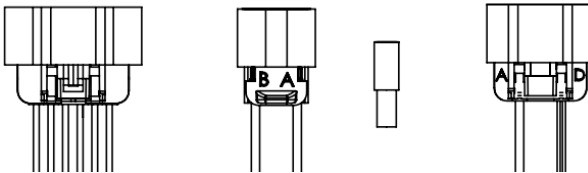
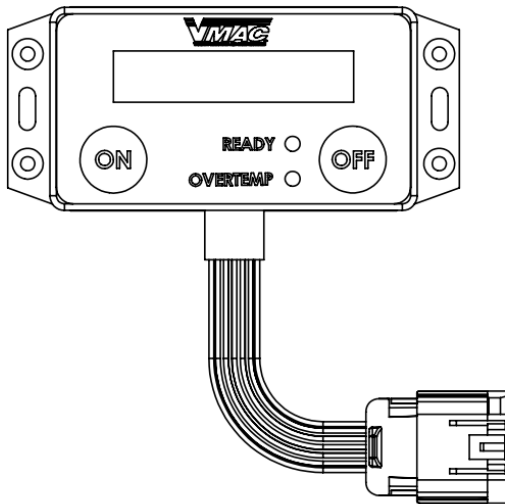


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Installation Manual for VMAC OEM Control Package and Harness – A260104

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			Mech.	Elec.			
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Important Information

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

Follow all safety precautions for mechanical work. Any fabrication for correct fit in equipment must follow industry standard “best practices”.

Notice

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General Information

Introduction

This manual provides installation instructions for the Control Box GT150 Harness Package. Read this manual prior to servicing or operating the compressor system.

Follow all safety precautions when servicing or operating the VMAC system.

Proper service and repair 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 the only approved methods of service and operation.

Ordering Parts

To order parts, contact the VMAC Inside Sales department. To assist in selecting the appropriate parts, please provide the VMAC compressor serial number, part number, description, and quantity. Contact VMAC Inside Sales by calling 1 (887) 912-6605 or by email to sales@vmacair.com.

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 the VMAC OEM department 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 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 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 OEM department prior to beginning repairs.

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.

	<p><i>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.</i></p>
	<p><i>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.</i></p>
	<p><i>This symbol is used to call attention to additional instructions or special emphasis on a specific procedure.</i></p>

Safety Precautions



As it is impossible to warn of every possible hazard that may result from operating this system, common sense and industry standard safety practices must be observed.

Read this information before operating the compressor for the first time. Follow the information and procedures in this manual for operation, maintenance, and repair. Observe the following items to reduce the chance of personal injury or equipment damage.

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

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



Moving Parts Hazard

- Before performing service, disconnect the power source to prevent unexpected equipment start.
- Do not operate the system without guards in place. If the guards are damaged or missing, replace them before operating the equipment.



Electrical Hazard

- Ensure the ground point connection is connected to the equipment body/chassis to prevent the chance of injury.
- Ensure the equipment is grounded appropriately.

General Install and Wiring Guidelines



- *18 AWG is recommended for all interconnections, unless otherwise stated.*
- *Use wiring/cable and loom rated for the ambient temperature range that the harness will be exposed to.*
- *Soldered and sealed connections are recommended.*
- *Use appropriate restraints to protect the control system components and harness from hot and/or moving parts.*
- *Seal the ends of unused wires with heat shrink.*

Wiring Best Practices

- To confirm a good ground, use an ohm meter to measure the resistance between the ground point and the negative battery terminal. Resistance should be less than 1 Ω.
- Route all wires to ensure they will not contact hot, sharp, or moving parts
- 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.
- Whenever possible, solder all electrical connections and protect the joint with heat shrink.
- Apply loom to all wiring:
 - Use high temperature loom in areas where high temperatures may be expected.
 - Use spiral loom in areas with high vibration.
- 18 AWG is recommended for all interconnections, unless otherwise stated.
- Seal the ends of unused wires with heat shrink.

Splicing into OEM Wiring (Figure 1, Figure 2)

VMAC recommends against cutting OEM wires whenever practical. The preferred method is to remove the pin from the connector using an appropriate tool and slide the shrink tube onto the wire. Strip the wire at the desired location and solder the VMAC wire into place. Slide the shrink tube up to the soldered joint and seal it. Finally, replace the pin in the connector, taking special care to ensure the pin is fully inserted and the locking tabs are engaged.

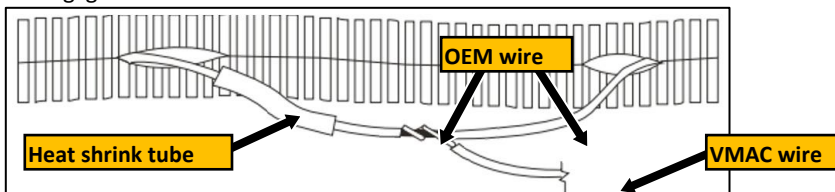


Figure 1 - Solder Spliced Joint

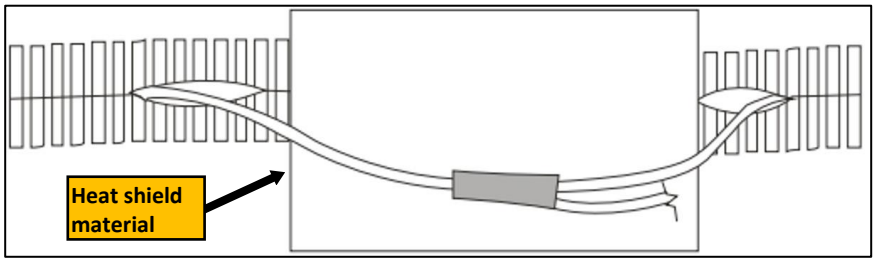


Figure 2 - Seal Soldered Joint

Control Box

The control box serves as the operator’s control panel and contains the “ON/OFF” switches, compressor status lights, and the compressor hour meter. See supplied generic “VR70 & VR150 UNDERHOOD AIR COMPRESSOR OWNERS MANUAL” (1930060) for more information on the control box interface, operation, and troubleshooting. If lost, scan the following QR code for manual pdf.

1930060



SCAN FOR MANUAL



The control box (Figure 3) is not weatherproof; ensure it is mounted in an area free from rain, snow, mud or direct sunlight.



Figure 3 - Control Box

Harness/Wire Installation

The components in this system are connected to the control box via a 12 pin connector (3551061) and individual pigtails. Wires between the interface cable and the component pigtails are not supplied. This allows the freedom to choose and optimize wire lengths between components. Connections can be seen in the figures located in Connection Overview.

Connection Overview

Interface Cable Connections

Interface Connector		Connection	Wire Description
Pinout	Function		
A	Power	Control system power +12v dc w/ 10a breaker	16 AWG, RED TXL
B	Clutch	Compressor clutch +12v output @ 5a max	16 AWG, WHITE TXL
C	Temp Probe	Compressor temperature probe (not polarized)	18 AWG, WHT TXL
J			18 AWG, WHT TXL
D	T/C Enable	Remote 12VDC Auxiliary Power Signal +12v output @ 1a max	18 AWG, RED TXL
E	On Button	System activation <u>momentary</u> switch to ground	18 AWG, YEL TXL
F	Green Led	Remote Green LED Recommended LED = 2V@25ma	18 AWG, GRN TXL
G	Ground	System ground	18 AWG, GRN/YEL TXL
H	Interlock	Safety interlock ground enabled	18 AWG, BLK TXL
K	N/C		
L	Off Button	System de-activation and diagnostics-mode <u>momentary</u> switch to ground	18 AWG, PPL TXL
M	Red Led	Remote Red LED Recommended LED = 2V@25ma	18 AWG, ORG TXL

NOTE: "I" is not used in pinout and "K" is plugged with a seal (not used).

NOTE: "I" NOT USED IN PINOUT

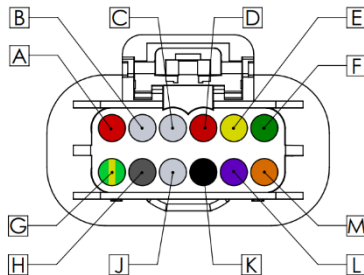


Figure 4: Connector Pinout - Wire End

System Connection Notes

Interface Cable Connections (3551061)

Power Connection A

- Use a minimum of 16AWG.
- Ensure the “POWER” wire is overload protected with a 10 Amp breaker/fuse.

NOTE

It is critical that the breaker/fuse is located as close to the power source as practical. Any wiring between the power source and the breaker/fuse will not be overload protected in the event of any short in that section.

Clutch Connection B

- Clutch coil draws about 4A depending on applied voltage and coil temperature. Minimum 16AWG is recommended.
- This wire outputs 12VDC when the ON button is pressed and there are no faults with the “INTERLOCK” or “TEMP PROBE” circuits.
- Connect the supplied blue bullet connector to the white “CLUTCH” wire in pin B of the interface cable pigtail.
- The clutch itself is grounded through the compressor and main bracket to the engine block. It is important to ensure that there is a good ground connection between clutch ground and control box ground.
- This connection wire must be directly connected to the clutch for the clutch protection logic to function (see error codes 05, 06, 07). Clutch control thru a relay is not possible.

NOTE

If the combined length of these two connections exceeds 10 feet, increase the size to 14AWG to minimize voltage loss at the clutch. Reduced clutch voltage reduces the holding strength of the clutch and can allow the clutch to slip and fail. Excessive wire length or insufficient wire gauge may prematurely trigger error code 06

Temp Probe Connection C/J

- Use a minimum of 18AWG.
- The temperature probe VMAC uses for this control system is an NTC thermistor.
- The thermistor functions as a resistance that varies with temperature.
- The connections are not polarized.
- Connect white wires from the temperature probe pigtail to pins C and J on the interface cable pigtail.

NOTE

It is particularly important that all connections for these two wires are done securely and sealed well to minimize the risk of incorrect readings as this can be very challenging to troubleshoot.

Remote 12VDC Auxiliary Power Signal Connection D

- Use a minimum of 18AWG.
- This is intended to be used to activate a throttle control or other control circuit when the clutch is activated (clutch connection B).
- This signal is activated about .5s before the clutch wire B is activated.
- This is a 12V output and is rated to drive 1.0A maximum.

On/Off Button Connections E/L

- Use a minimum of 18AWG.
- These connections provide a remote duplication of the ON and OFF buttons on the control box.
- They are connected directly in parallel to the momentary push-button pads on the control box.
- Only momentary switches or control circuitry can be used. Do **NOT** use latching switches or leave the signal activated for more than a few seconds.
- These circuits are signal circuits only, switches or relay contacts used to activate them only need to be rated for 100mA minimum (higher is acceptable).
- Do **NOT** connect any other loads to these signals.
- For switch activation, connect one side of a momentary switch to the ON or OFF wire and the other side of the switch to ground.
- Activating the “OFF BUTTON” for more than 5 seconds will put the control box into “DIAGNOSTICS” mode. In this mode service reminders, and error logs can be accessed. Refer to the following section “Digital Control Box Information and Warning Messages” for more details.

Green/Red LED Connections F/M

- Use a minimum of 18AWG.
- These connections provide a remote duplication of the red and green LEDs on the control box.
- These connections are **NOT** for 12VDC LEDs or lamps.
- They are intended to drive a nominal 2V, 25mA LED. An external current limiting resistor is not required.

Ground Connection G

- Use a minimum of 18AWG.
- This connection provides the ground reference for the control box.



Ensure there is a good connection to the system ground to help avoid false diagnostic errors and erratic system operation.

Interlock Connection H

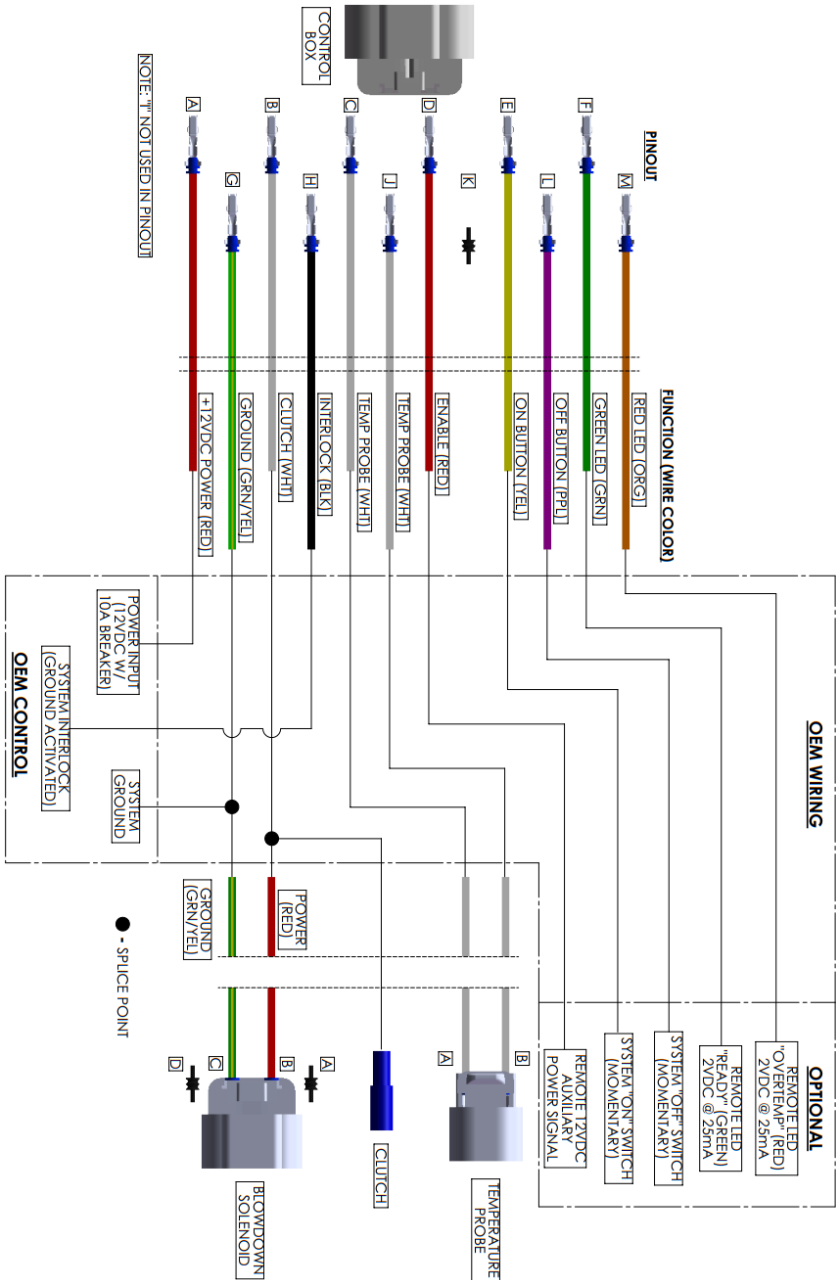
- This connection is intended to be used as an interlock with the equipment the compressor is installed on. For example, a door switch to ensure an access panel is closed during operation.
- It requires a ground signal to enable the compressor system to engage.

- It is the integrator's responsibility to determine if this feature is required for safe operation of the compressor and the overall system.
- If this feature is not required, it must be tied permanently to ground to bypass it.

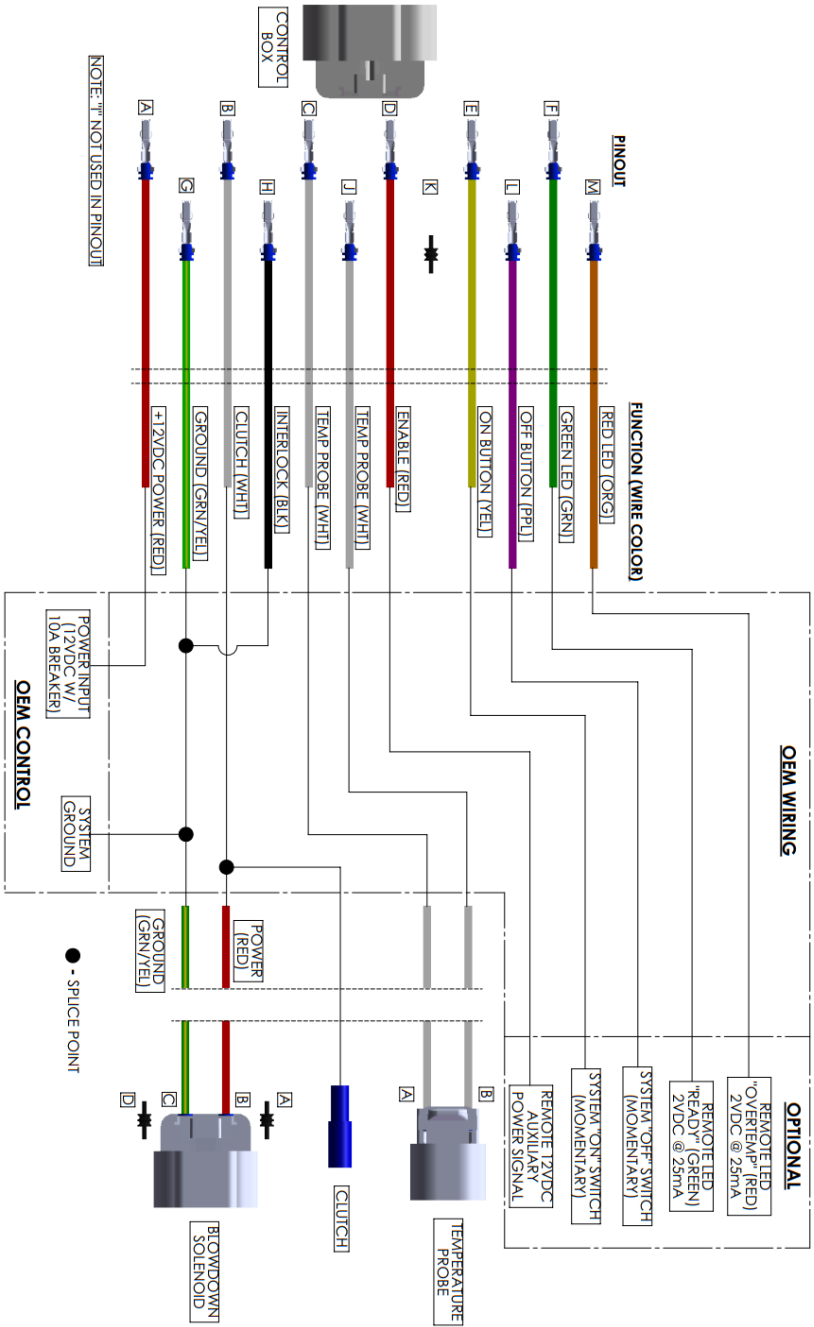
Blowdown Solenoid Connections (3551020)

- This solenoid is “normally-open” and vents the system air when no power is applied.
- It should be powered when the system is running. i.e. the clutch has been activated.
- Connect the red wire from pin B on the blowdown solenoid pigtail to the white “CLUTCH” wire in pin B of the interface cable pigtail by splicing it into the connection at an appropriate location. This can be done anywhere along the wire between the interface cable and the bullet connector on the clutch.
- Connect the green/yellow wire from pin C to system ground by either splicing into the OEM wire or by directly connecting to the system ground where applicable.
- Note the solenoid is not polarized but the wiring pigtail is so as to match DC wiring color convention.

Wiring Diagram – With System Interlock



Wiring Diagram – Without System Interlock



Diagnostics and Trouble Shooting



Read the “Safety Precautions” section prior to performing any work on the system (on page 5).

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



For the following tests, isolate the air-oil separation tank from all downstream (customer supplied) equipment.

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.

Accessing Diagnostic Mode and Retrieving Logged Error Messages

- Turn the system “ON” but do not start the drive system for the compressor such that the control box receives power without running the compressor.
- Press and hold the “OFF” button on the control box until “DIAGNOSTICS” message is displayed.
- Press the “OFF” button to scroll down, press the “ON” button to scroll up.
- When the end is reached, “NO SVC NEEDED” message will be displayed.
- To exit diagnostic mode, press both the “OFF” and “ON” buttons simultaneously.

Digital Control Box Information and Warning Messages

Warning/Information Message	Warning/Information Description	Compressor State
HRS:XXXX:XX	Main screen hour meter	On/Off.
Park Brake	System interlock is not applied or bad signal	Off.
HRS:XXXX500HR SVC	500HR service is needed.	On/Off.
HRS:XXXX1000HR SVC	1000HR service is needed.	On/Off.
COMP TOO COLD	Compressor too cold for operation (<-25C).	On.
TEMP XXXF/XXXC	Displays elevated temperature 130°C (266°F) to 150°C (300°F).	On/Off.
Wait xx Seconds	A 30 second countdown to allow for compressed air blow down.	Off.

E	0	1		2	3	0	1	:	3	5		0	4
Error number			Compressor hours when error was logged							Error code			
(E01: most recent error)			(2,301 hours, 35 minutes)							(04: Battery low)			

Error Code	Display	Fault	Possible Problem(s)
01	OVER TEMP	Compressor is too hot.	<ul style="list-style-type: none"> • Low compressor oil level. • Faulty or crushed cooler hoses. • Exceeded cooling capacity of the compressor cooling system. • OEM changes in cooling • Non-standard application
02	TEMP PROBE SHORT	Compressor temperature probe wires shorted or failed.	<ul style="list-style-type: none"> • Faulty temperature probe. • Crushed temperature probe wires • Pinched or bare wires that are grounded
03	TEMP PROBE OPEN	Compressor temperature probe disconnected or failed.	<ul style="list-style-type: none"> • Disconnected temperature probe. • Faulty temperature probe. • Broken temperature probe wires.
04	BATTERY LOW	Equipment power supply voltage detected is less than 11V	<ul style="list-style-type: none"> • Faulty power wire connection. • Bad fuse. • Broken or poorly crimped electrical connectors. • Equipment power supply system issues.
05	CLUTCH HIGH	Current draw on the clutch is too high (5 A – 10 A).	<ul style="list-style-type: none"> • Faulty clutch. • Broken or pinched clutch wire.
06	CLUTCH LOW	Current draw on the clutch is too low (below 2 A).	<ul style="list-style-type: none"> • Faulty clutch. • Broken or pinched clutch wire. • Disconnected clutch wire.
07	CLUTCH SHORT	Current draw on the clutch is too high (above 10 A).	<ul style="list-style-type: none"> • Faulty clutch. • Clutch wire shorted to ground or pinched.

Limp Mode

Limp mode was created to provide a way to bypass the temperature sensor in case of a sensor failure. This mode is an emergency mode and should be used with extreme caution.

How to activate

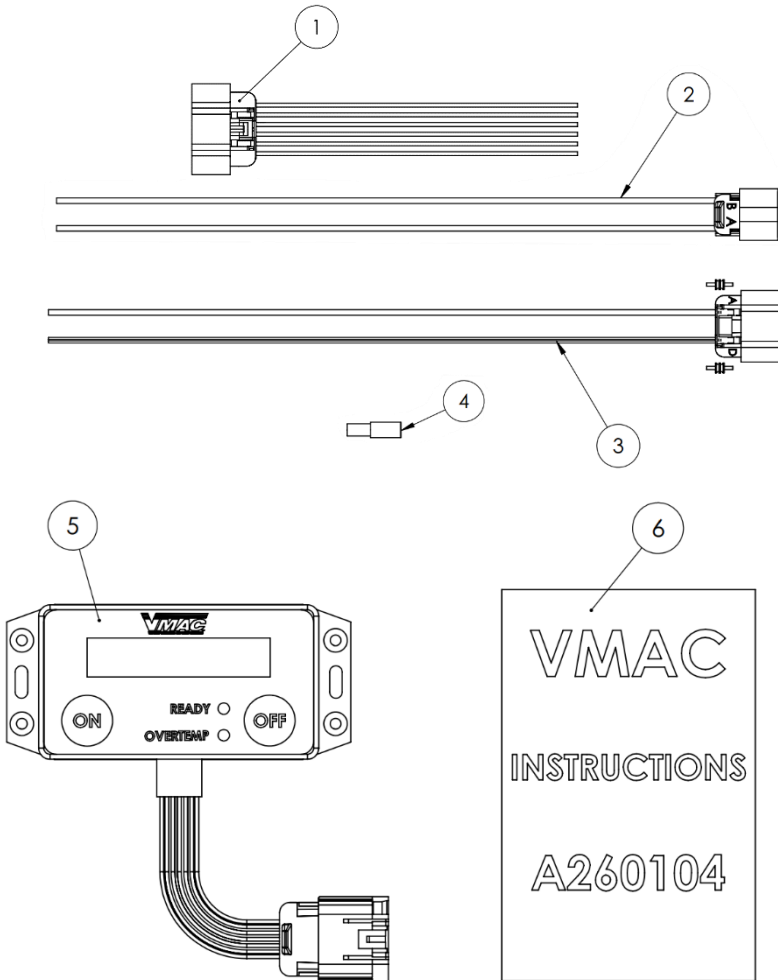
- Press and hold the “OFF” button on the control box until the “DIAGNOSTICS” screen appears (approximately 5 seconds). Release the “OFF” button and the screen will display “E01 xxxx xx xx” message.
- Press the “OFF” button again. The screen message “NO TEMP PROBE?” will appear.
- To disable the temperature probe, press the “ON” button. “TEMP PROBE DIS” message will appear. This indicates that the temperature probe has been disabled.
- Press both the “ON” and “OFF” buttons simultaneously to exit.

While in “Limp Mode”, the main menu screen will display “NO TEMP PROBE?” message with a red LED then “CHECK OIL” message and the green LED and then the hours. The display will toggle between these messages approximately every second. The clutch and throttle will be on for 1 minute then off for 1 minute while in “Limp Mode”. Once the system is shut off via the “OFF” button, the control box will operate normally.

Illustrated Parts List

Control Package & Harness, OEM – A260104

Item #	Part #	Qty	Description
1	3551061	1	INTERFACE CABLE, GENERIC, GT150, 12
2	3551021	1	PIGTAIL, GT150, 2-PIN, FEMALE
3	3551020	1	PIGTAIL, GT150, 4-PIN, FEMALE
4	3500219	1	CONNECTOR, BULLET, FEM.,176. 16-14
5	3550995	1	CONTROL BOX, GENERIC, GT150, 12
6	1901131	1	INSTRUCTIONS, A260104



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