AMTECS

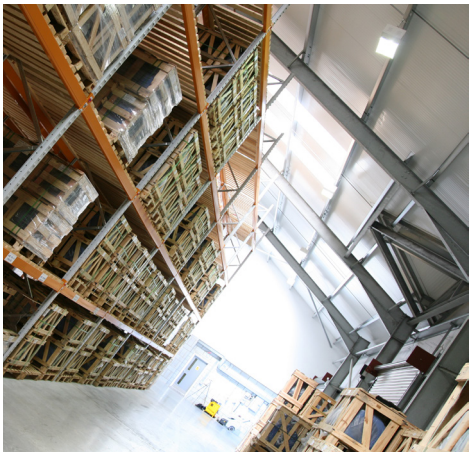
Operation & Maintenance Manual

01488 686970

www.amtecs.co.uk

About Us

AmTecs is the UK's largest independent supplier of motors and associated equipment. With over 25 years of experience we are able to offer our customers the service they need. Our bespoke designed warehouse and headquarters in Berkshire allows us to access £3m of stock for rapid delivery.



Vision

At AmTecs we constantly strive to improve the efficiency of our processes and develop better ways to respond to changing circumstances and customer needs.

Values

Our core values are geared to providing goods of the highest quality, together with the overriding care for customer service, innovation and reliability.

Quality

Our ISO 9001 Lloyds Accreditation means assured product quality and covers work on customer specified modifications to the standard range.

Partnerships

With strategic partnerships around the globe we are able to offer worldwide support for our product.

Sales Hotline: 01488 686970

Introduction

The electrical machines referred to in these instructions are intended as components for use in industrial areas. The information contained in this documentation is designed for use by qualified personnel who are familiar with the curent rules and regulations in force. They are not intended to replace any installation regulations issued for safety purposes.

In terms of Directive 89/392/CEE low voltage motors are to be considered as components to be installed on machines. Commissioning is forbidden until the final product has been checked for conformity.

Note regarding electro-magnetic compatibility

Low voltage induction motors, if installed correctly and connected to the power supply, respect all immunity and emission limits as set out in the regulations relating to electro-magnetic compatibility (EMC "Generic Standard" for industrial environments).
In the case of supply by means of electronic impulse (inverters, soft starters etc.), all verifications and any modifications necessary to ensure that emission and immunity limits stated within the regulations are respected, are the responsibility of the installer.

Note regarding manufacture date

The motor year of manufacture is coded in the motors serial number. The first 2 numbers of the serial number indicate the year of manufature.

e.g. serial # B19011990000 was manufactured in 2019 or serial # 16060580000 was manufactured in 2016

1.General safety warnings

1.1 Danger

Rotating electric machines are dangerous. Consequently:
- **improper use**
- **removal of protection** and disconnection of protection devices
- **lack of inspection and maintenance** can cause serious harm.

The personnel must be informed of any danger caused by contact with:

⚠ **- live parts**

⚠ **- rotating parts**

⚠ **- hot surfaces.** In normal working conditions the motor exceeds 50°C.

The safety manager must ensure and guarantee that:
- the machine is moved, installed, put in service inspected, maintained and repaired **only by qualified personnel**, who should have:
- specific technical training and experience
- knowledge of technical standards and applicable laws
- knowledge of general safety regulations as well as national, local and installation regulations
- ability to recognize and avoid all possible dangers.

Work on the electric machine should be carried out upon authorization of the safety manager after having ensured that:

a) the motor has been disconnected from the power supply and that no parts of the motor including auxiliary parts are live

b) discharge of the capacitor has been done for single phase motors

c) the motor is completely stopped and there is no danger of **accidental restarting**

d) the right precautions against faulty braking operations have been taken for **self-braking motors**

⚠ where thermal protection with automatic reset or brake units are used, care must be taken to ensure automatic restart cannot occur. Since the electric machine referred to is intended to be used in industrial areas, additional protective measures must be taken and guaranteed by the person who is in charge of installation where more stringent protective measures are needed.

2.Storage and installation

2.1 Control

The motors are shipped ready for installation. Upon receipt remove packaging and turn the shaft to check the motor has not been damaged, also check all physical aspects of the machine for damage. In the case where the machine is damaged an immediate notification must be given in writing by the storeman and the representative of the carrier to AmTecs within 3 days.

2.2 Storage procedure

2.2.1 Storage conditions

If the motors are not used immediately, they should be stored in a clean, dry temperate environment free of vibrations and protected from the weather. (If stored below -15°C, and before starting, the motor temperature must be restored to the permissible working temperature range (i.e. -15°C to 40°C). **In this case, it is necessary to specify these particular storage conditions during the ordering stage so that proper precautions can be taken during building and packaging.**

2.2.2 Checking bearings

When the motors are stored properly, bearings need, no maintenance. However, it is a good idea to turn the shaft by hand every three months. After storage of over one year motors with unshielded bearings (usually such motors have a lubricator and bear a lubrication plate), it is advisable to check the condition of the lubrication and motor components.

2.2.3 Checking insulation

Before installation check the motor windings using the appropriate instruments to ensure the condition of the insulation between phases and between phase and earth are of the corrects resistance values.

⚠ Do not touch the terminals during and immediately after measuring as they are live.

If the insulation resistance value is less than 10 Megaohms, or after storage in a damp environment, the motors must be dried in an oven for about 8 hours by gradually bringing the temperature up to 100°C. To ensure that the dampness has been completely expelled, the motors must be dismantled.

2.2.4 Operating precautions

All operations listed above must be carried out by qualified personnel. Be aware that dismantling or opening of the motor during the warranty period without authorization of AmTecs may invalidate the warranty.

2.3 Installation

⚠ ⚠ **Work on the electric machine must be carried out when the machine has stopped and been disconnected from the power supply** (including auxiliary parts, such as anticondensation heaters).

2.3.1 Lifting

Before using the lifting rings make sure they have been tightened.

⚠ The lifting rings are big enough to bear the weight of a single motor, therefore they must not be used to lift the equipment connected to the motor.

In environments where the temperature is below -20°C, these lifting rings should be used with caution as they could break at low temperatures and cause damage.

2.3.2 Connection to power supply

Use cables with sufficient cross-section to bear the maximum current absorbed by the motor, avoiding overheating and/or drops in voltage. Connect the cables to terminals by following the instructions on the plate or on the diagram included in the terminal box. Check that terminal nuts are tightened.

⚠ **When connecting to the motor terminals creepage and clearance distances must be maintained between live uncovered parts.**

⏚ Earthing is through the screw located inside the terminal box. Earths must be of sufficient size and installed according to relevant standards. The area of contact of connections must be cleaned and protected against corrosion.

When the cable inlet is made by means of a cable gland, it must be chosen properly in relation to the type of plant and type of cable used. The cable gland must be tightened so that the retaining rings create the pressure necessary to:

a) prevent transmission of mechanical stress to the motor terminals

b) ensure the mechanical (IP degree) protection of the terminal box.

2.3.3 Connection of auxiliary parts

a) thermal protection
Check which type of protection is installed before making connections. If thermistors (PTC) are used, it is necessary to utilize a suitable relay. Do not apply a voltage over 6V during the thermistor continuity test.

b) anti-condensation heaters
If the motor is fitted with anti-condensation heaters, their power supply must be separated from that of the motor, using the terminals housed in the terminal box.

⚠ **- WARNING:** the supply of the heater is always monophase and the voltage is different from that of the motor.

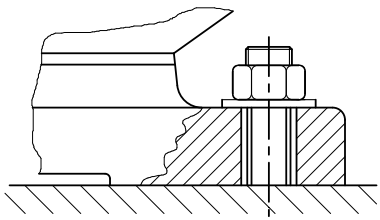
c) auxiliary ventilation
Connect the supply of the auxiliary ventilation motor separately from that of the main motor.

⚠ **- WARNING:** use a device that allows starting and operation of the main motor only when the auxiliary fan is working.

d) all the above-mentioned operations must be carried out by following the instructions shown on the connection diagram provided with the motor.

2.3.7 Fixing to the base

The bolts fixing the motor to the base must be fitted with washers so they ensure adequate load distribution.



3.Putting into operation

⚠ It is the responsibility of the installer **to establish the motor's fitness to be used in a certain plant,** after analysing the characteristics of danger existing in the installation area with respect to current provisions of the law and to those issued for safety purposes.

3.1 Initial Controls

Before starting the motor it is important to check that:

a) installation has been carried out properly

b) the bearings have not been damaged during installation

c) the motor base is sturdy enough and the foundation bolts have been tightened

d) the design data corresponds to those given on the plate and in the technical documentation

⚠ - The electric motor is a component made to be mechanically connected to another machine (single or part of a plant). Consequently, it is the task of the person responsible for the installation **to guarantee that during operation there is an adequate degree of protection for people or things against the danger of accidental contact with moving parts.**

3.2 Control of Design Data

Make sure that the motor is suited for use in the working conditions foreseen and check the following:

3.2.1 Environmental conditions

a) ambient temperature: standard closed motors can operate between -15°C and +40°C.

b) altitude: normal motors have been designed to work between 0 and 1000m above sea level

c) protection against the presence of harmful agents like; sand, corrosive substances, dust and/or fibre, water, mechanical stress and vibrations

d) mechanical protection: installation inside or outside considering the harmful effects of the weather, the combined effect of temperature and humidity and the formation of condensation

e) adequate space around the motor particularly on the fan side to allow proper ventilation
f) motors mounted in the vertical, shaft down require a protective cowl over the fan inlet
g) any danger of explosion or fire.

3.2.2 Working conditions

a) The motor must only be assembled and operated in the construction form indicated on commercial and technical documentation (e.g. datasheet or drawing).
b) operation type: the motors are normally for S1 duty continuous operation.
c) load type: carefully evaluate machines with high moments of inertia and the relative starting times.

3.2.3 Electrical characteristics

a) voltage and frequency should correspond to those on the plate
b) motor power should be adequate as required by the load
c) power supply protection against overloads and/or short circuits should be adequate for the nominal current and starting current
d) for connection to control circuits follow the connection diagram supplied with motor

⚠ **Abnormal working conditions must always be defined when placing order** to ensure that the site conditions are not prejudicial to the proper operation of the machine.

3.2.4 Other checks before commissioning

a) Check that the motor rotates in the correct direction, and that when the inverter is activated the speed limit is not exceeded.
b) Check that the motor is protected as prescribed in the standards.
c) Where using a star/delta starter, to avoid the risk of overloading make sure that the switch over from star to delta only takes place when the starting current has been adequately reduced.
d) Check that any auxiliary accessories are working.

3.3 Starting

3.3.1 Earthing connection

Before starting the motor ensure that the grounding cable is connected.

3.3.2 Motors with auxiliary ventilation

For motors with forced ventilation by means of external ventilation make sure that the motor starter is interlocked with the, contactor of the external ventilator to ensure the fan is operational.

3.3.3 Start up

When all previous checks have been made satisfactorily, the motor may be started. Unless otherwise stated all motors can be direct on line started. If you intend to start the motor by means of static starters, rheostats or the star-delta system, they must be chosen and set property to avoid incorrect functioning of the motor.

3.4 Conditions of Use

3.4.1 Working features

Once the motor has started it is necessary to check that during operations the working conditions remain within the limits envisaged, and that the following does not occur:
a) overload
b) dangerous rise in environmental temperature
c) excessive drop in voltage

3.4.2 Restarting after long rest

Before starting the motor after a long resting period, repeat the controls described in section 2.2.2 and 2.2.3.
Where supplied, heater must not be energised when the motor is running.

3.4.3 Abnormal conditions

⚠ The motor must be used solely for applications it was designed for and must be utilized and controlled complying with the precautionary standards.

⚠ **If the motor starts to exibit unusual working characteristics such as; drawing more power, increase in temperature, vibration, or becomes noisy. Inform the personnel in charge of maintenance immediately.**

3.4.4 Protection against overloading

In terms of the IEC 60079-14 standard all motors are to be protected using a suitable switch, such as one with a delayed trip that is triggered by the current, as well as protection in case of a phase going down. The protective device is to be set at the nominal current shown on the plate. This device must be chosen so that the motor is protected thermally should the rotor jam.

The windings must be protected in such a way that the switches or relays are connected in series with the winding phase. Switches are to be chosen set taking the nominal phase current, that is, 0,58 times the motor's nominal current, as the base value.

4. Maintenance

⚠ ⚠ Any operation on the motor must be carried out with the machine stopped and disconnected from the power supply (including auxiliary circuits, especially the anticondensation heaters). Maintenance of the original characteristics of electric machines over time must be ensured by a schedule of inspection, maintenance and set up managed by qualified technicians. The type and frequency of maintenance depends on environmental and working conditions. As a rule, it is recommended that the first inspection is made after about 500 hours of operations (or, within 1 year), while subsequent inspections should follow the schedules established for lubrication and general inspection.

4.1 Inspection

4.1.1 Normal working

Check that the motor works normally without abnormal noise or vibrations. If it does not, locate the cause of the anomaly.

4.1.2 Cleaning the surface

Make sure that the ventilation is not obstructed. Clean the motor by removing any dust or fibre deposits from the fins and from the fan cover.

4.1.3 Checking the supply and earthing cable

Check that the supply cable does not show signs of wear and that the connections are tight. Make sure that the earth and supply cables are not damaged.

4.1.4 Transmission elements

Check that the transmission elements are in perfect condition and that the screws and nuts are tight.

4.1.5 Protection against water

When the motor is installed in a very damp environment or is subject to drips of water, check regularly that the seal and retaining rings and any protective devices work efficiently. Ensure that there are no infiltrations inside the casing or terminal box.

4.1.6 Drainage devices

The motors furnished with drainage devices should be checked and cleaned regularly so that such devices continue to work properly.

4.1.7 Thermal protection

Make sure that thermal protections have not cut out and have been set properly.

4.1.8 Unauthorized modifications

Check that no modifications have been made that alter the electric and mechanical operation of the motor.

4.2 Lubrication

4.2.1 Permanently lubricated bearings

Motors with shielded or sealed bearings (type ZZ or 2RS) do not require lubrication. Therefore, if used properly, they do not require maintenance.

4.2.2 Bearings with lubricator

Motors with unshielded bearings are furnished with lubricators. The interval time between lubrications depends on the type of grease, environmental temperature, (any excessive working temperature) and type of operation the motor carries out. The table in this manual shows the intervals foreseen for 70°C as a working temperature of the bearings in normal operating conditions. It is recommended to use a good quality lithium based grease with great penetration capacity and high dropping point like. (Eg. SKF LGHP 2, SKF LGWA 2). If the velocity is different from the one given in the table, the intervals must be modified in inverse proportion.

e.g. bearing 6314 at 1800rpm

$$1 = \frac{1500}{1800} \times 4100h = 3416h$$

Regardless of working hours, the grease must be renewed after 1 or 2 years or during a complete overhaul.

4.3 Lubrication Intervals for unshielded bearings

Bearing type	Qty of Grease	3000 rpm	1500 rpm	1000 rpm	750 rpm
	(g)	Hours (h)			
6209	15	5900	10100	12100	13200
6309	20	5200	9500	11700	12800
6211	20	4100	8000	9900	11100
6311	25	3500	7400	9400	10700
6212	20	3100	6400	8200	9100
6312	25	2600	5900	7800	8800
6313	30	2500	5700	7700	8700
6314	30	1800	4800	6600	7600
6317	40	1200	3700	5400	6500
6319	50	1000	3300	5100	6200
NU319	50	550	1800	3300	4600
6322	70	650	2800	4600	5800
NU322	70	400	1300	2800	4100

5. Troubleshooting

Problem	Possible Cause	Solution
The motor does not start	Fuses damaged due to overloading	Replace the fuses with similar ones of the correct size.
	Opening of the overload switch	Check and reset the switches.
	Insufficient power available	Check that the power required is as shown on the motor's plate.
	Connections incorrect	Check that the connections are as shown in the motor's connection diagram.
	Mechanical fault	Check that the motor and the machine to which it is coupled turn freely. Check the bearings and lubricant.
	Short circuit on the stator	The motor must be replaced.
	Defective rotor	The rotor or complete motor must be replaced.
	One phase is down	Check the connection cables and switching circuits.
	Incorrect application	Check the motor sizing with the manufacturer.
	Overload	Reduce the load.
	Voltage too low	Make sure that the motor is powered at the voltage shown on the plate.

Problem	Possible Cause	Solution
The motor does not reach its nominal speed or the acceleration times are too long and/or absorption excessive	Voltage drop on the line	Check the connections. Check that the cables are of the correct size.
	Undersized motor	Check the size of the motor.
	Defective rotor	Check the state of the rotor cage. Replace the rotor if necessary.
The motor overheats when working under load	Overloaded	Reduce the load.
	Cooling fins and/or fan cover blocked by dirt	Clear the ventilation slots to ensure a continuous flow of air over the motor.
	One phase on the motor may be down	Check that all the cables are connected tightly and correctly.
	One phase on the winding is earthed	Check the winding and remove the fault.
	Phase voltages asymmetrical	Check the power supply and motor voltages and rebalance the loads.
	Duty too great	Use the motor for the service indicated on the plate.
	Speed to slow	Motors powered by inverters require forced cooling for slow speed opperation.
Bearings overheating	Motor fitted incorrectly	Check that the motor is adequate for the type of fitting.
	Belts over-tensioned	Reduce the belt tension.
	Pulleys too far from the shaft shoulder	Move the pulley nearer to the shoulder on the motor shaft.
	Pulley diameter too small	Use a bigger pulley.
	Alignment incorrect	Correct the alignment of the motor and the machine coupled to it.
	Insufficient grease	Keep the correct amount of lubricant in the bearings.
	Lubricant ineffective or contaminated	Remove the old grease, wash contaminated bearings carefully andgrease with new lubricant.
	Excessive lubricant	Reduce the amount of lubricant. The bearing must not be more than half full.
	Bearing overloaded	Check the alignment and any radialand/or axial thrust.
	Bearing balls or race damaged	Replace the bearing.

Problem	Possible Cause	Solution
Abnormal vibrations	Motor not aligned	Align the motor with the machine it controls.
	Motor not secured to base or insufficient strength in base.	Reinforce the base. Check the bolts.
	Coupling or pulley not balanced	Balance the device.
	Coupled machine unbalanced	Balance the coupled machine.
	Defective bearings	Replace the bearings.
	Motor balanced differently from the coupling (half key – full key)	Balance the coupling using the half key.
	Three-phase motor working with 1 phase down	Check the phases and reinstate the three-phase system.
	Excessive play on the bearings	Either: - replace the bearings - replace the shield
Irregular noise	Fan touching the fan cover	Eliminate contact.
	Defective bearings	Replace the bearings.
Incorrect rotation	Incorrect phase sequence	Invert two phases.
Functioning of the protective device	The motor may have one phase down	Check the power supply.
	Wrong connection	Follow the wiring diagram for the connections and the performance data shown on the plate.
	Overloaded	Compare against the data on the plate and reduce the load if necessary.

6. Disposal

⚠ According to national requirement for environmental protection, after service life of motor expires, it should be disposed according to motor materials respectively, so as to avoid influence on environment in disposal process. Main materials of motor are cast iron, steel, copper, aluminum and insulating materials. General metal may be recycled for use. Nonmetal material cannot be recycled,but may be disposed by burning etc methods, however, it must be ensured that burning process will not pollute the environment. Please dispose according to relevant national regulations.

7. Overhaul and Repairs

7.1 Spare parts

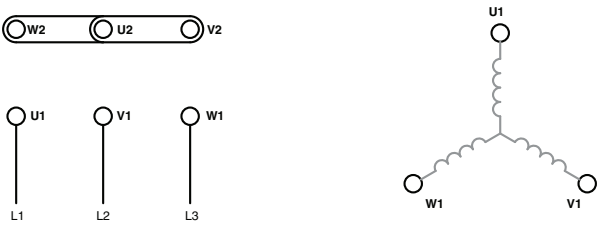
When needed, all motor components should be replaced by original spare parts. To request spare parts use the nomenclature shown in the catalogues and always give motor type and serial number.

7.2 Authorized repair shops

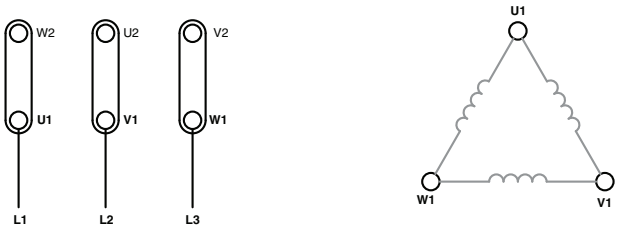
Overhauls and repairs must be carried out by trained personnel who guarantee restoration of the motor to its original conditions, we recommend that you contact an authorised repair agent. For further information please contact our sales department.

6.Connection Details

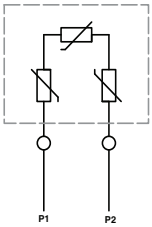
Star Connection



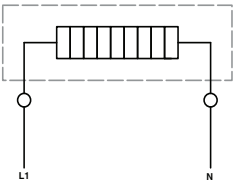
Delta Connection



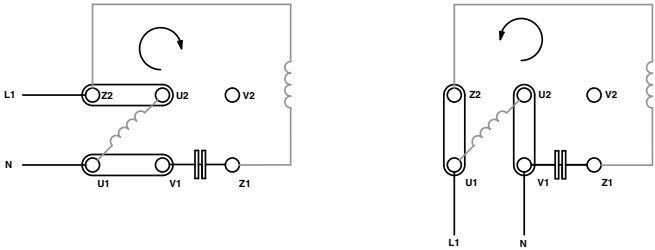
Thermistor (PTC)



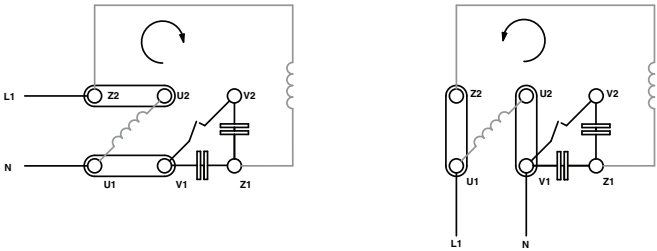
Anti Condensation Heaters



Single Phase Permanent Capacitor



Single Phase Capacitor Start/Capacitor Run



Our full product line and specifications can be found at
www.amtecs.co.uk

Email: sales@amtecs.co.uk

AMTECS

Head Office
Tealgate
Charnham Park
Hungerford
Berkshire
RG17 0YT
United Kingdom

Tel: +44 (0) 1488 686970
Fax: +44 (0) 1488 686968

www.amtecs.co.uk

Sales Hotline
01488 686970

Email
sales@amtecs.co.uk