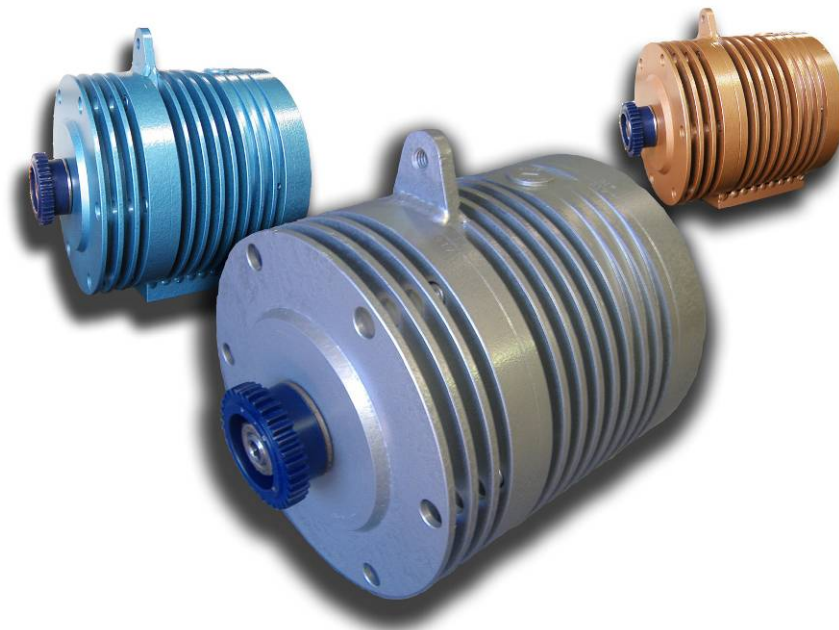


MINING REPAIRS

MR SERIES FLAMEPROOF ALTERNATORS

USER MANUAL and INSTALLERS GUIDE

Issued August 2007



Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 1 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



SCOPE OF DOCUMENT

The scope of this document outlines the installation, operation, maintenance and testing of the Mining Repairs MR series of flameproof alternators and explains their operational parameters.

The manual is equally applicable to various versions of the alternator where possible. Older versions of the alternator have individual components including a relay, fuse holder, capacitor and regulator.

This manual covers various topics designed for the safe and correct handling and installation of Mining Repairs Flameproof Alternators on Mine Sites and workshops.

The safety issues raised in this guide have been discovered via the undertaking of a Risk Assessment of the MR series of alternators on 15th March 2007 and are continually revised.

Please check the website for the latest versions of this document as soon as they are available or alternatively subscribe via email to receive the latest updates and information regarding the MR series alternators and products.

Included in the guide is information on manual handling issues such as;

- Crush injuries
- Back Injuries
- Burns
- Slips, trips and falls

The guide also covers installation and operating issues such as;

- Correct fitment and installation
- Belt tension
- Drive tension
- General maintenance
- Speed related issues
- Water ingress
- Alternator care
- Fault finding

This Installers guide is only to be used as reference and does not make any existing site practices and policies irrelevant. Current workplace procedures should be adhered to at all times and the highest level of safety constantly maintained.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 2 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



TABLE OF CONTENTS

SCOPE OF DOCUMENT	2
MR SERIES ALTERNATOR OVERVIEW	4
<i>Applications</i>	4
<i>Regulation</i>	4
INSTALLATION	5
<i>Alternator Fitment</i>	5
<i>Hydraulically Driven</i>	5
<i>Belt Driven</i>	6
<i>Rotation</i>	6
<i>Wiring</i>	6
<i>Connection</i>	7
<i>Field Winding terminals</i>	7
<i>Cable Entry</i>	7
<i>Rear Cover</i>	7
<i>Commissioning and Testing</i>	8
ALTERNATOR CARE	8
FLOW CHART	9
MR110/111 ALTERNATOR OVERVIEW	10
<i>Applications</i>	10
<i>Integrated Protection</i>	10
<i>Regulation</i>	11
<i>Reset</i>	11
<i>Remote Reset (M161)</i>	11
INSTALLER SAFETY	12
<i>Crush Injuries</i>	12
<i>Back Injuries</i>	12
<i>Burns by alternator</i>	12
<i>Burns by External sources</i>	13
<i>Slips Trips and Falls</i>	13
CONTACT	14

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 3 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



MR SERIES ALTERNATOR OVERVIEW

The current alternator is a self excited three phase multi-pole alternator with the following parameters shown in the table.

Parameter	Value
Category	Exd I
Ingress protection	IP65
Certification	IECEX TSA 06.0041X
Max alternator speed	7000 RPM
Output Voltage	12 or 24 V DC
Output Current	30 Amps Max

Applications

The MR series flameproof alternators are primarily designed for use on mobile diesel plant in Group 1 zone classifications as typically used by the underground coal mining industry.

Regulation

The voltage output of the MR series alternators is preset to a factory set voltage and is not to be adjusted by the end user.

The regulator has a load compensation feature which increases output voltage in proportion to the load current to compensate for voltage drop in the supply circuits

This load compensation feature is friendly to third party electronics and susceptibility to vibration is minimised due to the use of solid state components in the regulator circuit.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 4 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1

INSTALLATION

All applicable paperwork including certification documents is sent with each alternator when shipped.

Only authorised personnel who have been correctly trained should ever conduct work on an alternator.

Alternator Fitment

The MR series flameproof alternators are designed for a maximum ambient temperature of 40 deg C. Consideration should be given to the installation location to choose a mounting site that avoids high temperatures.

Locate or shield the alternator from sources of direct heat and ensure the alternator is well ventilated and airflow is not restricted.

Installation behind covers or shields is also advised to reduce the risk of inadvertently hitting or striking the alternator causing damage. Damage by physical striking of the alternator is strongly advised against and the addition of physical barriers reduces this threat.

To correctly mount the alternator to the machine, firmly attach the base of the alternator to the mounting bracket or correct machine location using at least four 5/16th UNC bolts with a washer and spring washer.

Specific mounting location dimensions are available in the specification flyer available for download from the website.

Hydraulically Driven

When mounting the alternator using a hydraulic drive motor ensure the UCDC drive (M135) is correctly fitted to the alternator. Correct instruction on this procedure is clearly explained in the pulley change out guide WI-5 available from the website.



Fit the UCC drive coupling (M120) between the alternator and the hydraulic drive motor and correctly align, ensuring that the hydraulic motor and the alternator are at the same height and are squarely facing each other. Tighten the alternator into this position

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 5 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1

Belt Driven

When utilising a belt drive setup, ensure that the belt is correctly aligned to minimise belt wear and increased bearing load. The belt should run squarely through the pulley.

When adjusting belt tension, ensure that the load on the pulley does not exceed 2400 Newton Force or 250kg load. This will help ensure that maximum bearing life potential is reached in service.



To adjust belt tension simply loosen the top adjusting bolt on the alternator and correctly tension the belt taking care to not exceeding the maximum figures shown above.

Rotation

The direction of rotation is not critical and rotation in either direction is acceptable. The polarity of the output terminal is not determined by direction of rotation.

Wiring

Access to the terminals is gained via removal of the rear cover. This is done by using a 5mm Allen key to remove the 6 bolts in an anti-clockwise direction.

Failure to correctly insulate the load conductors will result in the protection operation and isolation of the output voltage if a short circuit scenario occurs.

Ensure that vibration will not affect the integrity of the installation during use. Correctly terminating the cables and securing any looms ensures no damage can occur and minimises the risk of nuisance tripping if a DCBR is installed.

Never weld on the machine without first disconnecting the output terminals

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 6 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



Connection

Connect the load to the + and – terminals and connect the cable screens to the SCN terminal

The power terminals are 5mm metric thread.

The SCN terminal is internally connected to the inside of the flameproof enclosure.

High current alternator terminals must be securely fastened. The use of tooth lock washers in combination with brass flat washers is recommended.

Do not over tighten as any movement of the terminal stud will result in damage to the current paths on the circuit board.

Field Winding terminals

Observe the correct polarity when connecting the field windings.

RED	BLACK
POSITIVE +	NEGATIVE -

Cable Entry

Cable entry into the enclosure is via the 20mm conduit thread gland entry located on the top of the alternator using only an approved flameproof gland.

Ensure any un-used gland entries are properly sealed utilising an approved flameproof plug and are installed in the correct manner to the manufacturer's specification.

Rear Cover

When remounting the rear cover ensure flamepath surfaces are free from grease and dirt, and are in suitable condition. Apply a smear of fluid film to both surfaces and gently mount the rear cover into position using the correct 6mm bolts. Tighten the rear cover using a 5mm Allen key.

Once tight, check the gap with feeler gauges to ensure flameproof properties are maintained in accordance with approval drawing and the relevant standard.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 7 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



Commissioning and Testing

When the alternator is connected to the machine via the hydraulic coupling or belt drive (following the directions given on the belt tension procedure – WI-9, available on the web site) run the alternator up until excitation occurs. This takes place at approximately 1500 – 2000 RPM.

Initially the POWER LED will indicate that power has been applied to the regulator circuit. When full voltage has been reached the interrupters close making a supply to the output terminals. In the case of an MR100, the closed circuit breaker LED will illuminate.

This output supply should read approx 13.7 volts DC at the alternator.

If the supply is not established check for the following,

- Pulley is correctly tightened.
- Excitation is reached.
- Correct belt tension.
- Correct RPM/speed.
- Check LED indication.
- Temperature is not excessive.
- Follow flow chart.

ALTERNATOR CARE

Simple care and maintenance can result in increased service life of the alternator.

These include the following,

- Keep the alternator clean
- Do not hose the alternator
- Do not drive a machine with an alternator fitted through water at a level that the alternator may be subjected to water ingress.
- Keep the internals of the alternator clean
- Maintain flamepaths
- Use correct cabling techniques
- Mount in an appropriate location
- Ensure drives are correctly fitted
- Make sure only approved gland plugs are used
- Apply fluid film to all flamepaths
- Repair faults when they occur to minimise the risk of further damage.
- Never hit or strike the alternator
- Never run the alternator at excessive speeds

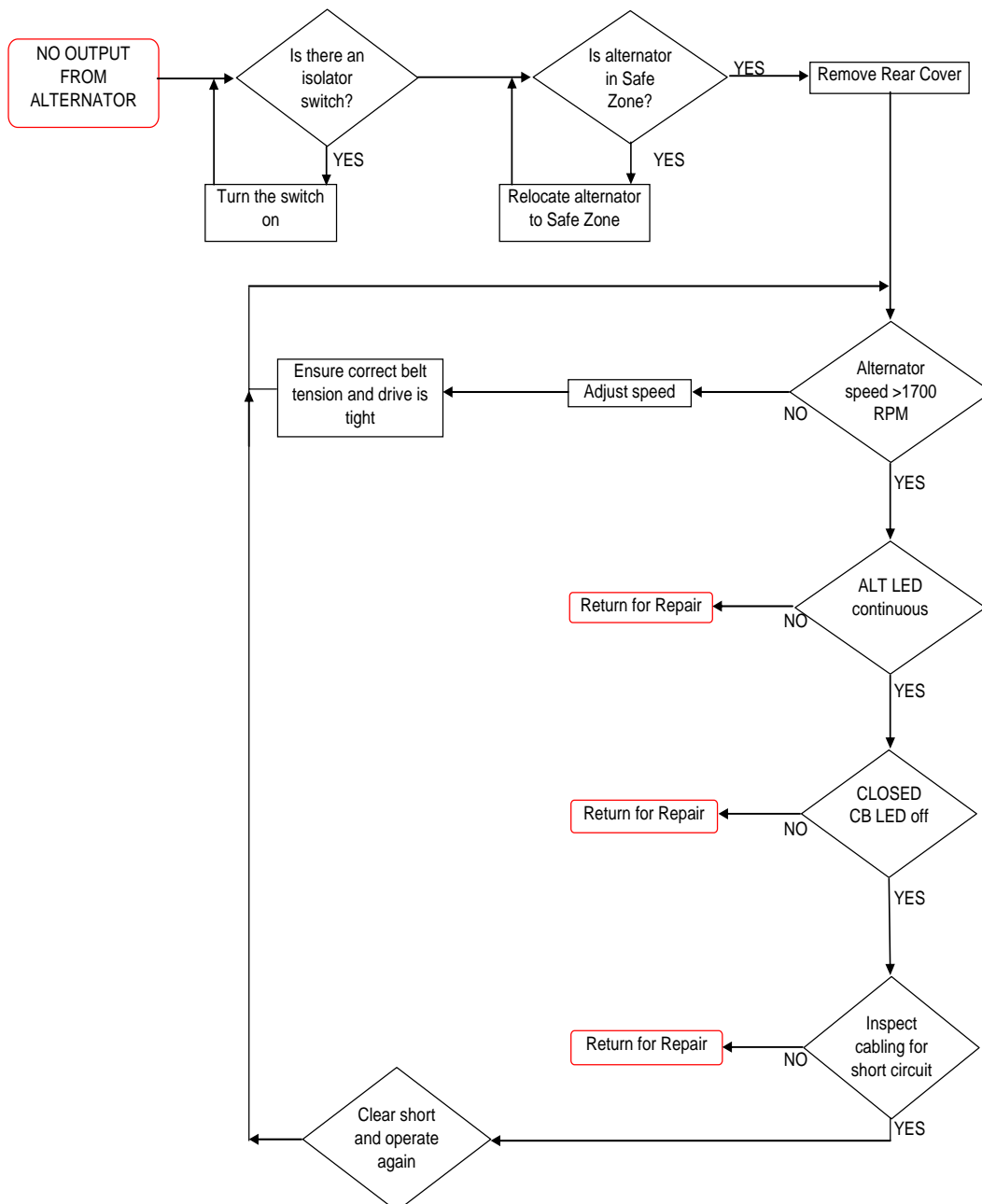
Carrying out these simple tasks will result in better overall alternator performance and service life.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 8 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1

FLOW CHART

Follow this flow chart to diagnose and repair alternator problems. This chart is only applicable to MR100 series alternators. For MR110 and MR111 flameproof alternators where a DCBR is installed refer to the DCBR User Manual.

Always disconnect the cables from the alternator when performing any insulation tests on associated cabling.



Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 9 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1

MR110/111 ALTERNATOR OVERVIEW

The alternator is a self excited three phase multi-pole alternator with the following parameters shown in the table below. The MR111 has two 20mm gland entries on the main housing and Remote Reset capabilities.

The MR110 alternator has the ability to be upgraded to enable reset via the remote reset facility (M161) using infrared. This allows the user to reset the alternator without removing the rear cover to reset the alternator and offers increased safety for the operator by not being exposed to hot or moving parts while performing a reset.

Parameter	Value
Category	Exd I
Ingress protection	IP65
Certification	IECEX TSA 06.0041X
Max alternator speed	7000 RPM
Output Voltage	13 V DC
Output Current	30 Amps Max

Applications

The MR110 and MR111 flameproof alternators are designed for use on mobile diesel plant in Group 1 zone classifications as typically used by the underground coal mining industry.

Integrated Protection

The MR110 and MR111 flameproof alternator offers the following features and protection above a MR100 alternator

- Protection Relay
- Data logger
- Instantaneous overcurrent
- Timed overcurrent
- Insulation impedance (+ve and –ve power rails to chassis)
- Overvoltage
- Upgradeable to remote reset. (MR110)

Benefits

The incorporated protection system minimises the risk that cable faults on flameproof electrical systems have by providing an additional layer of electrical interruption and isolation to existing mechanical protection techniques.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 10 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



The alternator offers an event log which provides detailed information and feedback on machine faults reducing downtime and unnecessary maintenance.

The excellent transient performance is compatible with third party electronic systems including gas detection.

Protection settings cannot be tampered with by unauthorised personal and must be factory set.

A protection operation is latched in persistent memory to ensure that even if the power is cycled, the protection operation is strictly enforced.

Regulation

The voltage output of the MR110 and MR111 alternator is preset to a factory set voltage and cannot to be adjusted by the end user.

The regulator has a load compensation feature which increases output voltage in proportion to the load current to compensate for voltage drop in the supply circuits

This load compensation feature is friendly to third party electronics and susceptibility to vibration is minimised due to the use of solid state components in the regulator circuit.

Reset

The alternator controller has protection functions that latch out the main circuit controller. Latched protection trips must be manually reset. This is done by removing the rear cover and pressing the reset button.

Alternatively a remote reset unit (M161) is available which with a Communications window (M160) and communications adaptor (M159) are installed in the alternator allowing reset via infrared.

The reset switch is only active if the alternator is running and energised. Operating the reset switch without the alternator being excited will not initiate a reset.

The reset may only be operated by an authorised person in a safe environment after the fault has been cleared and where the risk of igniting an explosive gas and or dust mixture has been assessed.

Further information on the DCBR is available in the DCBR User Manual available from the website and on the training DVD.

Remote Reset (M161)

Further instructions on the Remote Reset are found in the Remote Reset (M161) User Guide which is available on the website and also on the training DVD.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 11 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



INSTALLER SAFETY

Crush Injuries

Before lifting the alternator or removing it from the box, familiarise yourself with it and the general care instructions as outlined in this guide.

Crush injuries are most likely to occur when the alternator rolls onto the hand. This can occur when removing the alternator from the shipping box or when placing the alternator down.

Care should be taken when removing the alternator from the shipping box as the alternator can be rolled out carefully on to a soft surface such as rubber. Keep hands, feet and other body parts away until alternator has stopped moving to avoid injury.

When placing an alternator down on a flat surface, ensure fingers are not underneath the alternator as the weight of the alternator or a sudden drop may crush them.

The use of high grip gloves when handling the alternator is recommended to reduce the risk of slippage.

Back Injuries

Before lifting the alternator or removing it from the box, familiarise yourself with it and the general care instructions.

Back injuries can easily occur when handling the MR series alternators due to the weight and size.

Before lifting ensure you are familiar with relevant lifting advice for heavy loads and take care.

Do not suddenly twist or carry the alternator out in front of you with extended arms as this may put you off balance.

Always lift bending your knees and ask someone for help if necessary.

Burns by Alternator

The alternator can reach high temperatures after operating for more than half an hour.

Ensure that adequate protection from burns is sought by reducing possible contact or using gloves to protect from burns.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 12 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



Burns by External sources

Alternators may be located in areas that are in close vicinity of hot components.

Always make yourself aware of these potential risks and take correct precautions.

Follow any procedures or guidelines that are already in place at your workplace.

Slips Trips and Falls

Ensure that your work area is clean and free from potential slip trip and fall hazards.

When carrying an alternator you may become easily unbalanced so ensure your work area is free from any unnecessary obstacles.

Clean any spills that occur immediately and advise other employees and your supervisor immediately of the potential hazard.

Remove any trip hazards from your work area wherever possible. Familiarise yourself with your surrounding work environment.

Be aware of any potential area that a fall may occur such as stairs or raised platforms. These may not be clearly visible if carrying an alternator.

Ensure all hazards are clearly marked and signed in your work area.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 13 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1



CONTACT

Further information including all current documentation is available from Mining Repairs or from the web site.

Website: www.anderson-group.com.au
Email: minrep@anderson-group.com.au
Phone: +61 2 4256 1177
Fax: +61 2 42 57 1283

A training DVD is also available upon request.

Document Title : QD 7.2.3b - MINING REPAIRS USER MANUAL AND INSTALLATION GUIDE	Page(s) : 14 of 14
Written By : WORKSHOP MANAGER	Review: Annually
Approved By : MINING REPAIRS MANAGER	Version No.: 1