MOUNTING & MAINTENANCE INSTRUCTIONS FOR

THREEPHASE INDUCTION MOTORS - TYPES DM1 HV

TABLE OF CONTENTS

		page
1	General information	2
2	Delivery	2
3	Mounting	2
4	Coupling	2
4.1.	Direct coupling	2
4.2.	Indirect coup	3
4.2.1.	V belt	3
4.2.2.	Spur gear transmission	3
4.3.	Shaft couplings	3
5	Electrical connections	4
5.1.	General information	4
5.2.	Circuit detail	4
6	Motor protection	4
6.1	PTC's	4
6.2	PT100's	4
6.3	Windings	5
6.4	Bearings	5
7	Putting into service	6
8	Maintenance	
8.1	Dust	6
8.2	Moisture	6
8.3	Wear & vibrations	6
8.4	Greasing	7
8.5	Replacement of ball or roller bearing	7
9	Bearing types	8
	Grease-interval Bearings	9

1 GENERAL INFORMATION

This manual concerns normal three phase induction medium and high voltage motors with an output up to 1000 kW; they are externally cooled, totally enclosed, supplied in a cast iron frame and provided with ball bearings or roller bearings, lubricated with grease**.**

2 DELIVERY

Met opmaak: opsommingstekens en nummering

After receipt, remove the package material, if any, and mind the parts that have been delivered loose.

Check the motor to see whether transport damage has occurred.
You should be able to rotate the shaft easily and smoothly by hand.

Compare the details on the nameplate with those of the power network and with the requirements of the motor.

3 MOUNTING

Met opmaak: opsommingstekens en nummering

The motor must be fixed on a stable, clean and flat foundation with good fitting foundation bolts, using washers.
Never mount a motor manufactured for a horizontal mounting on a surface with an angle of inclination without consulting the supplier in advance.

Foot & flange motors always have to be mounted in such a way that the drain holes, if any, are situated at the bottom, otherwise you risk that moisture will condensate in the motor and cannot be drained off. To this end you need to remove the drain plugs.

Under no circumstances the entrance of cooling air, drafted by the cooling fan, may be obstructed. This will cause overheating of the motor.
Special attention is required where motors will be located in small-enclosed rooms.
The ambient cooling temperature must not exceed 40 ºC, unless otherwise agreed upon at the time of ordering.

4 COUPLING

Met opmaak: opsommingstekens en nummering

4.1 Direct coupling

Met opmaak: opsommingstekens en nummering

The motor and driven shafts must be accurately aligned. In case of a flexible coupling, the manufacturers distance between the parts to be coupled must be adhered to, also the degree of misalignment must be within the makers tolerance. We do not recommend using solid couplings.

4.2 Indirect coupling

Met opmaak: opsommingstekens en nummering

4.2.1. Flat or V Belts

Mount the motor on slide rails in order to adjust belt tension.
The belt pulley has to be fitted hard up the shoulder of the shaft. The pulley center line should be within the shaft center line. Use correctly sized belts with a correct profile and in sufficient numbers to drive without slip and undue tension. Align both pulleys accurately in such a way that the center of both pulleys are in line.

A belt pulley, which is either too small or too wide, or too high, a tension on the belt may damage the bearing or cause a shaft break.
In case of doubt, consult the supplier.

4.2.2 Spur Gear Drives

Met opmaak: opsommingstekens en nummering

The motor and the driven machine have to be positioned in such a way that the two gears align correctly. The motor should then be fixed with dowels.

4.3 Shaft couplings and pulleys etc.

Met opmaak: opsommingstekens en nummering

Remove the corrosion protection from the shaft extension and the coupling elements. The coupling parts, belt pulleys and gear wheels need to be dynamically balanced and fit easily on the shaft and to be provided with good fitting keyway.

In the factory the rotor has already been dynamically balanced including a half key in the shaft.

The dimension and the tolerances of the shaft extension and the key are indicated on the motor dimension sheet.

Assembling the coupling elements has to been done with great care. Careless handling may damage the bearings, shaft or end shields.

Do not file or emery on the shaft to achieve a fit!

When fitting pulleys couplings or bearings, we recommend using an induction heating device; therefore the part to be mounted has to be heated till ± 100 °C.

A large washer and setscrew can be useful for pushing on pulleys using the tapped hole in the shaft. Only use proper tools for removing the above mentioned parts e.g. pulley drawers.

5 ELECTRICAL CONNECTION

Verwijderd: ¶
¶
Pagina-einde
¶

5.1 General information

Met opmaak: opsommingstekens en nummering

On delivery the motor will rotate clockwise looking at the drive when the phases L1, L2 and L3 are connected respectively to the connection terminals U1,V1 and W1.
Exchanging any two-phase lines can change the direction of rotation.
When a motor is only suited for one direction of rotation, it is indicated with an arrow on the motor fan cowl.

Connecting cables must comply with the IEC regulations.
Line fuses only protect the cables in case of short–circuiting and do not constitute a safeguard against the overheating of the winding caused by overload. Therefore it is recommended that a motor start- and overload protection is mounted, giving single phase and overload protection.

5.2 Circuit

Met opmaak: opsommingstekens en nummering

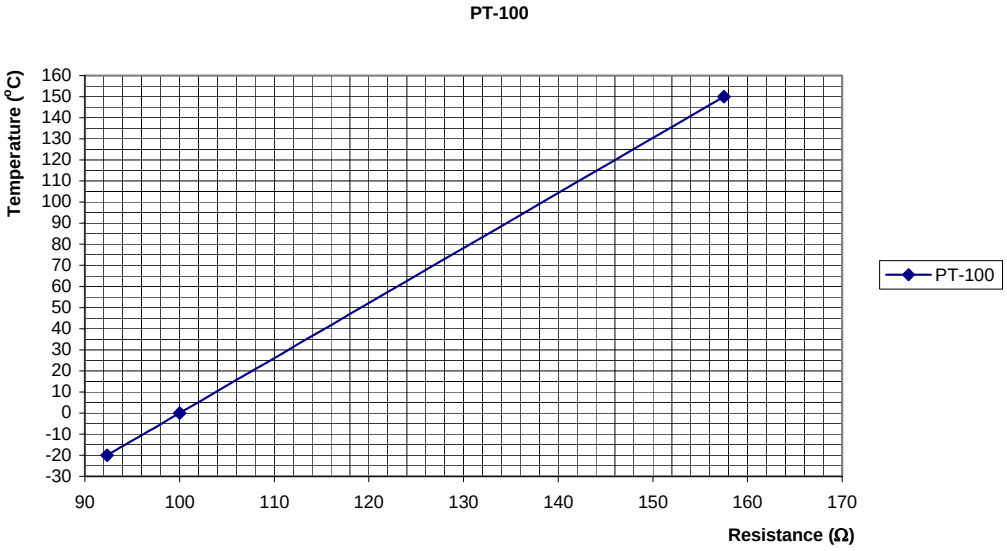
Normally our motors are provided with a terminal box with three connections, to which three leads from the winding are connected.

6 MOTOR PROTECTION

6.1 PTC’s

Positive Temperature sensors change the resistance from 20-250 W below the nominal reaction point to > 1500W above this temperature. One PTC is placed in each phase and connected in series. So the values above must be multiplied by three.
Never use a higher voltage than 7.5V DC for 3 PTC’s in series, otherwise damage can be done not only to the PTC’S but also to the windings!
PTC’s are available for different temperatures.

6.2 PT100’s are RTD’s Resistance Thermal Detectors made of Platinum.
Basically, RTD’s operate at the principle that the electric resistance of a metal conductor varies linearly with the temperature. See table:



6.3 WINDING PROTECTION

We recommend to set the alarm for motors with insulation class F, at 135°C and the trip at 150°C

6.4 BEARING PROTECTION

here we recommend an alarm at 90°C and a trip at 105°C

7 PUTTING INTO SERVICE

Before putting a motor into service, one should check especially when the motor has not been used for a long time that the insulation resistance of the winding (R_m) is sufficient.
The Rm insulation can be calculated with the formula:
$R_m = U_n + 1$
R_m= Minimum insulation resistance in Mega Ohm
U_n= Rated voltage in kV

If the insulation resistance is not high enough, the motor has to be dried out revarnished or rewound.
Check all connections and adjust the thermal protection units to the correct current. Switch the motor on in a no load state to determine the direction of rotation. Load the motor gradually and check whether it runs without vibration.

The motor can be used under a variation of the main voltage ± 5% or frequency variation of max. ± 2% compared to the nominal frequency or nominal voltage, in compliance with the international regulations for electric machines.

8 MAINTENANCE

The totally enclosed and fan cooled three phase squirrel cage induction motors require very little maintenance.
Nevertheless it is recommended to check the motor regularly in order to prevent a breakdown caused by dust, moisture, vibrations, too much or too little greasing.

8.1. Dust

7 The outer parts of the totally enclosed motors, especially the cooling ribs or cooling channels, have to be kept as clean as possible in order not to obstruct the cooling air from the fan extracting the heat from the motor frame.

Met opmaak: opsommingstekens en nummering

Verwijderd: ¶

8.2. Moisture

Motors that are stalled for a long time, should be started from time to time to prevent moisture affecting the windings in the long term. Before putting the motor into service, one should check especially when the motor has not been used for a long time that the insulation resistance of the winding is sufficient.

8.3 Wear & vibration

Met opmaak: opsommingstekens en nummering

To prevent abnormal wear & vibration, one should:

a. Take care that the tension of the belt or the chain is not too high;
b. Check whether the mounting of directly coupled machines is correct;
c. Check whether the foundation bolts to fasten the motor and the slide rails are tightly fixed.

8.4 Greasing

Before the motor leaves the factory, the bearings are filled with a high quality Lithium base grease.

Sizes 315 up to and including 450, has been provided with a permanent lubrication system containing a grease valve.
The lubrication must take place when the machine is running.
The old grease is ejected from the grease valve thus maintaining the correct level and avoiding overfilling which would be harmful.

8.5 Replacement of ball or roller-bearings

Met opmaak: opsommingstekens en nummering

When a bearing has to be replaced, the old bearing has to be removed from the shaft with proper tools in order not to damage the shaft. Thereupon the bearing location on the shaft has to be cleaned and checked thoroughly.

To fit a new bearing correctly, heat to 100 °C with an electric induction heater, then slip quickly onto the shaft up to the stop. In the case of a roller bearing only fit the inner part of this bearing with the induction heater.

Do not mount the end shield until the bearing has cooled down.

9. Bearing type

FRAME	DE	NDE
DM1-HV 355 2POLE	6317 C3	6317C3
DM1-HV 355 4POLE	NU 322	6322C3
DM1-HV 400 2POLE	6317 C3	6317 C3
DM1-HV 400 4POLE	NU 326	6326 C3
DM1-HV 450 4POLE	NU 226E+6226 C3	NU 226
DM1-HV 500 4POLE	NU 228E+6228 C4	NU 228

The type of bearing depends on the aplication and can be different than above.

9.1 Grease-interval Bearings

By the term “greasing interval” we mean the number of working hours after which the bearing lubricant has to be replaced.

Electric motors have such a wide range of application that they must cope with many adverse conditions as for instance dust, moisture, vibration, temperature, chemicals, marine atmosphere and of course, the mounting position and loading of the driven machine.
Generally we can say lubrication life is a product of time, speed and the bearing size. Due to the impact of all these factors, it is practically impossible to determine any exact values that are valid under all circumstances. Nevertheless it is necessary to provide at least some guidelines concerning greasing to the user.

Under normal load and environmental conditions the quality of the grease ensures proper operation of the motor for about 20000 service hours with 2-pole design and 40000 service hours with multi pole design. If not otherwise agreed upon the grease need not be refilled during this period. Nevertheless the condition of the grease filling should be occasionally checked also within the said lubricating intervals.

The stated service hours are only current under operation with rated speed. For relubrication thoroughly clean the bearings with a suitable solvent and use the same or substitute grades specified by the motor manufacturer. Bear in mind, however, that the bearings should be filled only up to about 2/3 of their free space as a complete filling of the bearings and bearing covers results in an increased bearing temperature and therefore in increased wear. For bearings with relubricating facility regrease at the grease fitting with the motor running according to the grease amount required for the motor in case. The relubrication intervals should be looked up in the following table:

A chemically aggressive environment, extreme moistness, strong vibrations, high or low ambient temperatures are not normal circumstances and such conditions must be taken into account.

Construction size	Two pole motors	Four-pole and multi-pole motors
315 up to and including 450	2 000 hours	4 000 hours