While the OEM FEAD belt may be replaced with a longer one (if required), the OEM belt tensioning system will remain the same and the OEM belt servicing interval should be followed.

Systems using a dedicated FEAD belt are equipped with an automatic tensioner and do not require manual adjustment.

Dependant upon the specific system, the compressor may be driven by a FEAD belt with up to 8 ribs. To ensure proper belt alignment, verify the belt is centered on the clutch (e.g. a 4 rib FEAD belt will sit on the middle 4 grooves of the compressor clutch with 2 grooves showing on either side of the belt).

Pressure Regulation and Engine Speed Control

When shut down, the VMAC system "blows down" or discharges all air stored in the WHASP Tank. When the system is started, the mechanical pressure switch in the WHASP Tank senses a lack of pressure and sends a signal to the control module to simultaneously engage the compressor clutch and signal the throttle control to increase engine speed. Once the system has built to full system pressure (150 psi/1030 kPa), the pressure switch signals the clutch to disengage and the throttle control to reduce engine speed to base idle. The mechanical pressure switch detects air use and will send a signal to engage the clutch and increase engine speed once a 40 psi drop in pressure is detected.

The VMAC control system offers the following benefits:

- Reduced fuel consumption when not using air.
- Reduced load on the compressor cooling system.
- Reduced noise when not using air.
- Quick response to airflow demands.

The elevated engine speed and "cut-out" (maximum) pressure on the pressure switch are adjustable ("cut-in" pressure moves in conjunction with "cut-out" pressure). Higher engine speeds will yield higher compressor output (cfm) but will generate more noise and consume more fuel.

Safety Features

A 200 psi pressure relief valve is installed in the WHASP Tank to prevent over pressurization. The WHASP Tank is also equipped with an integrated rapid blow down system that automatically discharges pressure from the WHASP Tank upon shutdown.

The UNDERHOOD 40 Air Compressor control logic utilizes built in safety circuits, in addition to OEM safety controls (if present), to prevent increasing engine rpm when certain conditions are not met. This helps to protect both the operator/ occupants and the vehicle should the VMAC system be inadvertently activated at an inappropriate time.

In the event that the air/oil temperature increases above a safe temperature, the temperature sensor in the compressor will signal the control module which will disengage the clutch and signal the throttle control to return the engine speed to base idle. The control module will also display the error code via the compressor status light on the interface panel.

System Operation

Before Running the UNDERHOOD 40 Air Compressor

- Ensure the vehicle is not parked on grades exceeding 20° as this will affect lubrication and air/oil separation (Figure 12).

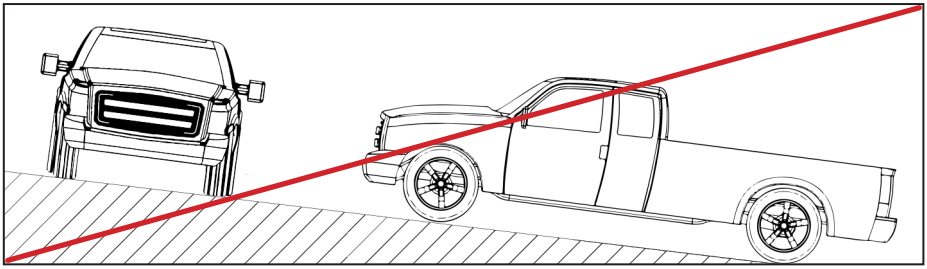


Figure 12 — Do not exceed 20° grade

- Place the vehicle transmission in "PARK" (manual transmission in "NEUTRAL") and fully apply the parking brake.
- Check the compressor drive belt.
- Start the engine and allow the vehicle to reach operating temperature.
- Ensure the oil level in the WHASP Tank is above the "ADD" line (this should be checked while parked on level ground).
- Ensure the vehicle hood is closed.
- Ensure all compressor outlets are closed.

Starting the Compressor / Normal Operation

- Turn on the compressor using the toggle switch on the interface panel.

Once the compressor is turned on, the engine rpm will increase to the value set on the throttle control (engine speed should not increase beyond 3,000 rpm). 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 pressure until it reaches full system pressure (150 psi factory setting). Once system pressure is achieved, the clutch will disengage, the WHASP Tank will blow down, and the engine speed will reduce to base idle.

Shutting Down the Compressor

- Close all open air valves/tools and allow the system to build to full pressure (factory default: 150 psi).
- Allow the engine speed to reduce to base idle for at least 10 seconds.
- Turn the system off using the toggle switch on the interface panel.

The automatic blowdown system only relieves pressure inside the compressor and the hoses connected to the WHASP Tank. Pressurized air stored in any downstream hoses or receiver tanks will not be evacuated.

To prevent FEAD belt slip and compressor clutch damage, do not attempt to restart the compressor before the system has fully blown down.

Digital Throttle Control (DTC) Operation

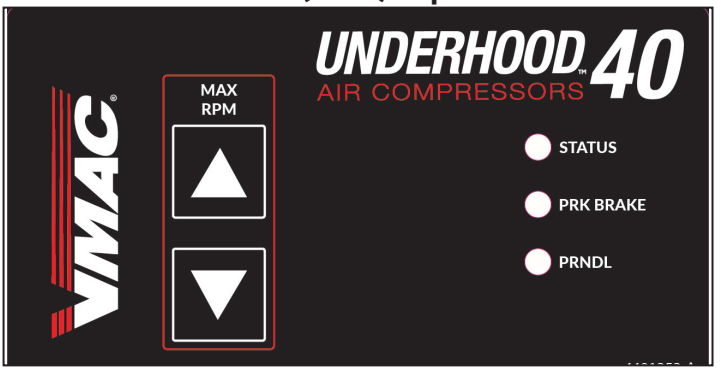


Figure 13 — Throttle control

Indicator LED's

Indicator LED	LED State	Description
STATUS	Green (Solid)	Throttle controller is active and the system is operating normally.
	Green (Single flash)	Indicates calibration update, "MAX RPM" adjustment, or "MIN RPM" adjustment.
	Red (Single flash)	Indicates "MAX RPM", or "MIN RPM" adjustment is at the maximum or minimum setting.
	Red (Flashes 2 to 5 times)	Throttle control is not operating normally (throttle control is deactivated until the issue is resolved (See "DTC Error Codes (Digital Throttle Control Only)" on page 38).
	Off	Indicates the vehicle is not in park or neutral and/ or the park brake is not engaged (throttle control is deactivated).
PRK BRAKE	Green	Park brake is engaged.
	Off	Park brake is not engaged (throttle control is deactivated).
PRNDLE	Green	Gear selector is in "PARK" or "NEUTRAL".
	Off	Vehicle is in gear (throttle control is deactivated).

If the vehicle is placed into gear, or the park brake disengaged, the "STATUS" LED and the "PRNDL" or "PRK BRAKE" LED will turn off and the throttle control will deactivate. This will reduce engine speed to base idle.

In order to activate the system again, re-engage the appropriate lockout and cycle the VMAC "OFF" then "ON" via the control box.

Safety features

The throttle control has built in safety features that will disable the system if an unsafe condition is detected, or either of the lock out parameters is not met (the vehicle must be in "PARK" and the park brake must be engaged).

If an unsafe condition is detected, the "STATUS" LED will turn off, and engine speed will return to idle. Once all unsafe conditions have been removed, the system must be cycled off, then on again to reset it. Once the system powers up, the "STATUS" LED will illuminate, and the system will operate normally.

Cold Environment Operation

Warm-up/pre-heat measures are required prior to using the UNDERHOOD 40 system in temperatures below 0C (32F).

Allow the vehicle to reach operating temperature prior to engaging the compressor system.

Air may be heard to escape from the blowdown muffler for longer than 20 seconds during system pressurization when ambient temperatures are below freezing.

Diesel Particulate Filter (DPF) Warning

When engine driven, or PTO driven equipment is run on vehicles with DPF for extended periods of time, particulates may build up in the filter. All vehicles with a DPF have a warning light on the instrument panel or notification in the message center.

It is impossible to make recommendations regarding run time before the DPF system will require a "regeneration" cycle as this is affected by many variables. It is therefore the responsibility of the operator to monitor this and take the necessary action to maintain the DPF system.

It is suggested that if equipment is run for extended periods of time (over 1 hour) without driving, the vehicle DPF warning system must be checked after 1 hour and every 15 min thereafter. If the DPF warning light/message appears, refer to the vehicle owner's manual for methods of cleaning or regenerating.

Stationary Elevated Idle Control (SEIC) Restart Delay (Ford applications only).

To prevent engine damage, the ECM will deactivate the SEIC system if any of the vehicle's parameters fall outside of normal operating specification.

OEM programming for the SEIC system maintains elevated idle for approximately 2.5 seconds after the high idle request is removed.

If the pressure switch requests air during this time, the clutch will engage as per normal, but the SEIC system will not recognize the high idle request. Should this occur, turn off the compressor system via the switch on the interface panel. Once the WHASP Tank has completed the blowdown cycle, turn the compressor system on and the system should operate normally.

General Maintenance Information

Routine Maintenance

In order to maintain the VMAC warranty, VMAC's maintenance schedule must be followed. Only genuine original VMAC replacement parts can be used to maintain the system.

With proper maintenance, the likelihood of premature failure or component replacement can be drastically reduced.

The most critical aspect of maintenance is proper air filtration and clean oil. If any particles enter the compressor, they can score the rotors and contaminate the roller bearings in the compressor. Any contamination will cause rapid and severe damage to components.

The compressor system must be run a minimum of once every 30 days for at least 30 minutes to provide lubrication and to prevent premature bearing failure in the compressor due to vibration from the vehicle. Regularly running the system will also help to vaporize and exhaust any water that has condensed and accumulated in the WHASP Tank.

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

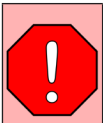
Table 1 — Torque Table

Maintenance and Repair Safety

It is impossible to warn of all the possible hazards that may result from operating, servicing, or repairing this system.

Wear all appropriate Personal Protective Equipment and follow all industry standard safety practices.

Confirm that the system is depressurized and has cooled prior to performing any service work.



Never use flammable solvents to clean any components. If a flammable solvent has been used, rinse the component thoroughly with water and dry it before reinstalling it to prevent the possibility of explosion.

Use only genuine VMAC replacement parts to maintain the system.

Genuine VMAC replacement parts are designed to work with the high pressure and heat generated by the compressor. Substituting genuine VMAC replacement parts may void the warranty and could cause equipment damage, injury, or death.

This information is intended for people with mechanical trade certification who have the tools and equipment to properly and safely perform the service or repair. Do not attempt to service or repair this system without the appropriate mechanical training, knowledge and experience.

Follow all safety precautions and industry standard "best practices".

Safety Check List

- ☐ Open the ball valve or connect an air tool to the system to ensure all the stored air is released.
- ☐ Gently pull up on the ring on the pressure relief valve to confirm the system is depressurized

Do not use the pressure relief valve as a means of depressurizing the compressor system. Doing so will prematurely wear the internal spring or the seat, preventing the valve from maintaining normal system pressure.

Maintenance Schedule

The following maintenance schedule must be observed to maintain both the "Standard" and "Lifetime" VMAC warranties and to assure proper performance and long service life of the system. In the event of a warranty claim, VMAC may request service records.

The hours indicated are those displayed on the interface panel hour meter. Service should be performed at the lesser of the two intervals (whichever occurs first).

To order service kits, see the ordering information on page 3.

In order to maintain the warranty on the UNDERHOOD 40 Air Compressor, use only genuine VMAC replacement parts to service the system.

Check the Illustrated Parts List for replacement part numbers or contact VMAC for more information.

Daily	
• Check compressor oil level. • Check FEAD belt.	• Check system for leaks. • Check pressure relief valve condition.

Every 6 months or 200 hours	
• Change compressor oil. • Change compressor oil filter.	• Change compressor air filter. • Check pressure relief valve condition.

Every 12 months or 400 hours	
• Change compressor oil. • Change compressor oil filter. • Change compressor air filter.	• Change pressure relief valve. • Change coalescing filter. • Change blowdown muffler.

Service Kit Contents

200 Hour / 6 Month Service Kit P/N: A700263		
QTY	**Part #**	**Description**
1	3600037	Air filter
1	9200039	Oil filter
1	A700094	VMAC High performance oil (4 L)

400 Hour / 1 Year Service Kit P/N: A700264		
QTY	**Part #**	**Description**
1	3600037	Air filter
1	9200039	Oil filter
1	A700094	VMAC High performance oil (4 L)
1	3600079	Spin-on coalescing filter
1	3600054	Valve, safety, 200 psi
1	4500104	Muffler, Sintered Exhaust, 1/8

Regular Inspection Instructions

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 23).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

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.

Inspecting and Adding Compressor Oil

- ☐ Ensure the vehicle is parked on level ground and that the compressor system is depressurized and cool to the touch.
- ☐ Check the oil level in the sight glass and ensure that it is between the "MAX" arrow and the "ADD" arrow.

If the level is below the "ADD" mark, perform the following steps:

- ☐ Remove the fill cap on the tank (above the sight glass).
- ☐ Using a funnel, pour oil into the fill fitting until the oil level in the sight glass reaches the "MAX" arrow.
- ☐ Replace the fill cap and tighten securely.

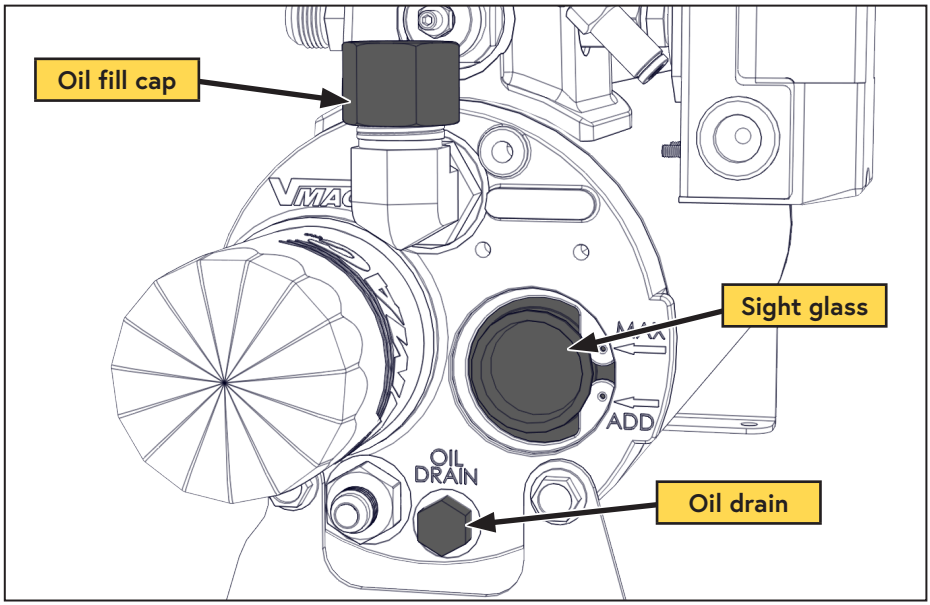


Figure 14 — Inspecting the oil

Inspecting and Replacing the Blowdown Muffler

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 23).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

The Blowdown Muffler (or remote blowdown muffler) is a regular service item and must be replaced every 400 hours or 1 year, whichever interval occurs first.

Visually inspect the blowdown muffler for evidence of corrosion or loss of functionality. Ensure the muffler allows the system to depressurize. To test the blowdown system and muffler:

- ☐ Turn the system on and allow it reach full system pressure (factory setting 150 psi).
- ☐ Turn the switch on the interface panel to "OFF".
- ☐ Listen for the pressurized air to blowdown through the muffler on the WHASP Tank. Blowdown should be completed in approximately 20 seconds.
- ☐ If the muffler is showing signs of blockage, contact a local VMAC dealer for a replacement.

A replacement blowdown muffler is included with the VMAC 400 hour service kit.

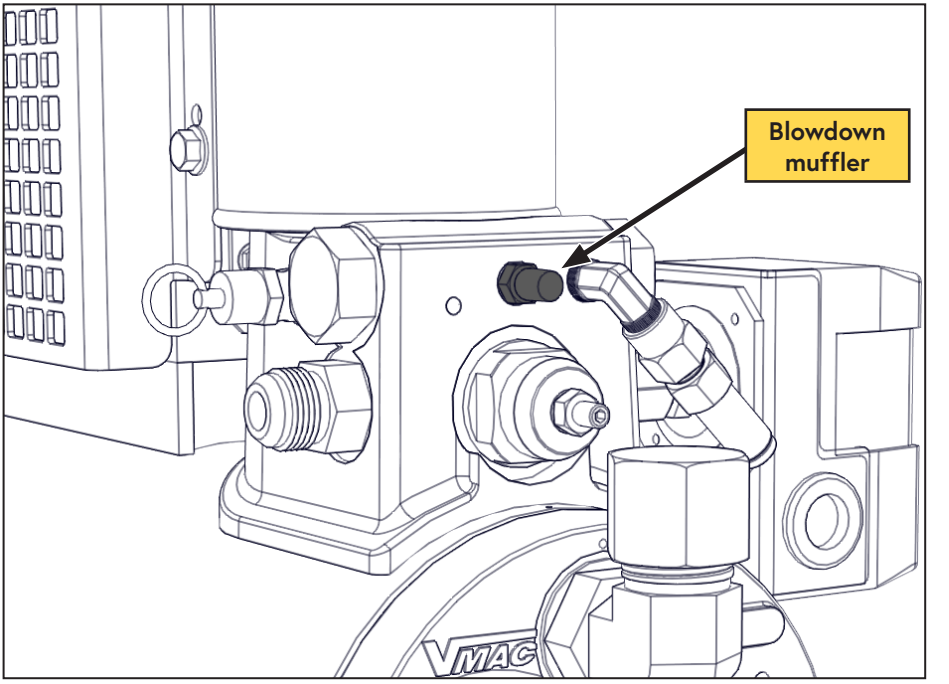


Figure 15 — Blowdown muffler

Inspecting and Replacing the Pressure Relief Valve

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 23).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Do not use the pressure relief valve as a means of releasing pressure from the system. Doing so will prematurely wear the internal spring or the seat, preventing the valve from maintaining normal system pressure.

The Pressure Relief Valve is a regular service item, and must be replaced every 400 hours or 1 year, whichever interval occurs first.

Inspect the pressure relief valve for any signs of corrosion and ensure the vents are clear of obstruction.

- ☐ Visually inspect the valve and ensure it is not corroded and that the vent holes are not plugged.
- ☐ Turn the system on and allow it reach full system pressure (factory setting 150 psi).
- ☐ Ensure that air does not leak out of the valve. Air leaking from the pressure relief valve when system pressure is at or below 150 psi indicates that the spring or seat in the valve is worn and the valve must be replaced.
- ☐ If the pressure relief valve is showing loss of functionality, contact a local VMAC dealer for a replacement.

A replacement pressure relief valve is included with the VMAC 400 hour service kit.

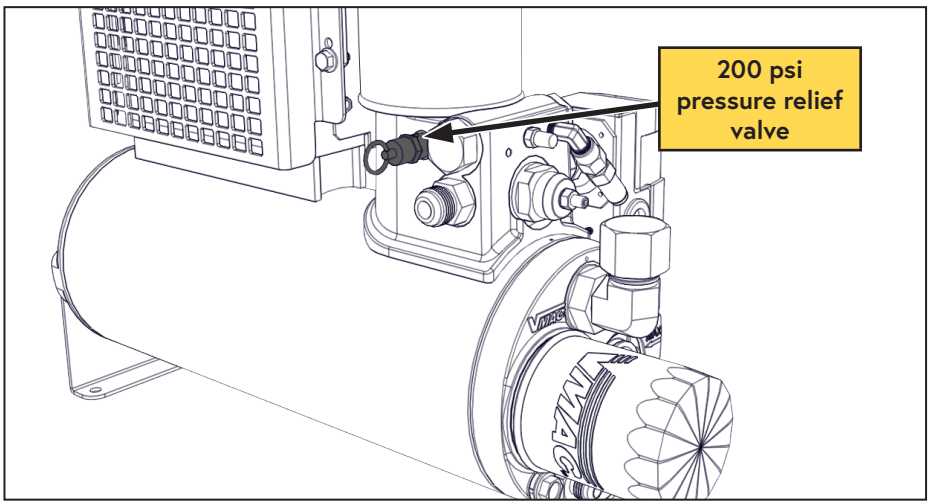


Figure 16 — Pressure relief valve

Inspecting the Drive Belt

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 23). Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Check the drive belt for evidence of glazing, cracks, missing or damaged ribs or damage to the belt edges and surface. If the drive belt is damaged, install a new drive belt.

Inspect the pulley(s), idler(s), and tensioner for damage. If any of the components show cracks, chipping, impact damage or any other indications of physical damage, replace the component.

If the damage indicates possible misalignment, check the pulley/idler/tensioner alignment. If the pulleys are not properly aligned, check all fasteners to ensure that they are properly torqued and that there are no loose or worn components.

For instructions on replacing the drive belt, refer to the specific VMAC installation manual for the system in question.

See the system specific Illustrated Parts List (IPL) for VMAC supplied part numbers.

VMAC Installation Manuals

https://www.vmacair.com/support/manuals/

VMAC IPLs

https://www.vmacair.com/support/ipl/

Replacing the Air Filter

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 23).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

To avoid any possibility of contamination, ensure the air inlet is covered with masking tape or a clean cloth whenever the air filter cover is removed.

Do not attempt to clean the filter element, or use compressed air to perform any tasks around the compressor until the filter and cover are replaced.

- ☐ Clean any loose debris from around the compressor and the air filter cover to prevent any contamination from entering the system.
- ☐ Remove the filter cover retaining nut, filter cover and the filter element. On some installations, it may be necessary to remove the filter assembly from the filter bracket to access the filter cover nut and remove the cover.
- ☐ Immediately cover the air inlet opening with masking tape or a clean cloth to prevent any contamination from entering the system.
- ☐ Clean the inside of the filter cover with a clean, dry cloth.
- ☐ Remove the cloth or masking tape from the air inlet and install the new air filter element.
- ☐ Ensure the filter element fits over the "step" on the filter plate (Figure 17).

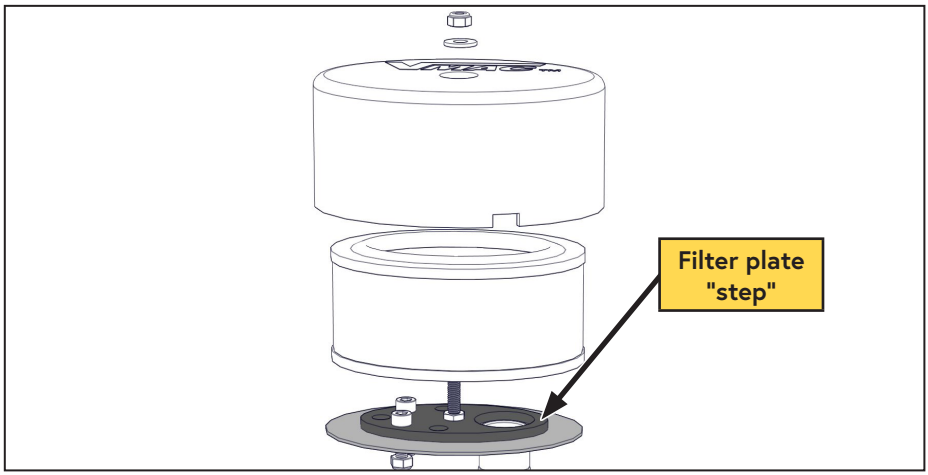


Figure 17 — Install air filter element

- ☐ Replace the air filter cover and secure it with the cover nut. Do not over tighten the nut.
- ☐ If removed for service, reinstall the filter onto the filter bracket.

200 Hour / 6 Month Service

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 23).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Do not use compressed air or perform any other tasks around the air filter and cover until both are replaced. Never clean the filter element with compressed air as this may allow contaminants to enter the compressor system. Always replace the air filter element during this service.

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

- ☐ Inspect the blowdown muffler (page 26).
- ☐ Inspect the pressure relief valve (page 27).
- ☐ Inspect the drive belt (page 28).
- ☐ Replace the air filter (page 29).
- ☐ Clean the area around the WHASP Tank and the oil filter to prevent contamination.
- ☐ Remove the oil drain plug and drain the oil into a container with a capacity of at least 4 L (1 USG) (Figure 18).

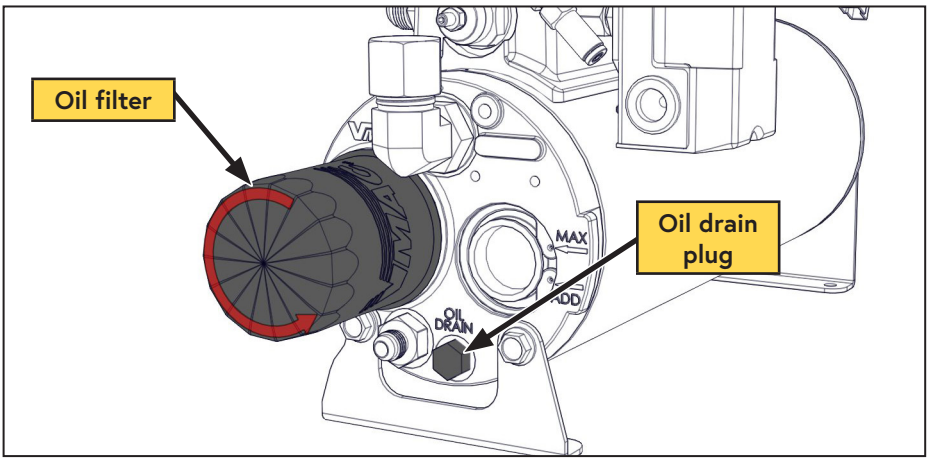


Figure 18 — Compressor oil filter

- ☐ Inspect the Viton® O-ring on the oil drain plug for damage, hardness or defects and replace if necessary.
- ☐ Install and tighten the oil drain plug.
- ☐ Remove the oil filter (Figure 18).

- ☐ Ensure the threaded nipple did not unscrew with the oil filter.
- ☐ *If the nipple came out with the oil filter, carefully remove it from the filter to avoid damaging the threads.
- ☐ *To reinstall the nipple, thoroughly clean the threads and apply Loctite 242 (blue) to the end with the short threads and replace it in the tank (Figure 19).
- ☐ Clean the gasket sealing surface on the front of the tank and inspect it for damage. The surface must be free of old gasket material and smooth to ensure a good seal (Figure 19).

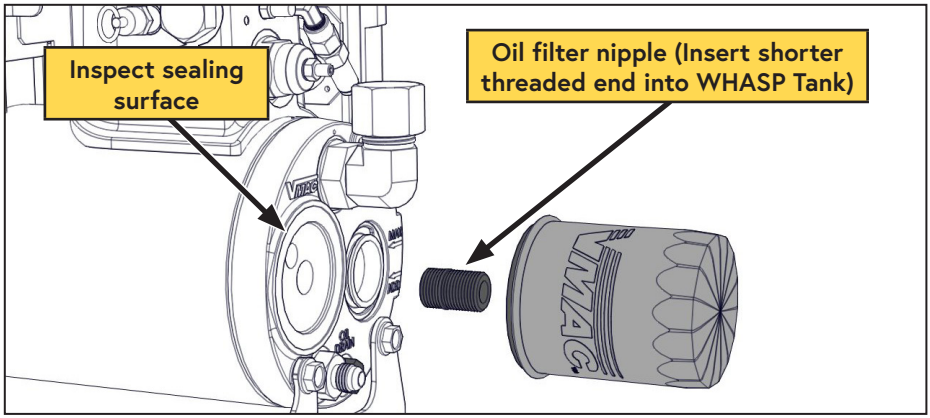


Figure 19 — Compressor oil filter

- ☐ Apply a thin coat of compressor oil to the rubber gasket on the oil filter.
- ☐ Spin the filter onto the threaded nipple until the gasket contacts the sealing surface on the tank, then tighten the filter an additional 3/4 to 1 turn to seat the gasket.
- ☐ Remove the filler cap on the WHASP Tank. Fill the WHASP Tank with VMAC compressor oil until is reaches the "MAX" mark. The air compressor system holds approximately 4 L (1 USG) of oil (Figure 20).

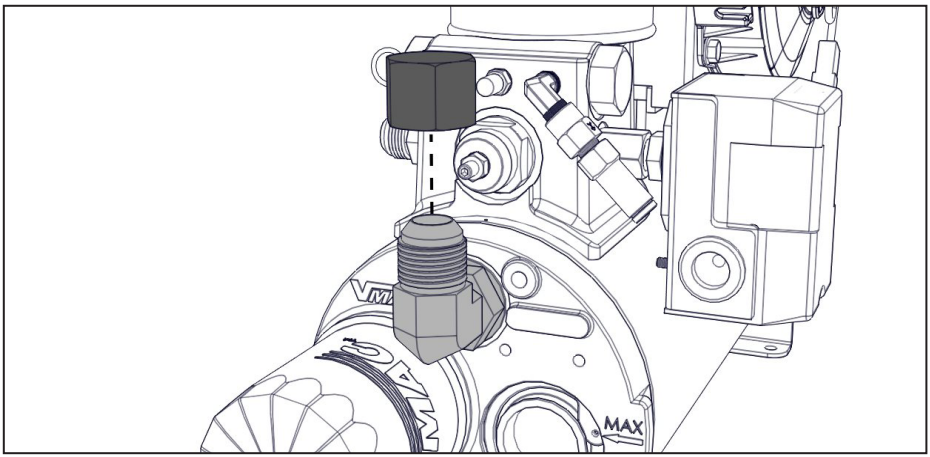


Figure 20 — Compressor oil fill

- ☐ Check the oil level at the sight glass on the front of the WHASP Tank. Continue adding oil until the level is correct.
- ☐ Reinstall the fill cap.
- ☐ Start the system and check for oil leaks.
- ☐ Allow the system to build to pressure (factory setting 150 psi) and for the engine speed to decrease to base idle.
- ☐ Turn the switch on the interface panel to "OFF".
- ☐ Once the system has sat for 5 minutes, check the oil level through the sight glass and add oil as necessary.
- ☐ Verify there are no oil leaks.

400 Hour / 1 year Service

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 23).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Do not use compressed air or perform any other tasks around the air filter and cover until both are replaced. Never clean the filter element with compressed air as this may allow contaminants to enter the compressor system. Always replace the air filter element during this service.

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

- ☐ Apply thread sealant and replace the blowdown muffler (page 26).
- ☐ Apply thread sealant and replace the pressure relief valve (page 27).
- ☐ Inspect the drive belt (page 28).
- ☐ Replace the air filter (page 29).
- ☐ Clean the area around the WHASP Tank and the oil filter to prevent contamination.
- ☐ Remove the oil drain plug and drain the oil into a container with a capacity of at least 4 L (1 USG) (Figure 21).

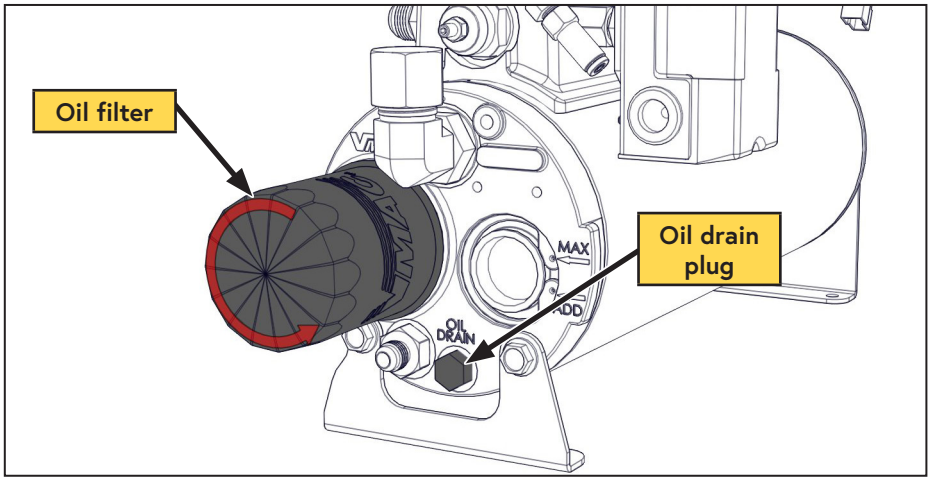


Figure 21 — Compressor oil filter

- ☐ Inspect the Viton O-ring on the oil drain plug for damage, hardness or defects and replace if necessary.
- ☐ Install and tighten the oil drain plug.
- ☐ Remove the oil filter (Figure 21).

- ☐ Ensure the threaded nipple did not unscrew with the oil filter.
- ☐ *If the nipple came out with the oil filter, carefully remove it from the filter to avoid damaging the threads.
- ☐ *To reinstall the nipple, thoroughly clean the threads and apply Loctite 242 (blue) to the end with the short threads and replace it in the tank (Figure 22).
- ☐ Clean the gasket sealing surface on the front of the tank and inspect it for damage. The surface must be free of old gasket material and smooth to ensure a good seal (Figure 22).

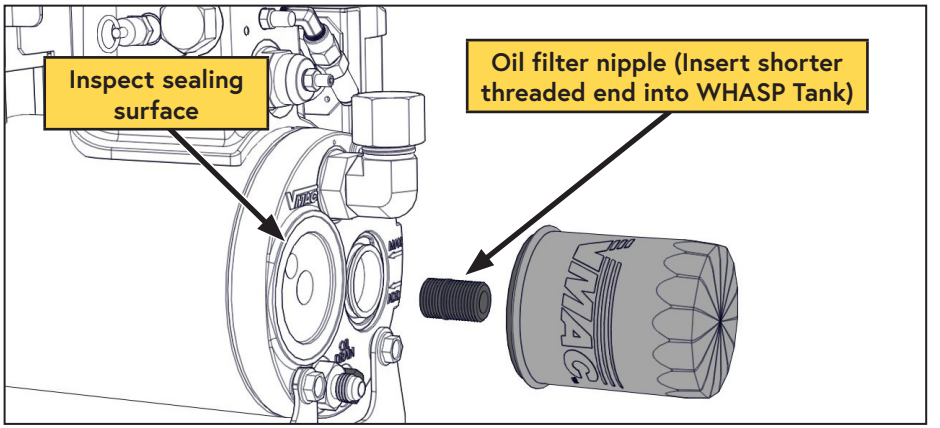


Figure 22 — Compressor oil filter

- ☐ Apply a thin coat of compressor oil to the rubber gasket on the oil filter.
- ☐ Spin the filter onto the threaded nipple until the gasket contacts the sealing surface on the tank, then tighten the filter an additional 3/4 to 1 turn to seat the gasket.
- ☐ Remove the filler cap on the WHASP Tank. Fill the WHASP Tank with VMAC compressor oil until is reaches the "MAX" mark. The air compressor system holds approximately 4 L (1 USG) of oil (Figure 23).

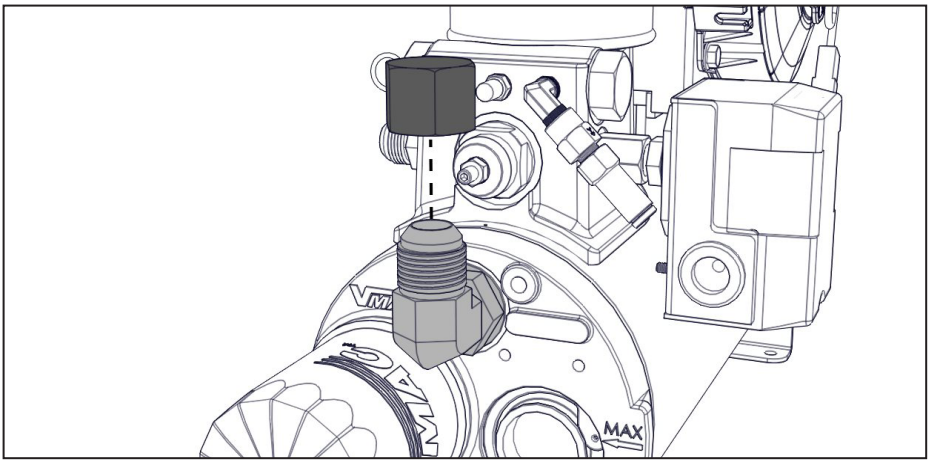


Figure 23 — Compressor oil fill

- ☐ Check the oil level at the sight glass on the front of the WHASP Tank. Continue adding oil until the level is correct.
- ☐ Reinstall the fill cap.
- ☐ Clean the WHASP Tank around the coalescing filter to prevent contamination.
- ☐ Remove the spin-on coalescing filter by turning it counterclockwise (Figure 24).

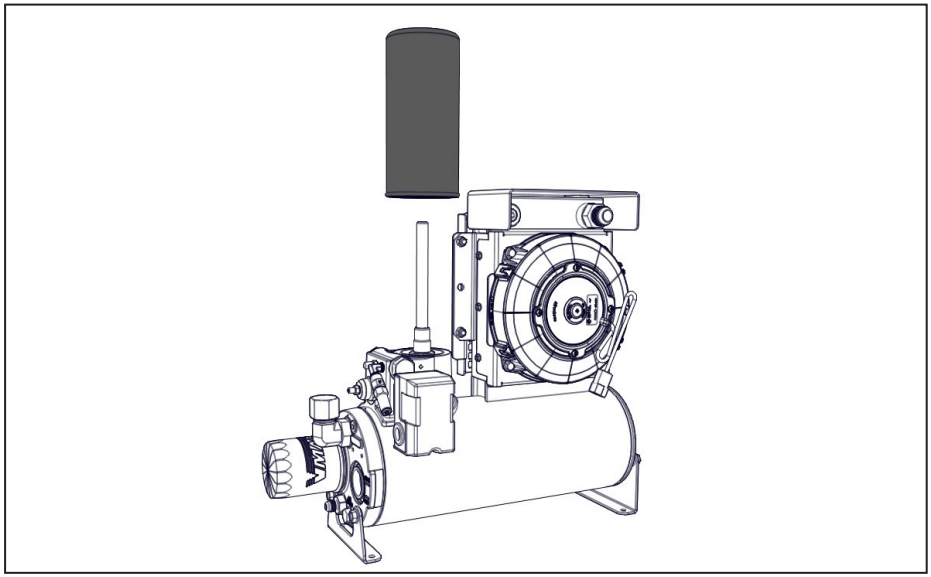


Figure 24 — Coalescing filter

- ☐ Clean the gasket sealing surface and inspect it for damage. The surface must be free of old gasket material and smooth to ensure a good seal (Figure 24).
- ☐ Apply a thin coat of compressor oil to the rubber gasket on the new coalescing filter.
- ☐ Spin the new filter onto the threaded nipple until the gasket contacts the sealing surface on the tank, then tighten the filter an additional 3/4 to 1 turn to seat the gasket.
- ☐ Start the system and check for oil leaks.
- ☐ Allow the system to build to pressure (factory setting 150 psi) and for the engine speed to decrease to base idle.
- ☐ Turn the switch on the interface panel to "OFF".
- ☐ Once the system has sat for 5 minutes, check the oil level through the sight glass and add oil as necessary.
- ☐ Verify there are no oil leaks.

Diagnostics and Trouble Shooting

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 23).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

For the following tests, isolate the WHASP Tank from all downstream (customer supplied) equipment.

If the UNDERHOOD 40 Air Compressor system is still within the warranty period, see the warranty claim process on page 9 prior to commencing with any diagnostics or repairs.

Problem diagnosis should follow sound, recognized practices. Quick and accurate diagnosis of problems should involve the following:

- Follow industry standard safety practices.
- Accurately identify the problem by operating the system (provided it is safe to do so).
- Determining the possible causes for the problem by understanding how the system operates.
- Isolating the potential causes by accurate testing using the correct and recognized procedures.
- Performing proper repairs using the correct procedures and the recommended replacement parts.
- Performing proper post repair testing to ensure that the repairs were effective.
- Electrical testing should be performed according to the processes described in the troubleshooting charts and in conjunction with any documentation provided by VMAC.

Air Compressor Error Codes

When an error is detected, the "Compressor Status" LED on the interface panel will flash red. The compressor status LED will continue to flash red until the unit is powered down.

Turning the UNDERHOOD 40 interface panel switch to "OFF" will reset the error codes. Once the codes are reset, any error codes that are no longer active will be lost.

Reading Error Codes

With the system depressurized, turn the vehicle ignition to "ON" but do not start the engine. Turn the compressor switch to "ON".

If there are no errors, the compressor status LED will be green; if there are errors present, the status light will begin flashing the LED red.

The compressor status LED will blink a sequence of short flashes that correspond to the error, followed by a pause to indicate the end of the sequence.

In a case where there are multiple errors, the codes will be delivered sequentially with a pause in between. Once an error is resolved, the system should be cycled to ensure no other errors are present as subsequent errors may not be logged if the system shut down prior to detecting it.

Error Number	Error	Description	Corrective action
1	Clutch Open.	No current detected flowing to the clutch (this error is only detected on some systems).	• Confirm clutch is connected. • Repair wiring to clutch. • With compressor switch "OFF" and the clutch wire disconnected, check resistance between the bullet connector and the compressor body. Resistance should be between 3 - 5 Ω. If outside of spec., replace the clutch.
2	Clutch Short.	Wiring to the clutch or coil has shorted to ground.	Refer to bullets 2 and 3 above.
5	Compressor Temperature Probe Open.	Compressor temperature probe disconnected or failed.	• Test temperature probe • Repair wiring to probe.
6	Compressor Temperature Probe Short.	Compressor temperature probe wires shorted or failed.	Repair wiring to probe.
8	Compressor Temperature Probe Hot.	Compressor has shut down due to compressor over temperature (145 °C / 293 °F).	Refer to related symptom on next page.

DTC Error Codes (Digital Throttle Control Only)

If an error is encountered, the "STATUS LED" will blink a set number of pulses corresponding to the respective error code. If multiple error codes exist, the throttle controller will cycle through all error codes repeatedly. To clear an error code, turn the system OFF, fix the problem, and then turn the system ON again.

The DTC is located under the dashboard panel near the steering wheel.

Error Number	Error	Description	Possible causes
2	Rpm error.	No rpm detected via the vehicle CAN bus.	• DTC connected to the incorrect vehicle CAN bus wires. • Poor crimp/splice between the DTC harness and the vehicle CAN bus wires. • 3rd party CAN bus module causing interference. • Incorrect DTC version for the vehicle. • Faulty or damaged DTC.
3	Pressure sensor error.	Pressure sensor signal is either too high or too low.	• Repair pressure sensor harness. • Pressure sensor damaged • Poor crimp between the DTC and the pressure sensor harness. • Faulty or damaged DTC.
4	Rpm too high.	The DTC rpm threshold has been exceeded.	• Compressor clutch not engaging. • Attempting to engage the VMAC system when the engine speed is high. • Incorrect DTC for vehicle application. • Faulty or damaged DTC.
5	Voltage too high/ low.	The battery voltage is either too high or too low *(The system will continue to operate with this error).* The normal operating range for the DTC is between 9.8 V and 16 V.	• Vehicle battery is discharged, damaged, or worn. • Alternator is damaged and voltage output is too low or too high • Faulty or damaged DTC.

Diagnostic Chart.

Symptom	Possible Cause	Corrective Action
Frequent Shut Down Due to Over Temperature.	Oil level is too low.	Add oil as necessary. See page 25.
	Restriction in the compressor oil hoses.	• Check for kinked or pinched hoses. • Check hoses for internal rupture.
	Compressor oil filter plugged.	Replace oil filter.
	WHASP Tank has insufficient access to cool air.	See WHASP Tank mounting parameters in installation manual.
	High ambient temperatures.	Reduce duty cycle.
	Temperature probe faulty.	Replace if defective.
	System requires service.	Perform recommended service.

Symptom	Possible Cause	Corrective Action
Compressor does not run.	Known error code displayed.	See error codes on previous page.
	Oil level too low.	Add oil as necessary. See page 25.
	FEAD belt broken.	• Inspect pulley alignment and tensioner for wear. • Install new drive belt.
	Bad ground connection.	Check the system ground.

Symptom	Possible Cause	Corrective Action
Frequent 200 psi relief valve operation.	Relief valve worn or defective.	Replace the relief valve.
	Pressure switch setting too high.	Adjust pressure switch setting to 150 psi. See page 42.
	Pressure switch defective.	Replace the pressure switch.

Symptom	Possible Cause	Corrective Action
Excessive air significantly greater than 150 psi.	WHASP pressure switch setting too high.	Adjust pressure switch setting to 150 psi. See page 42.
	Pressure switch defective.	Replace the pressure switch.

Symptom	Possible Cause	Corrective Action
System pressure higher than tool requires.	No downstream pressure regulator installed.	Install downstream pressure regulator. See accessories on page 50.
	Aftermarket pressure regulator set too high.	Adjust pressure regulator to desired pressure.

Symptom	Possible Cause	Corrective Action
Oil drips from clutch after shut down.	Input shaft leaking.	Contact VMAC dealer to replace input shaft seal.

Symptom	Possible Cause	Corrective Action
Low air pressure.	Air demand too high.	• Reduce air consumption. • Install air receiver tank. See accessories on page 50.
	Engine speed too low.	Adjust throttle control. See page 43, or page 45.
	Pressure switch set too low.	Adjust pressure switch setting to 150 psi. See page 42.

Symptom	Possible Cause	Corrective Action
Oil coming out of the compressor air filter on compressor shut down.	Compressor was shut down while building air.	Stop air demand and allow vehicle engine speed to drop to base idle before shutting the compressor off.
	Intake valve failure.	Check and replace as necessary.

Symptom	Possible Cause	Corrective Action
Excessive oil in the air stream (oil carry over).	Compressor was shut down while building air.	Stop air demand and allow vehicle engine speed to drop to base idle before shutting the compressor off.
	Vehicle parked on grade greater than 20°.	Level the vehicle and run the system. Oil carry over may take up to 20 minutes to dissipate.
	High oil level.	Correct oil level. See page 25.
	Failed coalescing filter.	Replace coalescing filter.

Symptom	Possible Cause	Corrective Action
Objectionable noise level.	Vehicle engine speed set higher than necessary to meet air demand requirements.	Adjust throttle control. See page 43, or page 45.
	Operating with the hood open.	Close the hood.

Symptom	Possible Cause	Corrective Action
Power fuse blows.	Short to ground in the control circuit.	• Locate and correct short. • Replace control system components.
	Incorrectly rated fuse.	Install correct fuse.
	System wired incorrectly.	Repair wiring according to installation instructions.

Symptom	Possible Cause	Corrective Action
Vehicle engine speed does not return to base idle.	Wiring fault.	Repair wiring according to installation instructions.
	Control module fault.	Replace control module.

Symptom	Possible Cause	Corrective Action
FEAD belt squeals when compressor activated.	System not blowing down / system starting under load.	• Check blowdown muffler. • Replace shuttle valve.
	Muffler is clogged.	Clean or replace muffler.
	Improper belt tension.	Replace belt tensioner.
	Belt is glazed.	Replace belt.

Symptom	Possible Cause	Corrective Action
Vehicle engine stalls when compressor is activated.	System not blowing down / system starting under load.	• Check blowdown muffler. • Replace shuttle valve.
	Safety interlocks not engaged.	• Ensure gear selector is in "PARK". • Ensure park brake is engaged.
	Digital Throttle Control issue.	• DTC not calibrated (sometimes occurs after factory reset). Refer to installation manual for calibration instructions. • DTC error. See page 38.
	Compressor issue.	Contact technical support.

Symptom	Possible Cause	Corrective Action
Vehicle engine speed does not increase when compressor is engaged.	Safety interlocks not engaged.	• Ensure gear selector is in "PARK". • Ensure park brake is engaged.
	Digital Throttle Control issue.	• DTC not calibrated (sometimes occurs after factory reset). Refer to installation manual for calibration instructions. • DTC error. See page 38.
	Throttle control set to minimum rpm.	Adjust throttle control. See page 43, or page 45.
	Throttle control not connected properly.	Repair wiring according to diagram.
	Throttle control not functioning.	Replace throttle control.
	SEIC restart delay (Ford only).	Turn off compressor, allow to blowdown, restart compressor.
	Pressure switch detects system is already pressurized.	• Test system blowdown function. See page 26. • Pressure switch faulty. Replace pressure switch.

Adjusting the Pressure Switch

To prevent the possibility of personal injury or damage to system components, the "cut-out" pressure must be set below the lowest rated pressure of any components in the system.

To prevent damaging the compressor, do not attempt to adjust the system pressure above 150 psi.

In applications that require pressures below 150 psi, VMAC recommends leaving the maximum pressure set at 150 psi and installing a regulator downstream to regulate pressure to the desired amount. This will provide optimum performance and response time when air is demanded.

The pressure switch monitors system pressure and signals the control module to disengage the compressor clutch once maximum system pressure has been built (factory setting: 150 psi). The "cut-in" pressure is a fixed value that moves in conjunction with the "cut-out" (maximum) pressure.

1) Ensure the compressor oil level is correct. See page 25.
2) Start the compressor and allow it to reach normal operating temperature.
3) Ensure the system has built to full system pressure and the vehicle engine speed has dropped to base idle.
4) Remove the plastic cover from the pressure switch on the side of the WHASP Tank.
5) The "cut-out" pressure is adjusted by turning the screw at the top of the switch counterclockwise to decrease maximum pressure, or clockwise to increase maximum pressure (Figure 25).

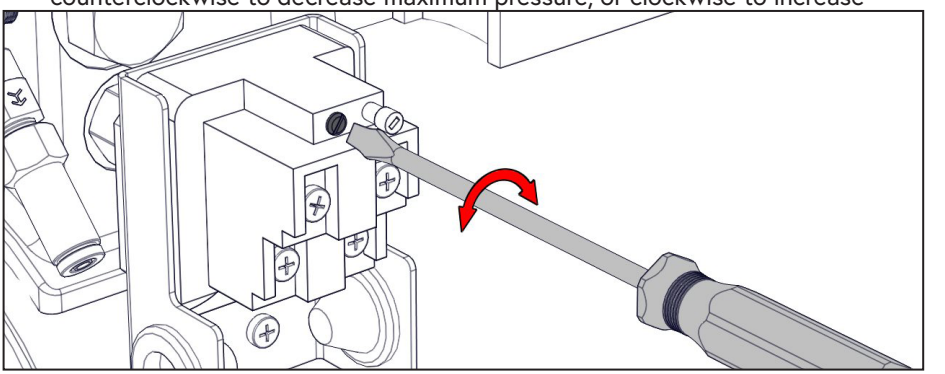


Figure 25 — Pressure switch adjustment

6) Use air until the compressor "cuts-in"; observe the pressure gauge to ensure the compressor "cuts-out" at the desired pressure.
7) Repeat steps 4 and 5 until the desired "cut-out" pressure is obtained.
8) Reinstall the plastic cover.

Performance Testing and System Adjustments (Analog Throttle Control)

Adjusting the Analog Throttle Control

Adjustment is made by turning the "SPEED 1" adjustment screw or knob. Turn the screw counterclockwise to decrease engine speed, or clockwise to increase engine speed.

The throttle control is designed to provide 40 cfm when the throttle adjustment is at its maximum, this also prevents overspeeding the compressor.

Engine speed adjustments may be made so that the amount of air delivered by the system matches the requirements of the tools or equipment that will be used.

- See the system specific installation manual for the rpm value required to achieve 40 cfm.
- If the system is unable to "keep up" with a specific tool, the engine speed may be too low. Try increasing the engine speed gradually, until the desired performance is obtained.
- If the system is cycling on and off rapidly when using a particular tool, the engine speed is likely higher than necessary for that tool. Try reducing the engine speed and observe the performance.

When testing the system or adjusting the VMAC throttle control, ensure the system does not exceed 3,000 engine rpm. Exceeding this speed will cause erratic system performance and in extreme cases may also cause long term damage to the compressor.

If the system is overspeeding, verify all wiring connections and retest. If the system continues to overspeed, contact VMAC Technical Support at 888-241-2289.

The throttle control is located under the dashboard panel near the steering wheel. Ford applications manufactured to fit 2017+ systems and tie onto the SEIC system will have the throttle control located in the passenger side footwell (Figure 26).

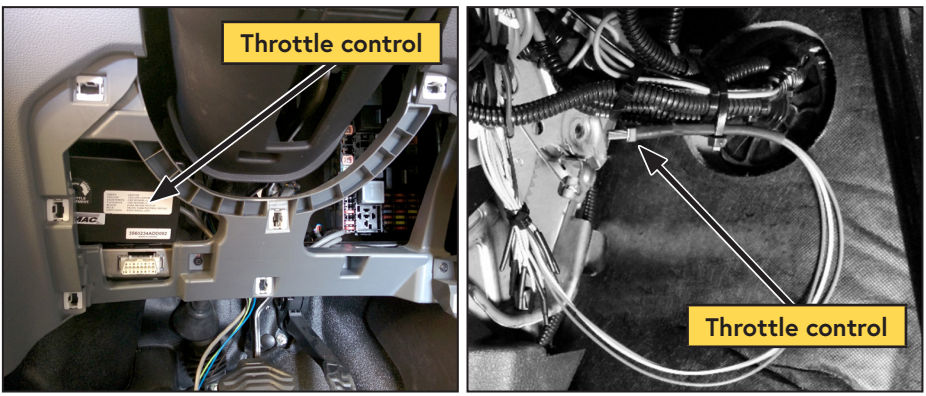


Figure 26 — Throttle control location
(Throttle control location may vary)

Compressor Performance Testing (Analog Throttle)

UNDERHOOD 40 Air Compressor systems have been adjusted at the factory for general operation, ***not maximum cfm***. Any performance testing should be done with the throttle control set for maximum cfm. See the previous page for instruction on adjusting the throttle control.

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 27).

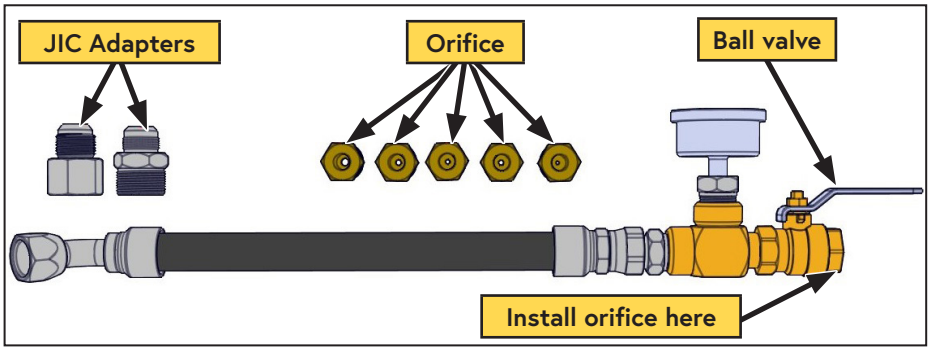


Figure 27 — A700052 VMAC Air Test Tool

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 (see the system specific installation manual for the rpm value required to achieve 40 cfm). The pressure on the gauge should be 90 - 120 psi.
- ☐ Close the air valve slowly to allow the system pressure to rise. When the pressure reaches the pressure switch set-point (factory setting: 150 psi), the system will disengage the compressor clutch and reduce the engine speed to base idle.
- ☐ Once the system pressure is at maximum, slowly open the ball valve on the test tool until the pressure on the gauge begins to drop. Engine speed should increase when the pressure drops approximately 40 psi below the pressure switch set-point (factory setting: 110 psi).

Performance Testing and System Adjustments (Digital Throttle Control)

Adjusting the Digital Throttle Control

In order to adjust the "MAX RPM", the throttle needs to be active and engine rpm elevated; VMAC recommends installing the VMAC Air Test Tool (P/N: A700052) with the 40 cfm (5/32 in) orifice. Turn the system on and open the ball valve, allowing the engine speed to increase.

Adjusting the rpm

The cfm produced by the system is directly related to engine speed; by default, the DTC is programmed to provide 40 cfm when the throttle is engaged (the default rpm setting is VMAC kit specific as it varies dependent upon vehicle manufacture and engine type/size).

The DTC is located under the dashboard panel near the steering wheel.

Maximum VMAC rpm can be adjusted via the "MAX RPM" "▲" or "▼" buttons (in 50 rpm increments). After pressing one of the buttons, the throttle will temporarily jump up to the new maximum rpm. After 4 seconds of inactivity, the throttle will store the new "Max RPM" value and resume normal operation.

If maximum cfm is not required, the operator may wish to reduce the "MAX RPM" to save fuel, as well as reduce the engine noise.

- See the system specific installation manual for the rpm value required to achieve 40 cfm.
- If the system is unable to "keep up" with a specific tool, the engine speed may be too low. Try increasing the engine speed gradually, until the desired performance is obtained.
- If the system is cycling on and off rapidly when using a particular tool, the engine speed is likely higher than necessary for that tool. Try reducing the engine speed and observe the performance.

For more information on the digital throttle, including error codes, see the related article the VMAC Knowledge Base:

https://kb.vmacair.com/help/vmac-digital-throttle-control

Factory Reset

In order to perform a factory reset, the throttle needs to be active and engine rpm elevated; VMAC recommends installing the VMAC Air Test Tool (P/N: A700052) with the 40 cfm (5/32 in) orifice. Turn the system on and open the ball valve, allowing the engine speed to increase.

The throttle control can be reset to factory default values via a button inside the throttle control box.

Using a paper clip (or similar object), push and hold the factory reset button for 5 seconds. All of the LED lights will illuminate for several seconds while the settings revert to their defaults. Once the LED's return to their normal state, the digital throttle may need to be recalibrated. Refer to the specific install manual for calibration instructions. (Figure 28).

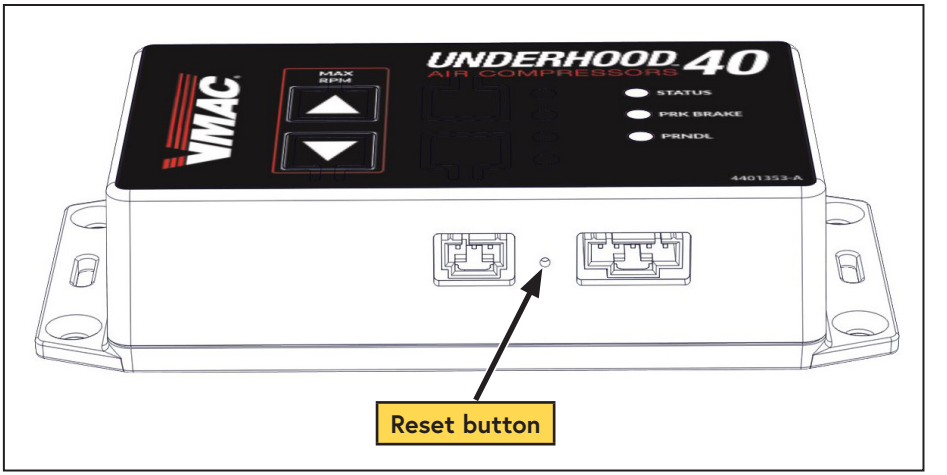


Figure 28 — Reset button

Compressor Performance Testing (Digital Throttle)

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 29).

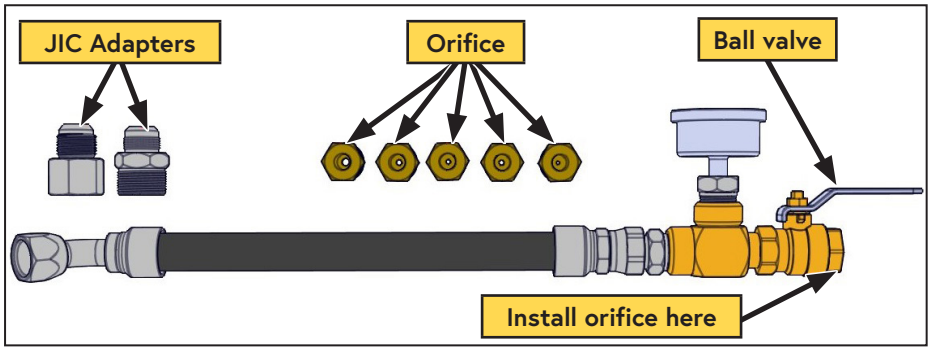


Figure 29 — A700052 VMAC Air Test Tool

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.

Refer to the appropriate VMAC installation manual for specific rpm values.

- ☐ 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 (see the system specific installation manual for the default rpm value).
- ☐ Close the air valve slowly to allow the system pressure to rise. When the pressure reaches the pressure switch set-point of 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 application specific "MAX RPM" (configured at the factory) when the pressure drops approximately 40 psi below the pressure switch set-point.

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.

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 30).

Drain the condensed water from the receiver tank daily.

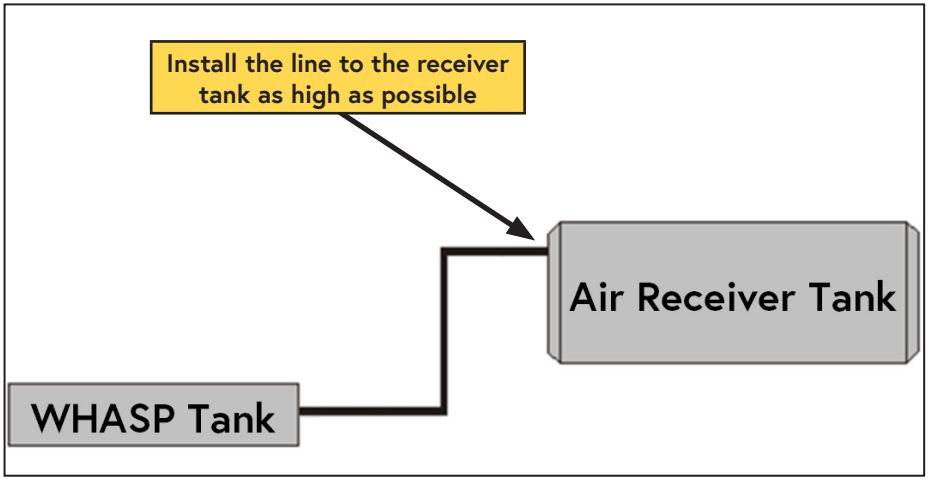


Figure 30 — Air receiver tank

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 50 for a list of products available for purchase through VMAC.

Larger Air Receiver Tank

A larger capacity air receiver tank provides a larger 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 not critical to system performance, a pressure gauge is important 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.

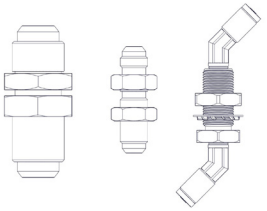
Accessory Products from VMAC

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.

Bulkhead Fittings



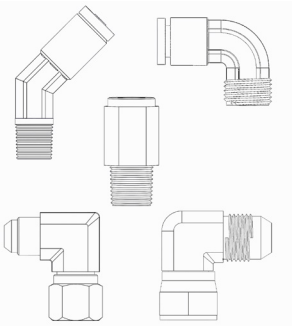
Part number: 3801095

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.

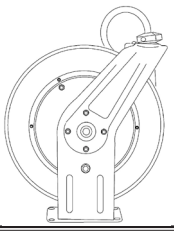
90° 1/4 push-to-connect fitting P/N: 5000020.
1/4 in push-to-connect fitting For PTFE scavenge tube.

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.

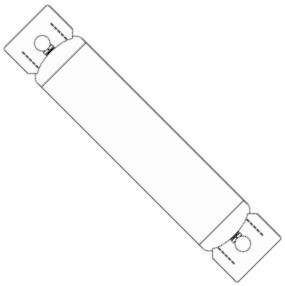
90° 3/4 in hose fitting P/N: 4900043.
3/8 in hose fitting for Compressor Discharge Hose.

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.

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).

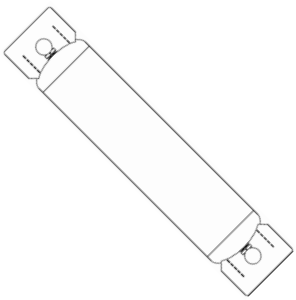
10 Gallon Air Receiver Tank w/ Mounting Feet

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

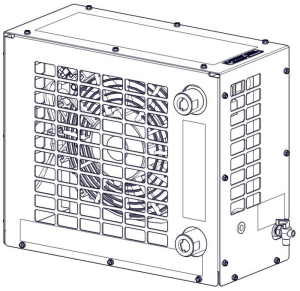


Part number: A300010

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).

UNDERHOOD 70 Air Aftercooler

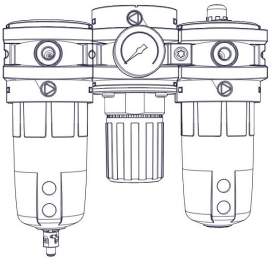


Part number: A800070

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

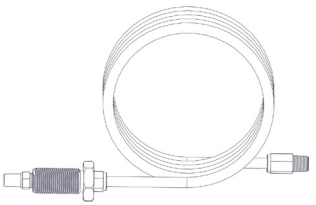


Part number: A700151

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.

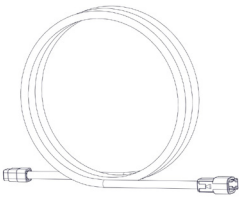
Remote Muffler



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.

Interface Harness Extension



Part number: A700265

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

Notes

Notes

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: _____

Vehicle Information (Optional)

Unit: _____ Year: _____

Make: _____ Model: _____

Vehicle Identification Number: _____

Manufactured by

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