# DIESELGUARD

## DIESEL MACHINE MONITOR

## User Manual

Version: 3, April 2016

Designed and manufactured in Australia by Ampcontrol Pty Ltd


Dieselguard

AMPCONTROL®

| Revision History | | |
|---|---|---|
| **Version** | **Date** | **Description** |
| 3 | 29-APR-2016 | This version of the manual relates to firmware version V5 of the Dieselguard. |

**WARNING!**


The **warning** symbol highlights a potential risk of **injury or death**.

Please share these warnings with other operators.

**CAUTION!**

The **caution** symbol highlights a potential risk of **damage to equipment**.

Please share these cautions with other operators.

**NOTE**

The **note** symbol highlights **key information**.

Please share these notes with other operators.

**ENVIRO**

The **enviro** (environmental) symbol highlights areas which may have an impact on the surrounding **fauna and/or flora**.

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## Before You Begin

Thank you for purchasing the Ampcontrol Dieselguard System.

**WARNING!**


This equipment has been designed to control the signals from equipment that detects hazardous gases and vapours and to provide warning and control signals before dangerous conditions are reached. In order to ensure that the equipment will warn of dangerous situations it is essential that the **instructions in this manual and those of the associated items be read, understood and followed**. It is further stressed that the effectiveness of the control system depends heavily on the user who is responsible for its correct installation, application, use and regular maintenance.

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# 1 SAFETY AND OTHER WARNINGS

*For safety reasons, the Dieselguard System must be installed, operated and serviced only by competent personnel. Please read and understand this instruction manual completely before installing, operating or servicing this equipment. Failure to install or operate this instrument in accordance with the instructions contained in this manual may create hazardous operating conditions.*

## 1.1 Safe Use of Equipment

The equipment supplied has been designed and manufactured to ensure safe operation. The equipment must only be used within the design parameters.

The instructions within this manual must be observed as an aid towards achieving the safest possible installation.

**Persons responsible for installation, maintenance, or operation, must observe the following instructions:**

### 1.1.1 Changes to Equipment

Changes in the design and modifications to the equipment are not permitted. Unauthorised changes made to the hardware or operating firmware will void the manufacturer's warranty, and may compromise the integrity of the system into which it is installed and other connected equipment.

### 1.1.2 Equipment Knowledge

Experience with, or understanding of, this equipment is essential for the safe installation and removal of the equipment. Therefore, please read and understand this manual prior to use. Competency based training courses are recommended and are available on request.

### 1.1.3 Manual Handling

Precautions have been taken to ensure all equipment is safe to handle and free from sharp edges. However care should always be taken when handling enclosures and gloves should be worn.

### 1.1.4 Installation

Correct operation and safety depend on the Dieselguard System and associated equipment being installed correctly. Mechanical and or electrical installation and maintenance of plant and equipment must only be carried out by appropriately qualified personnel and must be tested thoroughly prior to operation.

### 1.1.5 Operation

As safety depends on the Dieselguard System functioning correctly it is highly recommended that all safety functions of the Dieselguard System be periodically tested to ensure correct operation.

# 2 RECEIVING AND STORAGE

## 2.1 Receiving

All possible precautions are taken to protect the equipment against damage or losses during shipment, however before accepting delivery, check all items against the packing list or bill of loading. If there is evidence of physical damage, notify Ampcontrol immediately.

Notify Ampcontrol immediately in case of any discrepancies to the packing list. Keep a record of any claims and correspondence. Photographs are recommended.

Where practicable do not remove protective covers prior to installation unless there are indications of damage. Boxes opened for inspection and inventory should be carefully repacked to ensure protection of the contents or else the parts should be packaged and stored in a safe place. Examine all packing boxes, wrappings and covers for items attached to them, retain and store any approval documentation for your safety file as applicable prior to wrapping being discarded.

## 2.2 Inspection

Equipment that is found to be damaged or has been modified away from its published specification must not be used. Please contact Ampcontrol if the equipment is suspected to be different than that ordered or if it does not match the published specifications.

## 2.3 Storage after Delivery

When the equipment is not to be installed immediately, proper storage is important to ensure protection of equipment and validity of warranty.

All equipment should be stored indoors between 0-40˚C, preferably on shelves and protected from moisture and sunlight.

In order to maximise the lifespan of the battery installed in the Dieselguard unit, it is recommended that the Dieselguard be connected to a power supply during extended storage periods.

## 2.4 Unpacking of Equipment

The method of packing used will depend on the size and quantity of the equipment. The following cautions should be interpreted as appropriate.

**CAUTION!**

Take care when unpacking crates as the **contents may have shifted during transport**.

**ENVIRO**

The disposal of packaging materials, replaced parts, or components must comply with environmental restrictions without polluting the soil, air or water.

Ensure that any timber and cardboard used as **packaging is disposed of in a safe and environmentally responsible manner**.

Where possible, dispose of all waste products i.e. oils, metals, plastic and rubber products by using an approved recycling service centre.

# 3 PRODUCT OVERVIEW

The Dieselguard System monitors ambient gas levels (methane for a standard installation) and provides indication and control based upon the measured gas levels. The system prevents unsafe starting of a machine in the presence of dangerous levels of explosive gas. Similarly, if a machine is running, the Dieselguard System will shut the machine down if surrounding gas levels rise above the set alarm point. This prevents continuing unsafe operation of a machine in a potentially dangerous atmosphere.

**Key Features**

- Gas monitoring and control functionality
- IP66 stainless steel enclosure
- Ex 'm' ia certified product
- Powered from machine's alternator
- CH4 transmitters with integrated or remote sensor heads
- Standard external control enclosures available
- Intrinsically safe solenoid valve

## 3.1 Diesel Machine Monitor

*Figure 3.1: Diesel Machine Monitor*

The Ampcontrol Dieselguard Machine Monitor is the central connection point for the Dieselguard system, which comprises of external sensors, external display, control box and the I.S. solenoid valve. The Ampcontrol Dieselguard Machine Monitor is housed in a low-profile IP66 stainless steel enclosure, with all internal electronics being encapsulated.

The Diesel Machine Monitor is an Exm ia certified product that is powered from the alternator supply of the vehicle. Apart from the supply power all other connection to the Dieselguard Control unit are Ex ia Intrinsically Safe (IS) circuits.

The Diesel Machine Monitor provides the control via a solenoid incorporated into the diesel machine's safety pressure circuit. When released the solenoid allows the system to de-pressurise and as a result, shut down the machine

Input power is provided via the integral encapsulated cable and is not polarity sensitive. The input circuitry has been designed to withstand a wide variety of 'dirty' power supply types. Many alternators provide power that has a high level of ripple and high voltage noise spikes. The Dieselguard Diesel Machine Monitor is designed to withstand these conditions without operational problems. The unit will withstand a 90V repetitive overload condition via its internal auto-reset protection barrier. The input power supply circuitry is galvanically isolated from the rest of the system.

The unit is designed as a component approved device and can be used with Intrinsically Safe and

"simple apparatus" accessories provided that the entity requirements are adhered to. Accessories for the Dieselguard System include: Gas transmitters, RTD's, Pressure and level switches, LED indicators, Solenoid valves and Intrinsically Safe display systems.

The Diesel Machine Monitor is pre-configured to detect Methane gas around the vehicle and to provide a normally energised solenoid supply which will de-energise and hence de-pressurise the vehicle safety loop (diesel supply valve) in event of high gas readings. The warning signal is pre-set at 1.00% and the trip function is pre-set to de-energise the solenoid at 1.25% CH4 (as per the requirements of AS/NZS 4871.6:2013 Section 6.4.4).

The Dieselguard Machine Monitor is equipped with wireless capability that allows the user to connect to the unit, through the use of the Dieselguard Base Station, and configure alarm trip points, provide real time status information and download logged data.

The Diesel Machine Monitor is designed not to need regular maintenance or access, as such, once fitted to the machine it does not need to be accessed.

## 3.2 Diesel Machine Monitor Wireless Antenna

In order for the Diesel Machine Monitor to communicate with the Dieselguard Base Station, it is necessary to mount the small whip antenna to the vehicle. The antenna is located at the end of the free coax cable and is protected by a rugged sheath.

When mounting the antenna, consideration should be given to keeping the actual receiving part (the last 200mm of the cable assembly) away from the metalwork of the vehicle. If the antenna is too close to the vehicle, then the useable range may be reduced. Ideally, the antenna should be mounted in the same orientation as the receiver.

**NOTE**

If the wireless capability is not required, it is **not necessary to cut off the antenna**. The coaxial cable can be unplugged inside of the Diesel Machine Monitor's enclosure.

## 3.3 Gasguard Transmitter / CH4 Sensor

*Figure 3.2: Gasguard Transmitter with Integrated CH4 Sensor*

The Gasguard transmitter may include an integral or remote head sensor. In either case the sensor should be mounted pointing vertically downwards and sufficient space left around and beneath the sensor for fitting of the calibration cup.

The front panel of the transmitter has to be accessible for calibration and service of the sensor and should be mounted in a position to allow for the magnetic screwdrivers to be used and the reading on the screen viewed.

It is not necessary for the transmitter to be viewed by the driver.

If the remote head sensor is used bear in mind that if the sensor needs to be replaced, easy removal and re-installation of the cable is advantageous.

See Gasguard sensor manual for further information.

## 3.4 IDA Display (Optional)


*Figure 3.3: IDA Display*

The IDA display provides feedback to the operator of the diesel machine as to the ambient CH4 levels.

The IDA display is optional and alternative display panels using LED and other equipment can be used.

If the IDA display is used it should be mounted in a position where the driver can see it without it being in his direct line of vision. See IDA technical datasheet for more detail.

## 3.5 I.S. Solenoid Valve

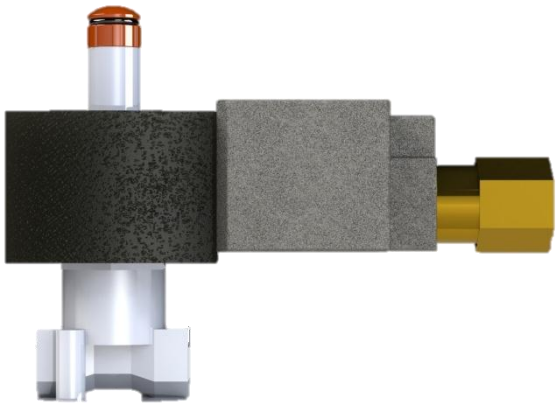

*Figure 3.4: I.S. Solenoid Valve*

The IS Solenoid Valve is used to control the diesel machine's pressure circuit based upon the outputs of the Diesel Machine Monitor.

The I.S. Solenoid Valve can be mounted in any suitable location. The pneumatic connections are:

- Ports 1 and 2 are normally connected when the solenoid is energised.
- Ports 1 to 3 (the vent port) are connected when the valve is de-energised.

The valve should be connected so that the pressure is released from the downstream side of the valve when de energised.

See manufacturer's installation and maintenance sheet for additional information.

## 3.6 Pneumatic Bypass Assembly (c/w I.S. Solenoid Valve)

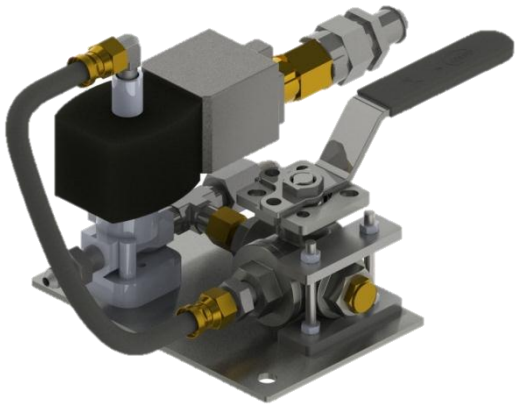

*Figure 3.5: Pneumatic Bypass Assembly*

The Pneumatic Bypass Assembly contains the I.S. Solenoid Valve as well as a manually operated valve. The manually operated valve allows the operator to bypass the Dieselguard system in the event of a flat battery in the Diesel Machine Monitor.

# 4 INSTALLATION

## 4.1 General Warnings

These instructions have been designed to assist users of the Dieselguard System with installation.

Before the Dieselguard System can be installed, there are a number of things that need to be considered and understood to prevent incorrect or unsafe operation of the Dieselguard System or the system into which it is installed.

Along with relevant competence, and an understanding of the target application, the following points should be considered:

### 4.1.1 Ensure that the information provided in this user manual is fully understood.

It is extremely important that the limitations and functionality of the Dieselguard System are understood to prevent incorrect installation and use from creating a potentially dangerous risk. If in doubt as to the nature of the limitations or their implication, consult a competent authority such as a supervisor or Ampcontrol technical representative.

### 4.1.2 Ensure that the application into which the Dieselguard System is being installed has been properly defined, designed and approved.

Any system intended to mitigate the risk of injury needs to be properly designed and implemented. Such a system must be the result of structured risk analysis with the outcomes used to define the system requirements. These requirements, in turn, will guide the choice of instrumentation, logic solvers and actuators needed to implement the system. Understanding the needs of the system will ensure proper selection of equipment.

### 4.1.3 Ensure that the Dieselguard System will properly perform the required functions within the system design.

It is important to understand how the Dieselguard System is intended to interact with other equipment within a system. For safe and reliable use, it is crucial that neither the Dieselguard System logical operation nor its signalling be compromised by incompatibilities with connected equipment.

### 4.1.4 Modifications of any form to the Dieselguard System are prohibited.

The Dieselguard System as supplied has been designed and manufactured to comply with the requirements of protection standards. If modifications of any form are made to the Dieselguard System, the equipment may no longer be fit for use. If any modifications or damage to the Dieselguard System is evident, do not use the equipment and contact Ampcontrol for advice.

## 4.2 Mandatory Installation Practices

The following information must be adhered to when installing the Dieselguard System. Failure to adhere to this information may give rise to unsafe operation.

Using the Dieselguard System in a manner that exceeds its electrical, functional or physical specifications, or in a way that is contrary to its operating restrictions, may create risks to personnel and/or equipment resulting in injury or death.

- The Dieselguard System must be powered within the specified voltage range.
- The installation of the Dieselguard System must be carried out by suitably trained and qualified personnel.
- Identification labels fixed to the Dieselguard System must not be damaged, removed or covered before, during or after installation.
- The installation is to be in accordance with the relevant installation Standards/Codes of Practice.

- Modifications must not be made to any part of the Dieselguard System. As supplied, the unit is built to, and complies with the relevant standards. Modifications to its construction will render the unit non-compliant.
- Complete and accurate records of the installation must be kept as part of the site installation.

**WARNING!**


The apparatus is **not suitable** for use in areas where **acetic acid gases, mists, vapours or liquids are present**.

## 4.3 Mechanical Installation Information

### 4.3.1 Enclosure Dimensions

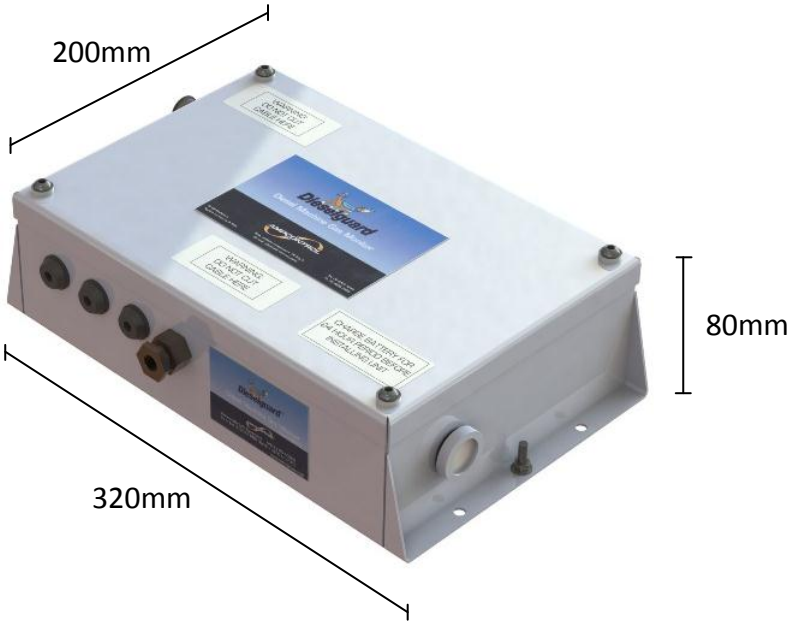


*Figure 4.1: Diesel Machine Monitor Dimensions*

### 4.3.2 Mounting Arrangements

The Dieselguard Diesel Machine Monitor can be mounted in any orientation without affecting its operation. Since the unit does not require routine servicing, it can be mounted in a position that is not normally accessible.

The lid of the enclosure must be fitted correctly with the Dubbo seals and M6 stainless steel button head screws tightened to at least 0.1Nm. This is required to comply with the certification and IP rating.

Space should be allowed to ensure the lid is fitted correctly and the screws are torqued as required.

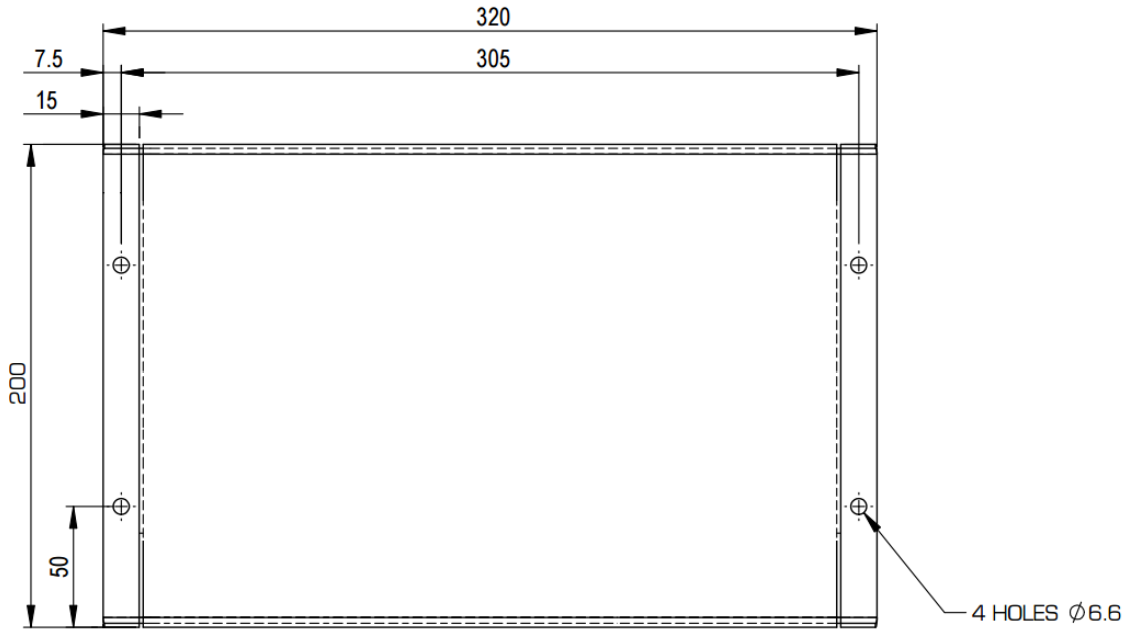


*Figure 4.2: Mounting Hole Locations*

### 4.3.3 Terminal Layout

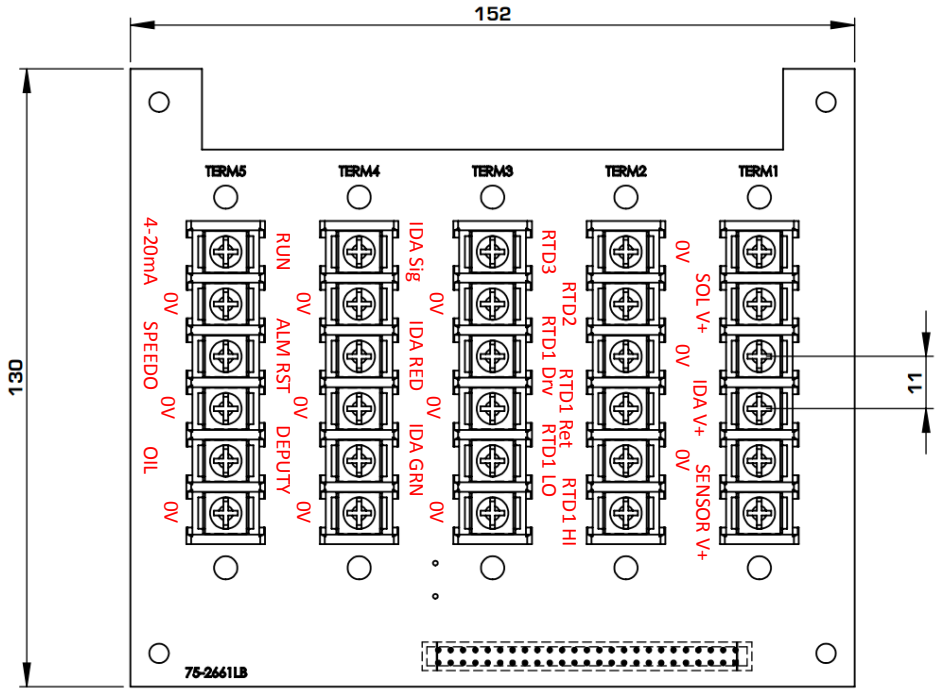


*Figure 4.3: Terminal Layout for Diesel Machine Monitor*

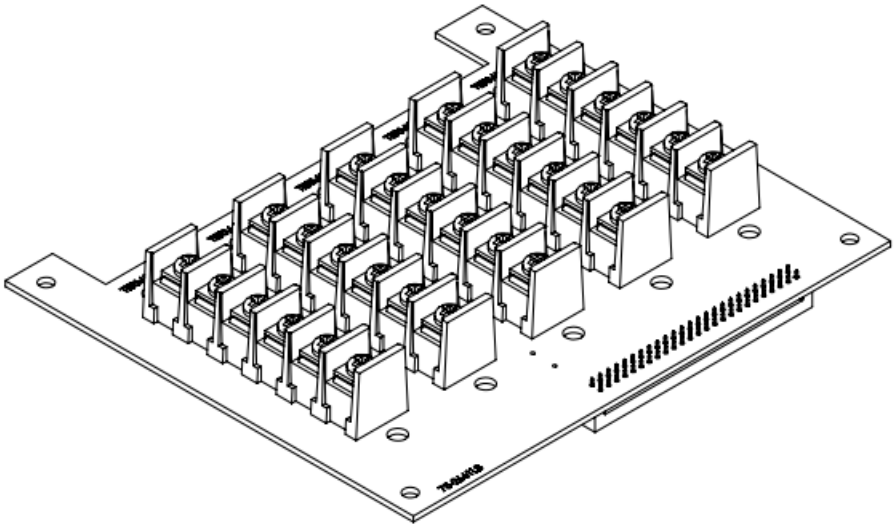

*Figure 4.4: Isometric View of Diesel Machine Monitor's Terminal Block*

## 4.4 Electrical Installation Information

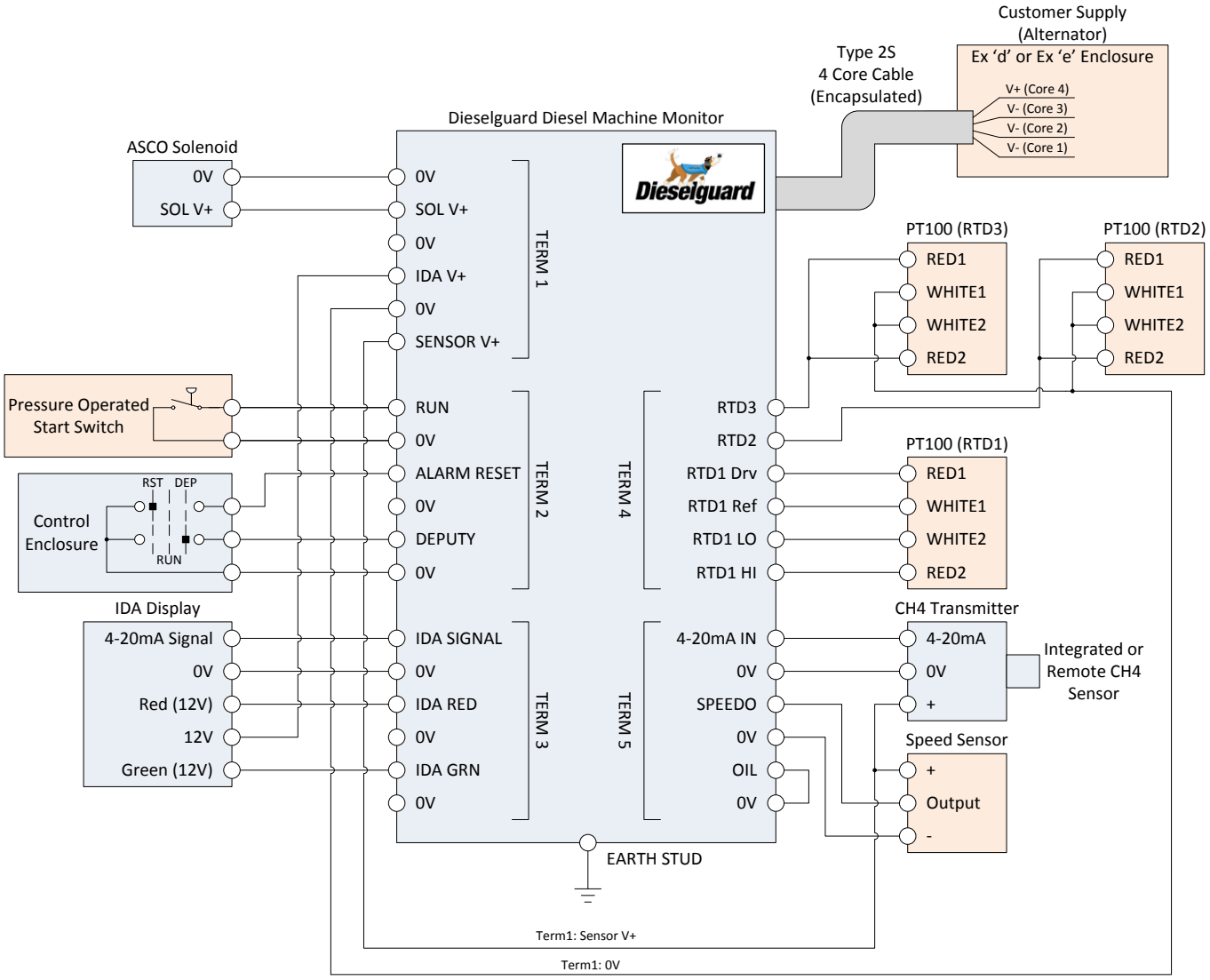


*Figure 4.5: Typical Connection Diagram for the Dieselguard System*

With the exception of the encapsulated flying lead, all of the connections to the Diesel Machine Monitor are IS circuits and should be wired accordingly. In some locations it may be necessary to protect IS cabling from mechanical damage. The unit is not supplied with interconnecting cables; the installer is responsible for providing cabling to suit the application.

### 4.4.1 Power Supply

The power supply connection for the Diesel Machine Monitor is via the 3 metre 4 core Type 2S flying lead. This cable must be terminated into a suitable Ex 'd' or Ex 'e' enclosure and is intended to be connected to the alternator supply. The installer would typically gland this cable into the hours run enclosure, but if all the gland entries are already allocated, a separate enclosure may be required.

The Diesel Machine Monitor can be powered from a nominal 12-24V supply. The unit is designed to operate on an AC/DC supply of 9.5 - 36V but will withstand 90V. The input to the Diesel Machine Monitor is isolated from the enclosure for use with non-earthed alternator systems.

Cores 1, 2 & 3 of the Type 2S cable should ideally connect to 0V. Core 4 of the Type 2S cable should be connected to the +ve of the alternator supply. The Dieselguard system is not polarity sensitive, thus the connections can be reversed if required. The polarity markings are present for variants with a non-isolated 0V referenced input supply.

**WARNING!**


The apparatus must be installed such that the integral wires are **terminated in a suitably certified Ex 'e' or Ex 'd' enclosure** having a minimum Ingress Protection (IP) rating of IP55. If the wires are terminated in an Ex e enclosure suitably certified Ex e terminals must be used for terminating the wires.

### 4.4.2 Earth Stud


*Figure 4.6: Location of the Earth Stud on Diesel Machine Monitor*

**WARNING!**


The Diesel Machine Monitor has an **earth stud that must be infallibly connected to the chassis of the vehicle** to comply with the certification requirements.

### 4.4.1 Solenoid Output (Terminal Block 1: SOL V+)

The control solenoid for the Dieselguard System should be connected between the SOL V+ output and 0V on Terminal Block 1. The Diesel Machine Monitor will energise this output when the system is in the healthy state, or when the Deputy Override Switch is activated.

The solenoid output is 24Vdc and is current limited to 84mA.

### 4.4.2 RUN/Start Input (Terminal Block 2: RUN)

When the RUN input is shorted to 0V, the Diesel Machine Monitor will wake up. This can be accomplished via the connection of either a normally open momentary “Start” pushbutton in the control enclosure, or via a pressure operated switch in the main pneumatic line.

Some machines have a two stage safety pressure loop and this function could also be derived from a pressure switch mounted in the primary pressure circuit. When the machine’s pneumatic lines are pressurised, the switch will close and the Diesel Machine Monitor will wake up.

### 4.4.3 Alarm Reset (Terminal Block 2: Alarm Reset)

When the Alarm Reset input is shorted to 0V, the Diesel Machine Monitor will clear any latched trips (provided that the system is healthy). This can be accomplished via the connection of either a normally open momentary “Reset” pushbutton or a selector switch with a momentary “Reset” position. This operator is normally installed in the control enclosure.

### 4.4.4 Deputy Override (Terminal Block 2: Deputy)

Whilst the Deputy Override input is shorted to 0V, the Diesel Machine Monitor will override any current alarm states and allow the machine to be started following, or during, a fault condition. This should be implemented using a latched or locking contact on a selector switch. This operator is normally installed in the control enclosure.

### 4.4.5 IDA Display Connections (Terminal Block 1 & 3)

The IDA display output terminals provide supply and control of the Dieselguard System’s intrinsically safe display.

Terminal Block 1: IDA V+ should be connected to the 12V supply input of the IDA display.

Terminal Block 1: 0V should be connected to the 0V terminal of the IDA display.

Terminal Block3: IDA SIGNAL should be connected to the 4-20mA terminal of the IDA display.

Terminal Block 3: IDA RED should be connected to the Red (12V) terminal of the IDA display.

Terminal Block 3: IDA GRN should be connected to the Green (12V) terminal of the IDA display.

### 4.4.6 RTD Temperature Inputs (Terminal Block 4)

The Diesel Machine Monitor has one 4-wire RTD input (RTD1) and two 2-wire RTD inputs (RTD2 & RTD3).

**NOTE**

If not in use, the RTD Inputs should be connected to the 0V terminal to prevent the inputs from floating.

### 4.4.7 CH4 Transmitter Input (Terminal Block 1 & 5)

The GasGuard CH4 Transmitter should be powered from the SENSOR V+ supply on Terminal Block 1, with the 0V connection being made on Terminal Block 5.

The 4-20mA output of the transmitter should be connected to the 4-20mA IN connection on Terminal Block 5.

### 4.4.8 Speedo Input (Terminal Block 5)

The Diesel Machine Monitor is provided with an input for monitoring the speed of the diesel machine. The Speedo input accepts a 5V pulse train input and records this information in the Diesel Machine Monitor’s log in Hertz.

**NOTE**

If not in use, the Speedo Input should be connected to the 0V terminal to prevent the input from floating.

### 4.4.9 Oil (Auxiliary) Input (Terminal Block 5)

The Diesel Machine Monitor is provided with an input for monitoring the voltage output of an auxiliary sensor (typically an oil sensor). The Oil input accepts a 0-5V input and records this information in the Diesel Machine Monitor's log.

**NOTE**

If not in use, the Oil Input should be connected to the 0V terminal to prevent the input from floating.

# 5 COMMISSIONING AND CALIBRATION

Prior to being put into service, the Dieselguard System must be correctly commissioned. This manual does not cover system commissioning; the full scope of commissioning tests should be determined during the risk assessment or FMEA covering the design of the electrical protection system.

The following test can provide guidance on checking the correct operation of the Diesel Machine Monitor during commissioning. This is not intended to provide an exhaustive commissioning checklist, but should be considered to be a minimum set of tests.

## 5.1 Gasguard Sensor Calibration

Prior to being put into service, the Gasguard CH4 sensor will need to be calibrated as per the instructions within its user manual.

## 5.2 Commissioning of the Dieselguard System

In order to confirm the correct operation of the Dieselguard System, the operation of the Gasguard sensor, Diesel Machine Monitor and the solenoid will need to be tested.

To confirm correct operation:

1. Turn on the diesel machine, following all relevant site safety procedures.
2. Using a calibration gas of known concentration (above the trip level of 1.25%), test the operation of the Gasguard sensor.
3. Confirm that the Dieselguard System trips, closing the solenoid and turning off the diesel machine.

# 6 PRODUCT OPERATION

The Dieselguard System is designed for simple operation, compromising of a “start” switch input which energises the gas detection system for two minutes from its own back up battery. During the two minute period normal starting procedures can be followed, if the gas level is acceptable after a 20 second test.

The Dieselguard Machine Monitor is a blind control unit that can be mounted in any convenient position. The gas sensor (Gasguard) would normally be mounted near the front of the vehicle adjacent to the air filter intake and an IDA 3 digit display or LED status panel indicates the status of the system for the driver.

## 6.1 Start Sequence

The IDA display is activated when the “start” contact operates. The display flashes **Orange** for 20 seconds while the gas sensor stabilises. Following this 20 second period, the display shows a continuous display and will indicate the gas level measured.

The Diesel Machine Monitor will energise the output solenoid and allow the machine to start if the CH4 level is below 1% by volume (healthy). The IDA display will be **Green** for measurements of less than 1%.

For gas readings between 1% by volume and 1.25% by volume, the IDA display will be **Flashing Orange**. Within this range, the Diesel Machine Monitor will prevent the diesel machine from being started.

## 6.2 Machine Running

The Dieselguard System remains in operation while the machine’s engine is running. If the ambient CH4 level increases above the allowable during this time, the Diesel Machine Monitor will enter one of the two alarm states.

### 6.2.1 First Level Alarm (Warning)

For gas readings between 1% by volume and 1.25% by volume, the IDA display will be **Orange**. If the diesel machine is already running when the ambient gas level enters this range, it will be allowed to continue running. The operator should move the vehicle to a safe area.

### 6.2.2 Second Level Alarm (Trip)

If the gas level rises above 1.25% by volume, the IDA display will turn **Red**. Under this condition, the solenoid will be de-energised, closing the fuel supply line. Once the engine stops the Diesel Machine Monitor will operate for about 2 minutes before going to sleep.

In the manual reset mode an external switch must reset the “shutdown” alarm before the machine can be started. The display will flash **Orange** if the system has been tripped and is waiting for a reset.

## 6.3 Optional Alarm Functions

The Diesel Machine Monitor is provided with 3 temperature monitoring inputs, a speed monitoring input and an auxiliary analogue input. Each of these inputs can be programmed to trigger warning alarms and trip alarms using the wireless interface software. For information on this process, refer to the MAG-181 Dieselguard Communications Manual.

## 6.4 Deputy Override

A deputy override switch input is provided so that the vehicle can be moved under supervision in an emergency. This switch is often incorporated into a multi-purpose selector switch that also provides the reset function.

## 6.5 Cold Start Function

In regular use the Diesel Machine Monitor's battery will keep the system ready for operation. After periods of non-use, the battery drain in standby mode may mean that eventually the unit will not have sufficient power to start the system. Typically the Diesel Machine Monitor can be left for 10 to 11 days before a bypass or "cold start" is required.

A lockable Pneumatic Bypass Valve can be installed in parallel to the I.S. Solenoid Valve that can be used to override the Dieselguard system. When the bypass valve is used the vehicle can be started without the use of the detection system.

Depending on the valve configuration, as soon as the vehicle has started in the bypass mode the Dieselguard system can be energised and when a stable indication is shown the bypass valve can be opened again. The alternator charges the Diesel Machine Monitor's internal battery and within 20 - 30 minutes the unit should have enough charge for the normal start sequence to be possible.

If the vehicle is started and the valves are reset and then the engine is not run for sufficient time the battery may not pass its minimum voltage requirement to operate the system. The Diesel Machine Monitor has a battery saver cut off voltage and the monitor will not operate from the battery until the minimum charge has brought the battery voltage above that level.

In this case the Diesel Machine Monitor may not complete its 2 minute run and may shut down shortly after the machine engine is stopped. It would be necessary to re-start the machine in bypass mode and run it for a longer period.

Consideration should be given to the storage of the unit. If the unit remains in storage for a length of time prior to installation, a re-charge will be required before it can be used. The unit can be charged directly by connecting a 12-30V supply to the Type 2S power lead. It is therefore recommended that the unit is re-charged on a supply prior to installation. The required re-charge time is around 12 hours from a completely discharged battery.

## 6.6 Charge Indication

The IDA display will flash red every 4 seconds (0.25Hz rate) whilst ever the Dieselguard battery is charging.

# 7 SERVICE, MAINTENANCE & DISPOSAL

## 7.1 Equipment Service

A number of external system based checks should be completed on a regular basis. These 'routine inspections' must be carried out by suitably trained people with knowledge of the Dieselguard System and the systems into which it is fitted. Routine inspections may take the form of either visual-only checks, or visual and 'hands-on' checks.

### 7.1.1 Visual Only Inspections

A basic visual inspection focuses on looking at the installation for signs of physical damage, water or dust ingress and the condition of cables and labels. This type of inspection may involve opening cabinets to gain access to the Diesel Machine Monitor and other equipment. This level of inspection may also include cleaning display windows that have become obscured by dirt.

Observations would typically be:

- Check that equipment enclosures, cable trays, conduits, etc. are in good order with no physical damage.
- Check that sealed wall boxes are free from water and dust ingress internally. Door seals are in good condition.
- Check that connected cables are free from cuts, abrasions and obvious signs of damage. Cable restraints are in good order and correctly fitted.
- Check that labels on equipment, wall boxes and cables are present and in good condition (especially certification labels).
- Check that no modifications have been carried out to installed equipment.

### 7.1.2 Hands-On (Detailed) Inspections

A more detailed inspection would include all of the elements of a visual inspection, plus some checks that cover the integrity of connections, fixtures and fittings.

In addition to basic visual observations, more detailed integrity checks would involve:

- Verify that equipment housings, wall boxes and other mechanical fixtures are secured in place. This includes terminal box lids, tightness of cable glands, integrity of wall-box mountings, security of equipment fixing to walls/DIN rails etc.
- Verify all electrical connections are secure with no loose screw terminals or DIN rail terminals not fitted to rails etc.
- Ensure that the screws that secure the lid to the Diesel Machine Monitor are tightened to at least 0.1Nm.
- The Diesel Machine Monitor is fitted with a hydrophobic barrier and this should be inspected to ensure that it is not damaged. This barrier is essential to the IP rating of the enclosure and must be intact to maintain the IP66 rating.

### 7.1.3 Factory Overhaul & Repair

The Diesel Machine Monitor is fitted with an internal battery that is **not** user replaceable.

After a period of use, the internal battery will need to be replaced. The length of time before this becomes necessary will vary depending on charge/usage cycle, but will be typically 3 to 5 years.

Because the construction of the battery housing forms part of the products' certification, this operation must be done by the manufacturer. This will entail removing the unit from the vehicle and returning it to Ampcontrol. Because of the infrequency of replacing the battery, this could be done as part of a vehicle routine major service.

## 7.2 Equipment Maintenance

**WARNING!**


The Dieselguard System has no user-serviceable parts.

**All repairs must be carried out by Ampcontrol only**.

If a fault develops, return the equipment to Ampcontrol for repair. It is essential that **no attempt be made to repair the equipment** as any attempt to dismantle or repair the equipment can **seriously compromise the safety of the unit and voids product warranty**.

It is recommended that the system incorporating the Diesel Machine Monitor be subject to regular functional tests at intervals determined by risk assessment or FMEA. These intervals typically coincide with periodic maintenance checks and will cover (but not limited to) tests such as:

- Calibrating the CH4 detector
- Comparing the calibration reading on the CH4 detector to the reading shown on the IDA display (if used).

## 7.3 Disposal

**ENVIRO**

The electronic equipment discussed in this manual **must not be treated as general waste**. By ensuring that this product is disposed of correctly you will be helping to prevent potentially negative consequences for the environment which could otherwise be caused by incorrect waste handling of this product.

# 8 SPECIFICATIONS

| **Supply (Flying Lead)** | |
|---|---|
| *Voltage* | 9.5 - 36Vdc |
| *Current (Full Load)* | 1.4A |
| *Supply Ripple Tolerance* | 12V Supply Voltage: ±3V<br>12V Supply Voltage: ±12V |
| *Max. Voltage Overload* | 90V for 100ms |

| **Battery** | |
|---|---|
| *Type* | Sealed 'Gel' type Lead Acid |
| *Life* | Up to 5 years |
| *Charge Cycle* | Two stage, hardware/software controlled |
| *Max. Charge Current* | Limited to 420mA max |
| *Outgassing Relief* | Battery pressure valve and sintered vent on enclosure |
| *Standby Life* | 3 weeks before recharge required |
| *Charge Time to First Use* | 3 hours min for 5 re-starts following 3 weeks standby |

| **Methanometer Supply** | |
|---|---|
| *Voltage (Full Load)* | Minimum: 8.5Vdc (input supply off or battery in empty state)<br>Maximum: 10.8Vdc (input supply active or full battery) |
| *Voltage (No Load)* | 12Vdc |

| **Status Indicator Supply** | |
|---|---|
| *Voltage (Full Load)* | Minimum: 8.5Vdc (input supply off or battery in empty state)<br>Maximum: 10.8Vdc (input supply active or full battery) |
| *Voltage (No Load)* | 12Vdc |

| **Solenoid Supply** | |
|---|---|
| *Voltage* | 18Vdc max. holding solenoid |

| **Temperature Sensor Inputs** | |
|---|---|
| *Number of Inputs* | 3 |
| *Type* | RTD 100Ω at 0˚C |
| *Scaling* | 0 to 200˚C |
| *Excitation Current* | 1.0mA |
| *Resolution* | 1.0˚C |
| *Accuracy* | ±3˚C |
| *Fault Modes* | Open sensor up-scale<br>Shorted sensor down-scale |

| **Oil Pressure Sensor Inputs** | |
|---|---|
| *Number of Inputs* | 1 |
| *Type* | Analogue input (0V to 5V) |
| *Range* | Application specific |

| **Speed Input** | |
|---|---|
| *Number of Inputs* | 1 |
| *Type* | Digital frequency counter (0V to 5V pulse train). |

| **Gas Detection Sensor Inputs** | |
|---|---|
| *Number of Inputs* | 1 |
| *Type* | Catalytic Methane 0 to 5% V/V<br>3 wire 4-20mA signal return |

| **Data Communication** | |
|---|---|
| *Type* | 2.4GHz Wireless link using proprietary protocol |
| *Connection* | Antenna fed from internal radio section to exterior via 16/20mm gland. |
| *Range* | Up to 50m line of sight. |
| *Communication Functions* | Download of logged data and setup.<br>Upload of configuration settings. |

| **Mechanical Details** | |
|---|---|
| *Enclosure Rating* | IP66 |
| *IP Requirements* | It is a requirement that the screws of the lid are tightened to at least 0.1Nm to maintain the IP66 rating can met the requirements of the certification. |
| *Material* | Stainless Steel 316 (1.6mm) |
| *Dimensions* | W 320mm, D 200mm, H 80mm |
| *Mounting* | End flange. 4 x M6.6 holes, 305x100 Rectangular Pattern |
| *Protection Concept* | Encapsulated to Ex 'm' standard. |
| *Weight* | Approximately 10kg |

| **Connections** | |
|---|---|
| *Type* | 16/20mm cable glands with armour retention. Connections made via barrier screw terminals. |
| *Number of Glands* | 9 |

| **Environmental** | | |
|---|---|---|
| *Shock* | 1000 shocks 40g, 3 planes | |
| *Vibration* | Low Frequency | 0.25mm ppk sinusoidal 10Hz to 100Hz, 3 planes |
| | Medium Frequency | 2g ppk sinusoidal 10Hz to 600Hz, 3 planes |
| | EMC | Compliant with required standards |

| **Certification** | |
|---|---|
| *Certificate Number* | ANZEx 05.4010X |

| **Intrinsically Safe Parameters** | | | | | | |
|---|---|---|---|---|---|---|
| Terminal ID | Uo (V) | Io (mA) | Po (mW) | Co (µF) | Lo (µH) | L/R (µH/Ω) |
| T.B.1: Sensor V+ w.r.t. 0V | 16.2 | 2508 | 3929 | 1 | 11.2 | 45 |
| T.B.1: IDA V+ w.r.t. 0V | 16.2 | 2508 | 3929 | 1 | 11.2 | 45 |
| T.B.1: SOL V+ w.r.t. 0V | 29.9 | 116.4 | 869 | 1 | 10.9 | 537 |
| T.B.2 | 16.2 | 49.2 | 201 | 10 | 10.9 | 2347 |
| T.B.3: IDA GRN w.r.t. 0V | 16.2 | 37 | 147 | 10 | 10.9 | 3175 |
| T.B.3: IDA RED w.r.t. 0V | 16.2 | 37 | 147 | 10 | 10.9 | 3175 |
| T.B.3: IDA Drive w.r.t. 0V | 16.2 | 142.1 | 576 | 1 | 11.2 | 810 |
| T.B.4 | 16.2 | 101.8 | 411.9 | 1 | 10.9 | 1133 |
| T.B.5 | 16.2 | 1218.8 | 1710.6 | 1 | 10.9 | 94 |

# 9 EQUIPMENT LIST

| *Part Number* | *Certification Reference* | *Description* |
|---|---|---|
| 121105 | E09481 | Dieselguard Base Station RF Receiver |
| 106908 | E09484 | Dieselguard Base Station Radio Version |
| 121425 | - | Dieselguard User Manual |
| 139995 | - | IDA display |
| 121047 | - | Gas Detector Calibration kit |
| 106198 | - | Methane Gas Sensor c/w Display |
| 115217 | - | Methane Gas Sensor c/w Remote Head on a 5m lead and Display |
| 101768 | - | Methane Gas Sensor c/w remote head on a 10m lead and Display |
| 173620 | - | Asco 3/2 solenoid valve |
| 174157 | | Pneumatic Bypass Assembly |