



MV MY20 Economie

DIESEL POWERED

AIR HEATER

INSTRUCTION MANUAL

Ed 1.03

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MV MY20 Economie

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Preface

Thank you for purchasing the 'MV MY20 Economie' air heater. This instruction book describes the structures, working principles, installation and operation of the MV MY20 Economie. For correct use of the heater, please read this instruction book carefully before installation and use. The instruction book should be saved in a convenient place for reference later.

Note

- This instruction book is subject to revision without notice, but the instruction book is in conformity to the purchased product.
- Our effort is to explain all questions you may have. If you have any doubts or find anything incorrect in this manual, please contact us directly.
- Check the heater for any damage when unpacking and contact the dealer immediately if anything is found.
- If any troubles arise during operation, please contact MV Heating or other customer service stations authorized by this company. We shall do our best to provide service to you.

Comply with the operation manual for installation and operation, to ensure prolonged and reliable use.



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Introduction

The main equipment of the MV MY20 Economie air heater (hereinafter referred to as 'the heater') is a small fuel furnace controlled by a single-chip micro-processor. Its furnace body (the heat exchanger) is located in the hood shaped case, which serves as an independent air passage. Cold air is drawn into the air passage by the fan and blown out as hot air. The air is warmed to around 90° above the ambient temperature. The heat can be supplied by the heater to the driver's cab and passenger's compartment independently from the engine, using ducting and joiners to accommodate most applications. The basic schematic diagram is shown in Fig I.

The heater is fully automatically controlled. It features a compact structure, easy installation, low running costs, easy maintenance and is safe and reliable.

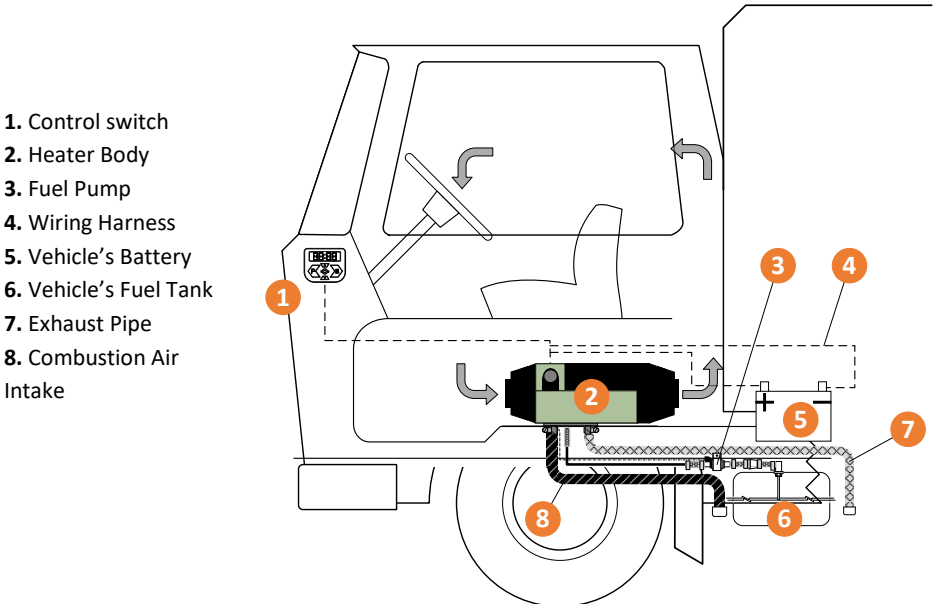


Figure I



Technical Data

Power (Watt)	2000
Heating Medium	Air
Fuel Consumption (l/h)	0.28-0.10
Fuel	Diesel
Weight	Approx. 2.7KG
Air Flow Rate (Without Counterpressure)	105
Power Consumption at start	8-34
rated Voltage	12/24V
Dimensions	210 X 115 X 122
Operating Range	10.5 - 18V
Operating Voltage	10.5-18V (12V 18V-28V (24V)
Ambient Temperature (Heater)	-40°C to 70°C
(Fuel Pump)	-40°C to 50°C
Maximum Air Inlet Temperature	40°C

MV Airo 2 Boost Internal Structure

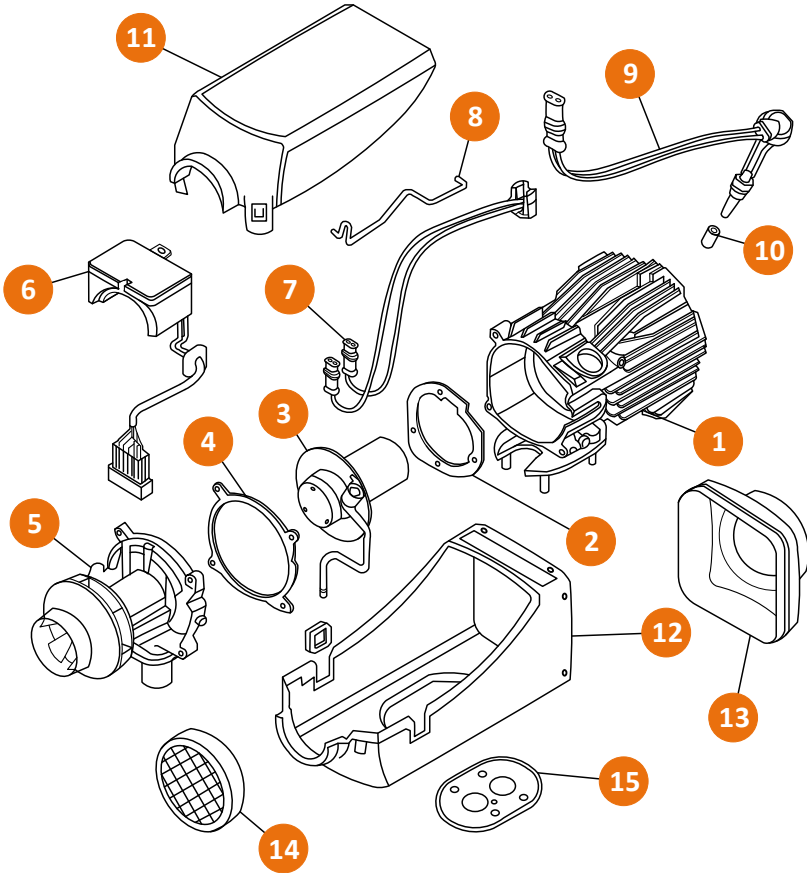


Figure II

- | | | |
|----------------------------|-------------------------|----------------------------|
| 1. Heat exchanger | 2. Burner Gasket | 3. Burner Assembly |
| 4. Air Motor Gasket | 5. Air Motor | 6. ECU |
| 7. Overheat Sensor | 8. Spring Clip | 9. Glow Pin |
| 10. Glow Pin Screen | 11. Top Case | 12. Bottom Case |
| 13. Outlet Cover | 14. Inlet Grill | 15. Mounting Gasket |

Kit Contents

The kit includes everything necessary for installation.

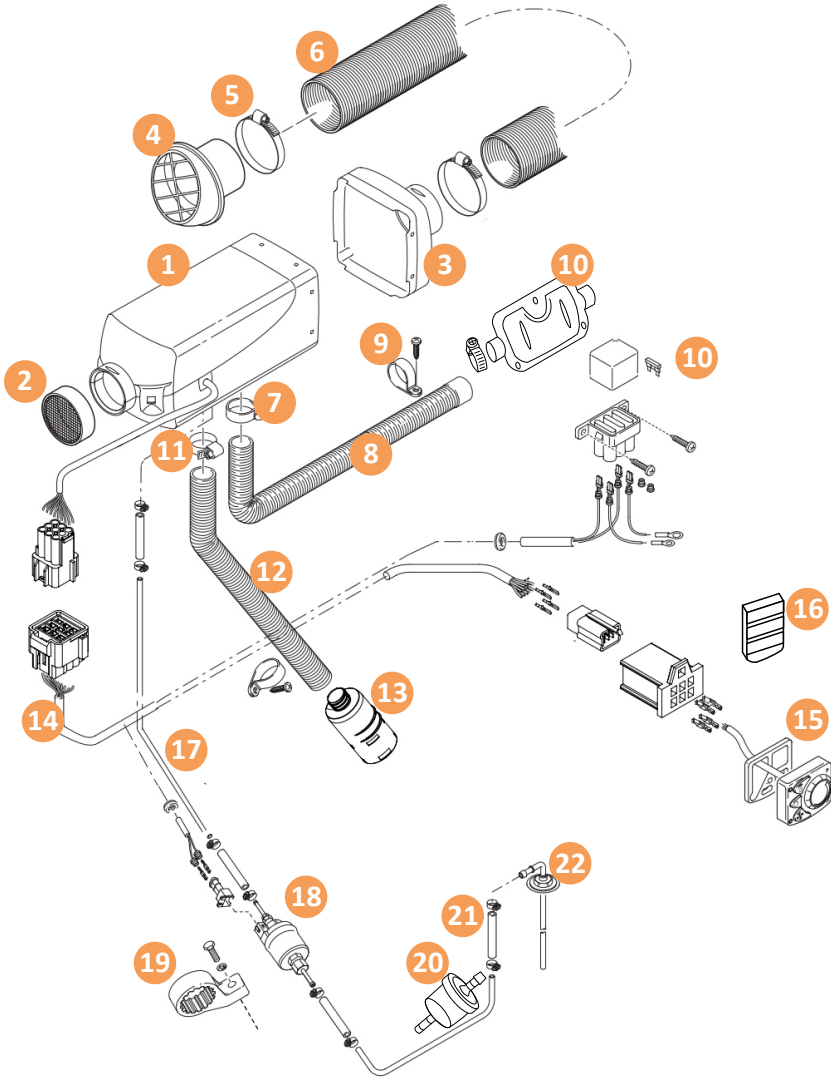


Figure III



- | | |
|---|------------------------------|
| 1. Main heater unit | 2. Inlet Grill |
| 3. Outlet Case | 4. 60mm Vent |
| 5. Hose Clip | 6. 60mm Ducting |
| 7. 24mm Exhaust Clamp | 8. 24mm Exhaust |
| 9. P-Clip | 10. 24mm Exhaust Silencer |
| 11. 24mm Hose Clip | 12. 24mm Combustion Air Hose |
| 13. Combustion Air Filter/Silencer | 14. Main Wiring Harness |
| 15. Main Control Unit | 16. Remote Control Fob |
| 17. Fuel Pipe | 18. Fuel Pump |
| 19. Fuel Pump Mount | 20. Fuel Filter |
| 21. Rubber Fuel Line Joiners & Connectors | 22. Fuel Standpipe |

Figure III shows the basic principle for installation. The position and ways of fixing of various parts may vary from one vehicle/boat to another, but the general principles remain the same.

Attention:

- Do not mount the heater near any flammable sources
- Do not install the heater in closed spaces without ventilation
- Do not place the heater near anything that can cause a blockage
- Do not mount the heater near any water sources and protect it from any splashing or road debris

Installation

Installation of the Main Heater Body

For the ease of servicing, fault finding and air flow it's recommended that the main body is placed in an area with easy access. Figure V shows the minimum distances required.

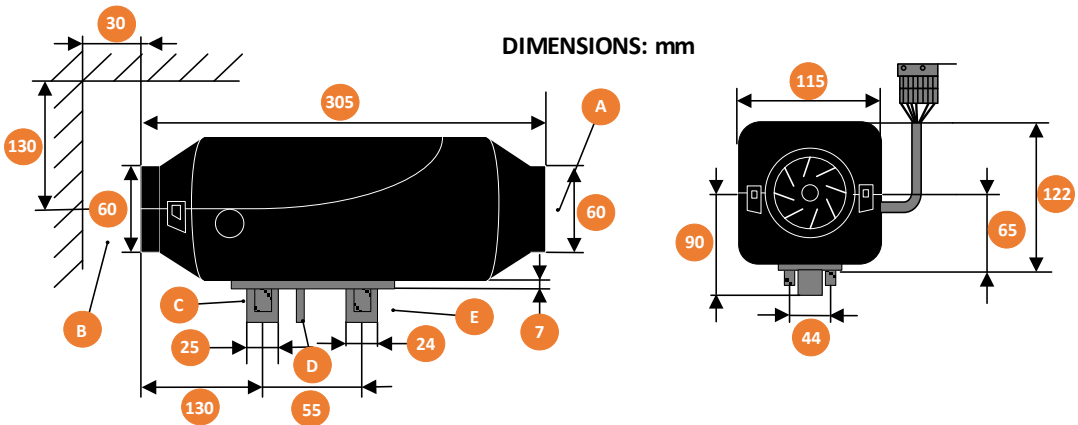


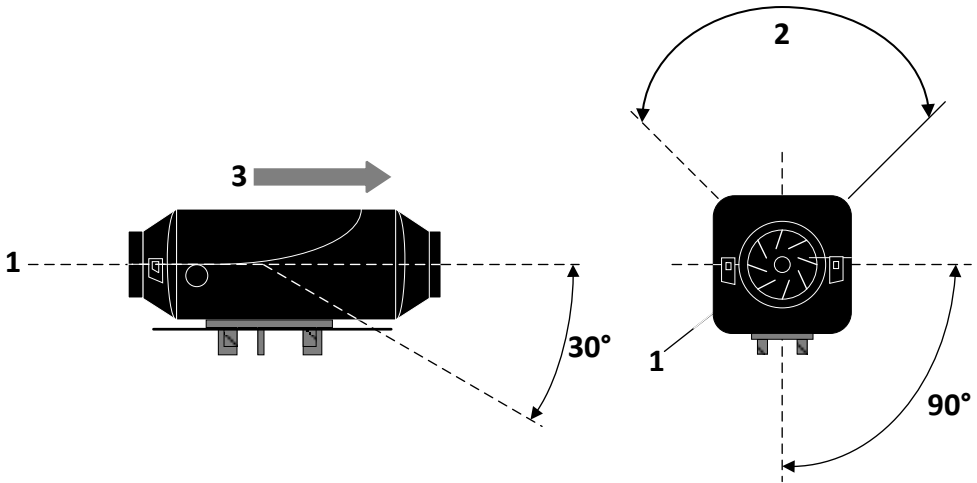
Figure IV

- A. Air heating Outlet
- B. Air Inlet
- C. Combustion air inlet
- D. Fuel inlet
- E. Exhaust outlet

Choose a flat installation surface, any undulations could cause the case to twist and will not ensure an even mount. Make sure there are no foreign bodies between the bottom of the heater and the installation surface itself. This will ensure a good seal between the two.

Installation: Angle

All positions suggested are examples. Other locations are possible so long as they correspond to the proper installation guidelines and requirements.



1. Heater air intake 2. Glow pin position 3. Direction of air flow

Figure V

Figure V shows the ideal installation position of the heater; with exhaust pointing downward. Depending on its location it can be tilted by 30° with the air flow and hot air outlet facing the bottom. It can also be tilted on its longitudinal axis by 90° so long as the glow pin position points upward. During usual operation the heater can deviate by 15° each way with vehicle movement without impaired function of the heater.

Wiring Harness Connector Positions

The main connector coming off the heater can be moved to the other side of the heater if necessary. To do this you must first remove the air inlet grill by twisting it counter clockwise until it is removed. Next, remove the top cover by lifting the two front flaps near the air inlet. You can then lift out the entire innards of the heater (heat exchanger to fan motor and all) removing the cable from the rubber securing bush and rerouting it underneath the fan motor where it can then sit in the cut-out on the opposite side. Ensure the rubber bush is properly inserted and the heat exchanger is back securely in position, then simply replace the lid and grill back in position.

Note: Ensure the bottom cover fits correctly inside the groove of the lid.

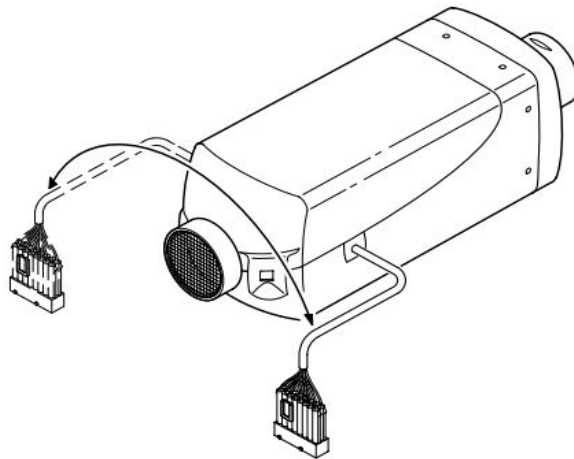
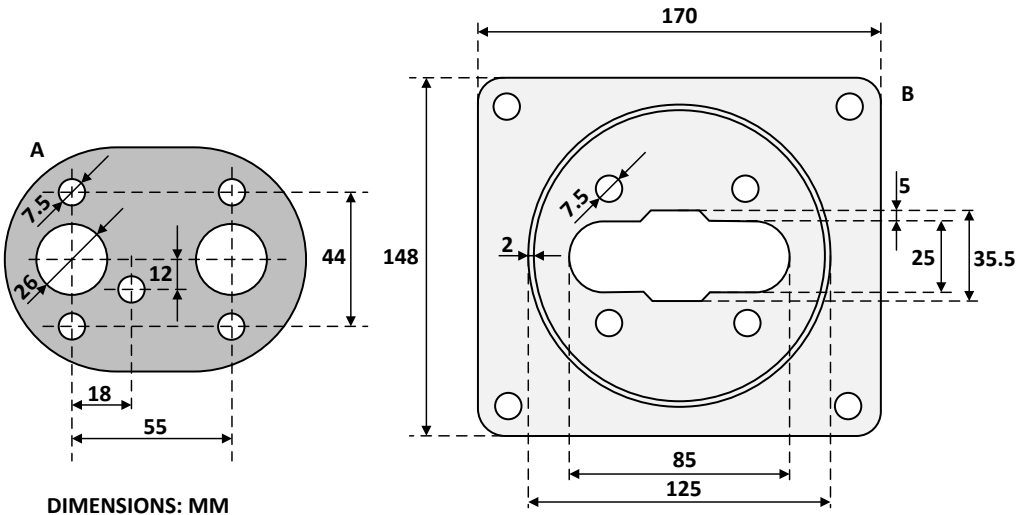


Figure VI

Installation: Mounting

The chosen mounting surface should be flat, and you will need to drill the appropriate size hole for the exhaust, combustion air inlet, fuel inlet and mounting bolts. It is a good idea to mount the heater on the supplied mounting bracket, particularly if the original mounting surface is thinner than 1.5mm.



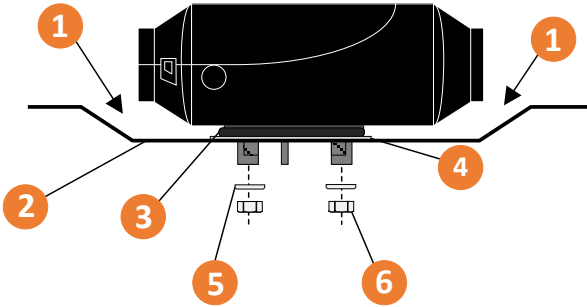
A. Mounting Gasket

B. Mounting Plate

Figure VII

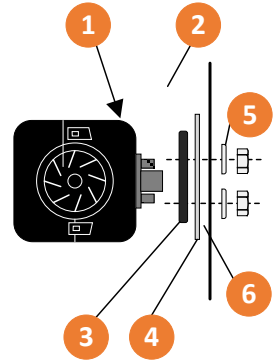
Note: The mounting plate shown in figure VII *may* differ in overall size and the circular flange may not be present, however the heater footprint will remain the same.

Installation: Mounting (Cont'd)



(Above)

Securing the heater to the floor



(Above)

Securing the heater to the wall

Figure VIII

1. Check that the fan wheel spins freely and that there is sufficient clearance between the heater and the vehicle floor
2. Ensure that the mounting surface is flat and smooth
3. The mounting gasket supplied must be fitted
4. The vehicle wall must be flat and smooth
5. Mounting bracket
6. M6 Washer
7. M6 Nut

Figure VIII shows the mounting positions on a vehicle's floor and wall.

Installation: Ducting and Pipework

Using the MV MY20 Economie as an example:

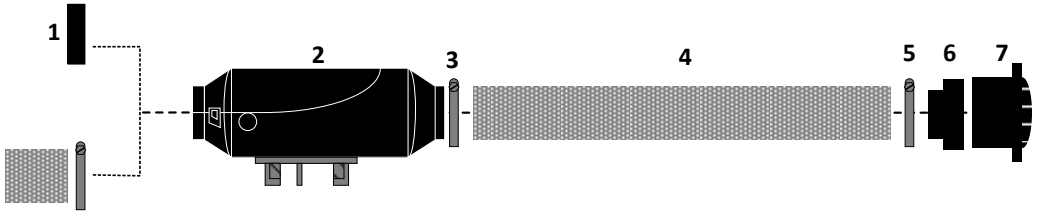


Figure IX

1. Ducting AND/OR Grill
2. Main Heater body
3. 60mm Hose Clip
5. 60mm Hose Clip
7. 80mm Directional Vent

4. 60mm APK Ducting
6. 60mm Reducer

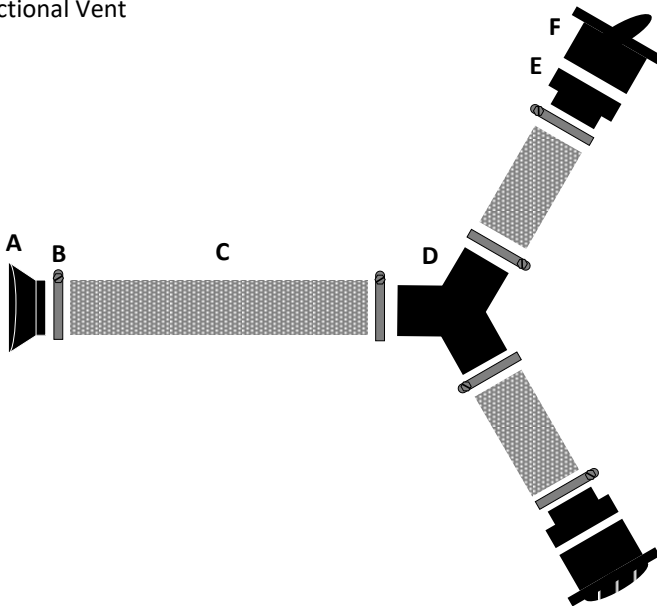


Figure X

- A. Heater's hot air outlet
- C. 60mm APK ducting
- E. 60mm Reducer

- B. 60mm hose clip
- D. 60mm 'Y' branch
- F. 80mm outlet vent



Installation: Ducting (Cont'd)

Ducting Can be installed as shown on the previous page. Extra outlets can be installed to fit your own needs however you should ideally not fit more than the maximum of 3 outlets to the MY20. The MY20 uses 60mm ducting.

Exhaust System

Note: Do not work on the exhaust system unless the heater has been switched off for over an hour and wear safety gloves if necessary. All types of combustion produce high temperatures and toxic fumes and must be installed in accordance with these instructions.

The flexible exhaust pipe can be shortened to no less than 20cm and should not exceed a length of 2.3m, depending on the installation parameters. Route the exhaust pipe from the heater to a suitable outlet, ensuring that is securely fitted to the heater using the clamp supplied in the kit.

As the exhaust gets very hot during operation, it should be installed in such a way that will not cause damage to the vehicle. Ensure that it has sufficient clearance of heat sensitive parts; paying close attention to fuel lines (plastic and copper) and electrical components. Make sure that the outlet ends in open air and does not point in the direction of travel. The whole system should also point downwards and if necessary, a 5mm hole should be drilled near the bottom to drain off any condensation. You should also route the exhaust so that the fumes are not taken back in by the air intakes of the heater and ensure that the outlet does not get blocked by anything like road debris etc.

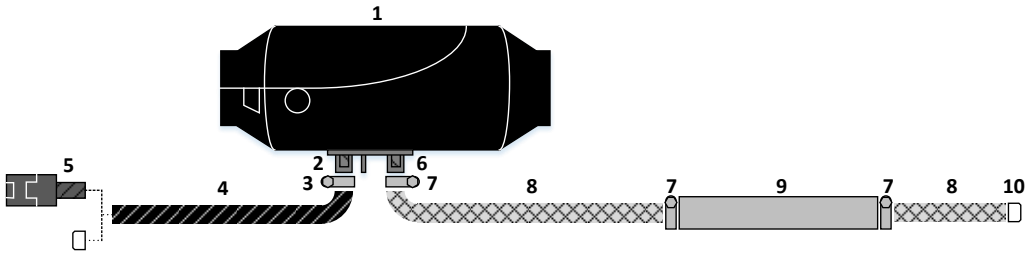


Figure XI

- | | |
|---------------------------------------|------------------------------|
| 1. Heater Body | 2. 25mm Combustion Air Inlet |
| 3. Combustion air inlet clamp | 4. Combustion air pipe |
| 5. Combustion air silencer OR end cap | 6. 24mm Exhaust outlet |
| 7. Exhaust clamp | 8. 24mm Exhaust pipe |
| 9. Exhaust silencer | 10. Exhaust end cap |

Combustion Air Intake

Like the exhaust pipe the combustion air intake can be shortened to up to 20cm or lengthened to no more than 2m, again depending on installation conditions. Some models can also be fitted with a combustion air silencer to reduce the noise of the air intake; this is ultimately down to personal preference.

In some situations, an air filter may be required to stop dust or debris making its way up the air pipe.



Installation: Fuel Lines

Note: When installing, priming, repairing fuel lines etc. there is always a risk of injuries due to flammable and toxic sources. Take all the necessary safety precautions when fitting any fuel line or fuel line parts.

DO NOT:

- Smoke
- Use naked flames
- Inhale fumes

When working on or near any fuel lines or parts!

DO:

- Ensure the engine and heater are switched off before attempting any and all work on the fuel line installation or repair
- Cut any fuel line with a sharp knife to ensure a clean cut free from crushes and burrs
- Make sure the pipe from the fuel pump to the heater is on a gradual rise
- Ensure fuel pipes are fastened safely to prevent noise rattle and securely fitted to prevent any damage
- Route the fuel pipes so that vehicle vibration and movement will not have any lasting effects on the service life
- Route the fuel line away from **any and all heat sources**. Ensure adequate clearing from heat sources if it cannot be avoided or use a suitable heat shield
- Make sure all connectors are fastened securely to prevent dripping of fuel, particularly onto hot surfaces or electrical components.

File down any drill holes to again ensure an even mounting surface. Tighten the M6 bolts provided to a torque setting of 6Nm+1Nm.

Installation of Fuel Lines

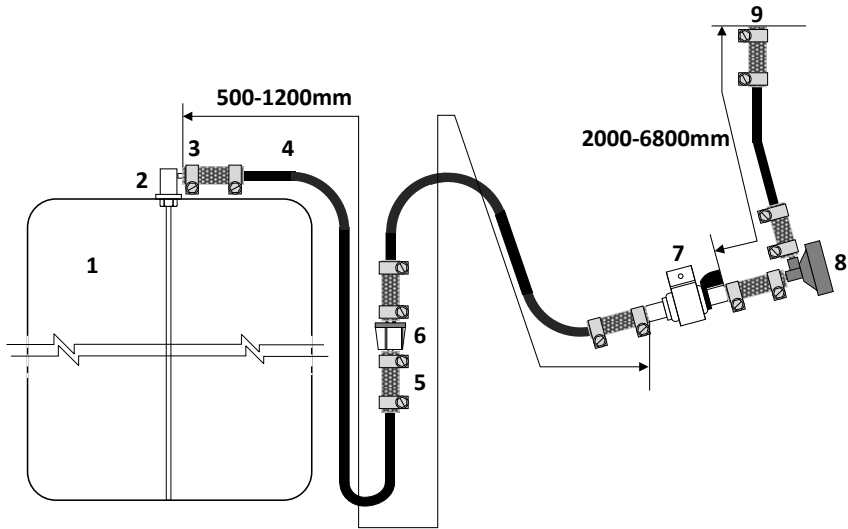


Figure XII

- | | | |
|--------------|------------------------|----------------------------------|
| 1. Fuel Tank | 2. Fuel Standpipe | 3. Fuel line connector hose clip |
| 4. Fuel Line | 5. Fuel line connector | 6. Fuel Filter |
| 7. Fuel Pump | 8. Damper | 9. Heater Body |

The vehicle's own fuel tank can be used to supply the heater, a separate tank can be used if necessary. If a separate tank has been used, please ensure that it is not installed in the driver or passenger cab and is away from anything that could cause a fire risk or inhaling of toxic fumes. Do not fit the heater below the level of fuel, to avoid syphoning of fuel into the heater.

Always fit the fuel pump on the anti-vibration mount securely onto the vehicle. Ensure the outlet of the fuel pump tilts upward. The correct angle is shown in figure XIII.

The fuel pump's outlet should tilt upward at an angle between 15°-35° (as shown above). Only use the fuel line provided, ensure the pipe is placed away from any possible debris and avoid any sagging in the line. Make sure the fuel line does not flow downward toward the fuel pump. This will prevent correct fuel flow and produce air bubbles in the line.

The fuel filter, fuel pipe and clamps should all be replaced after 2 years of us

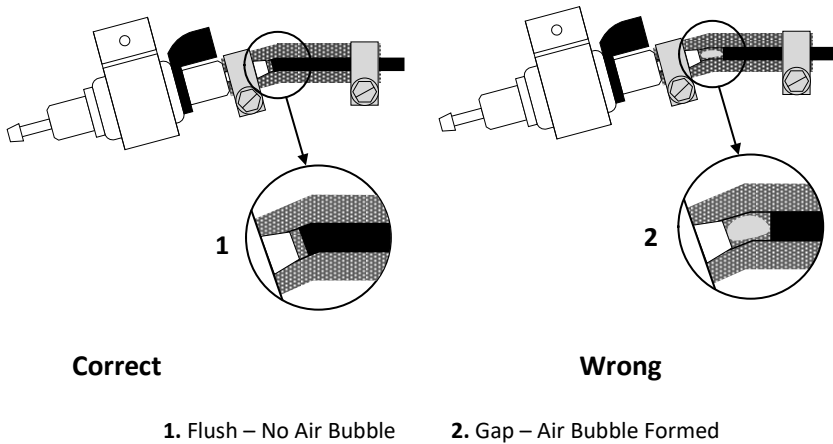


Figure XIV

Figure XVIII shows the correct way to connect fuel lines to prevent the build-up of air bubbles. Ensuring they are flush and minimising bends.

When the fuel is being sucked from the vehicle tank, or an independent tank, a suction pipe is required. Make sure all the openings are appropriate for the installation and a tight seal is maintained for the base of the suction pipe.

The bottom of the suction pipe should be about 30-40mm from the bottom of the fuel tank to avoid sucking impurities or sediment from the bottom of the fuel tank.

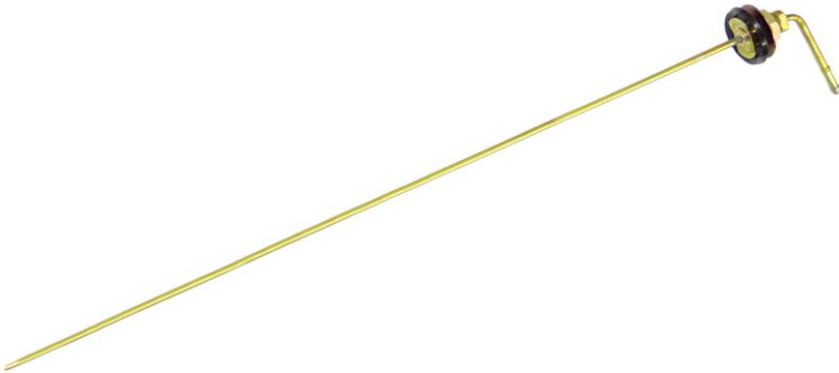
Fuel Standpipe

A fuel standpipe (or suction pipe) will need to be installed in the vehicle's fuel tank or an independent fuel tank depending on what the installation calls for. Sealant is not required to fit the standpipes.

Depending on the standpipe provide in the kit you will need to install the standpipe in one of two ways.

Standpipe 1: (Part No: AHZ-034)

Figure XV



Usually supplied in Marine kits and supplied bent, this standpipe is installed like so:

- Drill a hole in the top of the vehicle's fuel tank $\Phi 22 \pm 0.2\text{mm}$ in size. Ensure it is smooth and clean of burrs
- Remove the top nut and washers and bend the standpipe straight
- Cut the standpipe down to size if necessary
- Fit the standpipe by tilting it into position into the newly drilled hole
- Place the rubber and metal washers back on top followed by the nut and tighten it securely on top

Standpipe 2 (Sender Unit Pipe): (**Part No:** AHZ-035)



Figure XVI

Supplied mainly in vehicle kits, this standpipe (or sender unit pipe) is installed like so:

- If possible; remove the sender unit from the vehicle's fuel tank, this will make it easier to attach the nut securely back onto the standpipe
- Drill a $\Phi 6 \pm 0.2\text{mm}$ hole into the sender unit
- Remove the nut from the standpipe and feed it through the hole ensuring the rubber 'o' ring remains on the standpipe 'head' side
- Replace the nut on the standpipe to secure it safely to the sender unit.
- Replace the sender unit into the fuel tank.

The bottom of the fuel standpipe should be 30-40mm from the bottom of the fuel tank to allow enough suction of fuel and at the same time not allow impurities and sediment to be drawn up the standpipe.

MV MY20 Wiring Diagram

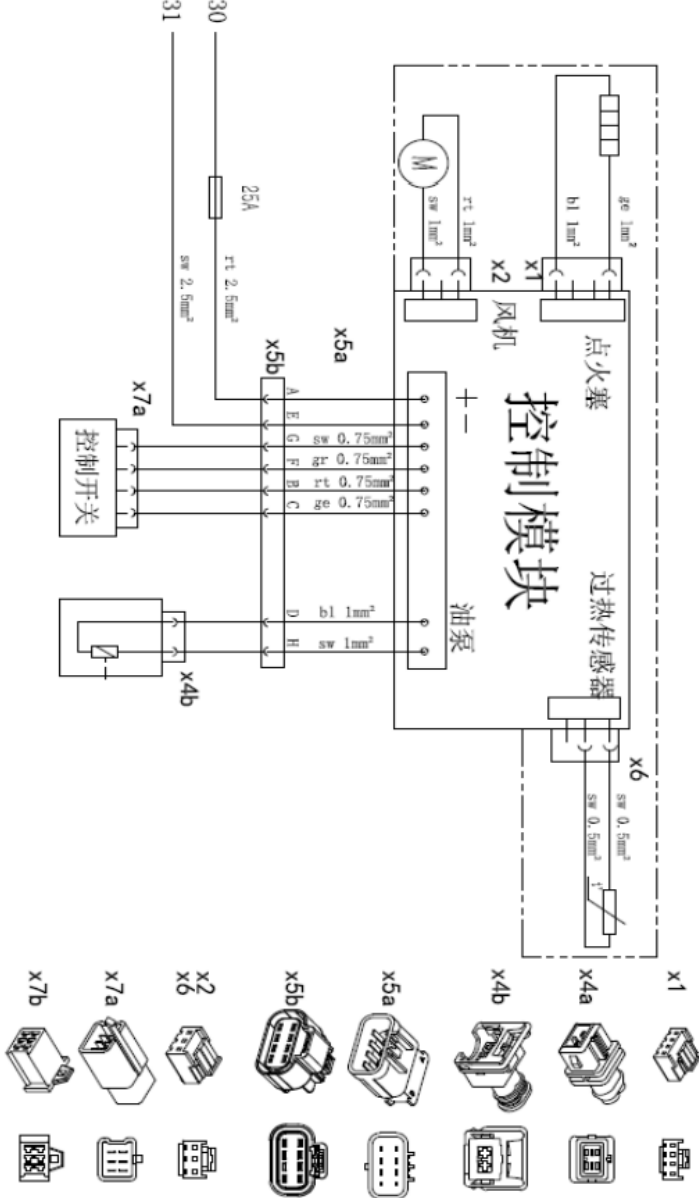


Figure XVII

The previous page shows the wiring diagram for the heater.

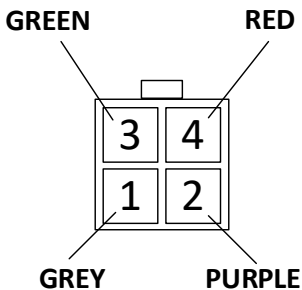
The wires of the main heater have been made into bundles. They can be laid according to the positions of various components and should be fixed to the proper locations. The distance between two fixing points should not exceed 300mm. Any exposed wire outside the vehicle should be protected so as not to be ripped by any road debris or similar.

The main connections are those the positive and negative to the power supply, the main plug from the loom to the heater, the fuel pump, and the plug from the loom to the timer control. All plugs are pre-made for ease of installation.

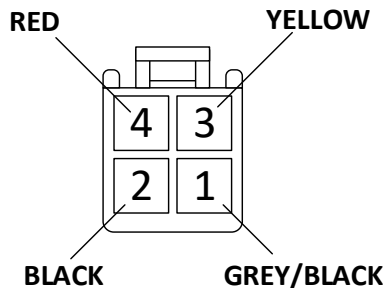
Timer and Rheostat Control Plugs

The timer is fitted by removing the plastic back, drilling a small hole, then pushing the back of timer in place, and fitting a screw to secure it. They are best installed so that they can be seen and operated easily to identify working conditions and for easy access. Figure XVIII shows the plug connections.

Timer Control Plug



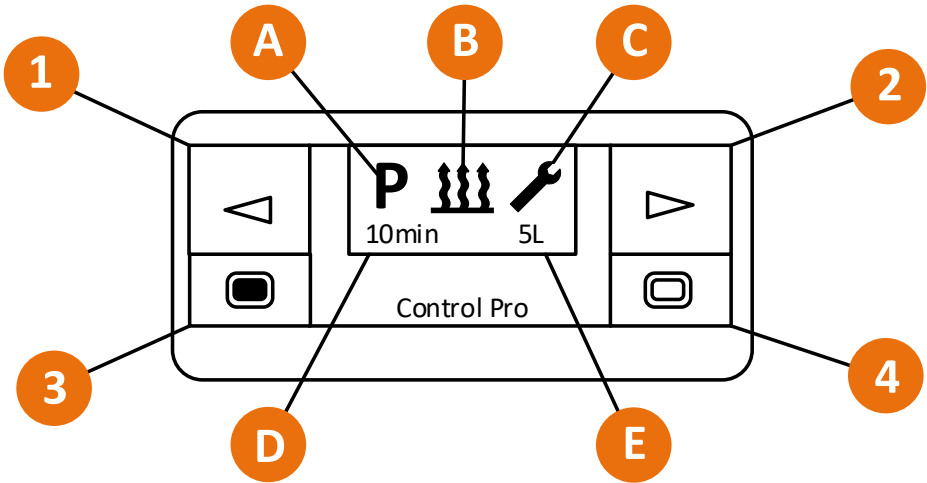
From Wiring Harness



From Timer

Figure XVIII

Timer Operation



1. Left Key/Down Key (Fan Mode)
3. Return Key

2. Right Key/Up Key (Priming Mode)
4. On & Off Key/Enter Key

A. Timer 'Program' Settings
C. Settings Icon
E. Heat Output Level

B. Heat Mode
D. Heat Time Setting

Figure XIX

Functions:

- On/Off Heating Function
- Three timer settings
- Fan Mode
- Fuel pump priming mode
- Remote control pairing
- Fault Code Display



Setting the Time and Date

On the first start up of the heater you will need to set the time and date.

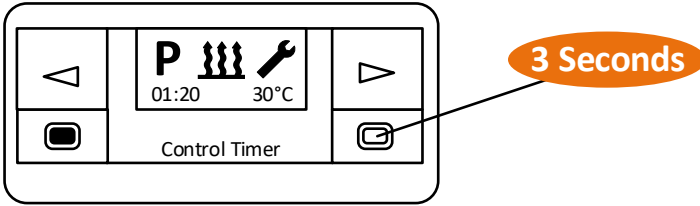
- 1) Press any button to wake the screen up.
- 2) Set the time by adjusting the hours with the left and right arrow keys, press the enter key to confirm
- 3) Set the minutes in the same way, pressing the enter key to confirm.
- 4) Select the day of the week using the left and right arrow keys and press the enter key to confirm. The time and date have been set.

Adjusting the Time and Date

- 1) To adjust the time and date at any time, press any key to wake the screen up.
- 2) Navigate to the settings icon using the left or right arrow keys and press the enter key to select it.
- 3) Navigate to the clockface icon to adjust the time in the same way as the previous steps.
- 4) Navigate to the calendar icon, to adjust the day of the week in the same way as the previous steps.

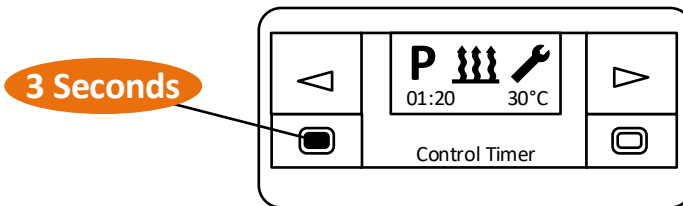
NOTE: When the timer begins, it will bleep twice, after the purge cycle has completed, and 5 times once the glow pin has stopped pulsing.

Power On/Off



- 1) Press any key to wake the screen up.
- 2) Press and hold the On & Off key for 3 seconds to turn the heater on.
- 3) Press and hold the On & Off key for 3 seconds to turn the heater off.
- 4) The display will automatically turn off (enter sleep mode) after 60 seconds, but a small dot will appear on the screen indicating the heater is running.

Convert to Thermostatic Mode



- 1) Turn the heater on using the above steps.
- 2) Press and hold the return key for 3 seconds to switch modes.
- 3) Use the arrow keys to change the range:

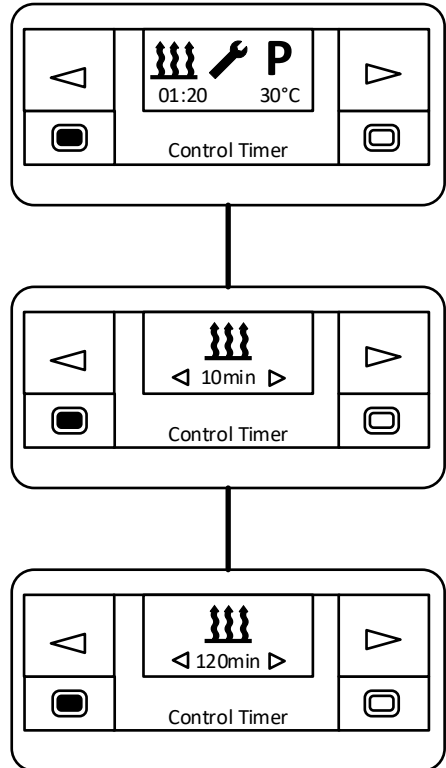
Temperature: 15°C – 32°C

Power: 1L – 5L

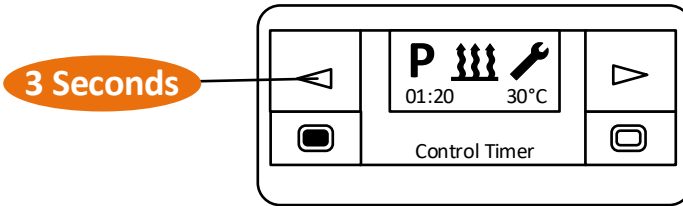
- 4) Press and hold the On & Off key for 3 seconds to turn the heater off.

Adjusting the Heating Run Time

- 1)** Press any button to wake the screen up.
- 2)** Press the left or right key to navigate to the settings icon (Figure XXII, Letter C), and press the enter key to select it.
- 3)** Navigate to the heating icon using the arrow keys, and press enter to confirm.
- 4)** Press the left key to reduce the running time, or the right key to increase it. The range is: 10 – 120 minutes or, by pressing the right key again after 120 minutes it can be set to run indefinitely, indicated by the infinity symbol (∞).

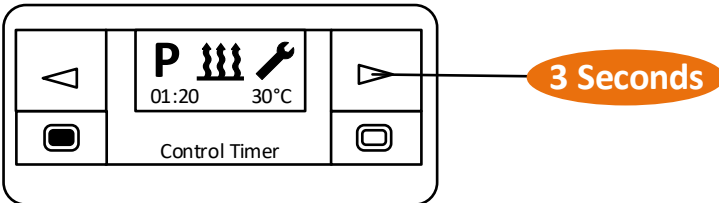


Fan Only Mode



- 1) Press any key to wake the screen up.
- 2) Press and hold the left key for 3 seconds to enter the fan only mode.
- 3) Press and hold the On & Off key

Fuel Priming Mode



- 1) Press any key to wake the screen up.
- 2) Press and hold the right key for 3 seconds to enter the fuel priming mode.
- 3) Press and hold the On & Off key for 3 seconds to start fuel priming, the default priming time is 90 seconds.
- 4) Hold the On & Off key to turn off the fuel priming mode at any time.



Timer Setting

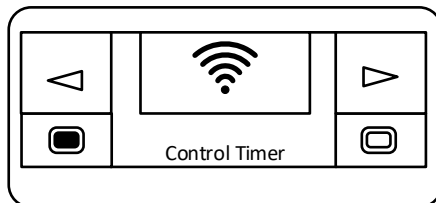
The timer can be used to select three separate heating times, either three times a day, or three times a week.

- 1)** Press any key to wake the screen up.
- 2)** Select the 'P' icon using the left or right key and select it by pressing the return button.
- 3)** Enter the first timing setting (P1) by pressing the enter key, select the second (P2) or third (P3) by using the left or right arrow key.
- 4)** Select the day of the week using the left or right arrow key and confirm with the enter key.
- 5)** Select and adjust the starting heating time using the left and right arrow keys and confirm with the enter key.
- 6)** Select the running time using the left and right arrow keys and press the enter key to confirm.
- 7)** Press ON or OFF to turn that heating time on or off and confirm again with the enter key this time to enter the main menu display. A 'dot' will appear in the upper left corner of the screen, confirming the heating time set.
- 8)** The second (P2) and third (P3) heating times can be altered in the same way.

Pairing Remote Control

1) Press any key to wake the screen up.

2) Press the left arrow key, and the return key for three seconds. The 'Wifi' symbol will appear on the screen



3) Press the 'On' button on the remote control. Upon a successful pairing, the timer will display 'OK'.

Using the Remote Control

The range of the remote control is 30m.

1) Once the remote has been paired, press the 'On' button to switch the heater on.

2) The fan speed can be altered by using the + and – symbol on the remote.

3) Press off to switch the heater off.



Maintenance

Once the heater is installed, it should ideally be turned on a few times to remove any air trapped in the fuel lines. Also ensure there is no leaking from the lines and that all electric terminals fit securely together.

You should also regularly:

- Check the air inlet and outlet for any pollution or foreign matters
- Clean the externals of the heater
- Check for corrosion or loose connections of the circuits
- Check the combustion air inlet and exhaust pipe for damage and clogs
- Check the fuel line for leaks

To ensure a long life of the heater it is advised that you run it for at least 10 minutes every month, to prevent malfunction of mechanical parts.

After 10 years the heat exchanger, overheat sensor and exhaust should be replaced by a professional.

If any welding is being attempted on the vehicle, please remove the positive power supply wire and earth it to protect the controller from any damage.



Fault Codes

Fault Code	Description	Diagnostic
E-01	Ignition Failure	Check the fuel (dirty, air in lines or lackthereof) Check voltage to the heater
E-02	Flame Extinguished	Check the fuel line (dirty, air in lines or lackthereof)
E-03	Voltage too High	12V - Higher than 15V 24V - Higher than 30V
E-04	Voltage too Low	12V -Lower than 10V 24V - Lower than 18V
E-05	Air inlet temperature is too high	Greater than 50°C
E-06	Internal Temperature Sensor	There is an open or short circuit on the air inlet sensor
E-07	Fuel Pump	There is an open or short circuit on the fuel pump
E-08	Air Motor	There is an open or short circuit on the air motor
E-09	Air Motor Speed	The air motor speed is irregular
E-10	Glow Pin	There is an open or short circuit on the glow pin
E-11	Heater Overheated	Temperature inside the unit greater than 260°C
E-12	Overheat Sensor	There is an open or short circuit on the overheat sensor
E-13	Control Unit (Timer) Signal Interrupted	There is an open or short circuit on the yellow/gray communication line
E-14	Atmospheric pressure sensor (Altitude Sensor)	There is an open or short circuit on the atmospheric pressure sensor
E-18	Communication Failure	Unplug all connections and check for any damaged or crooked pins

Thank you for purchasing the MV MY20

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