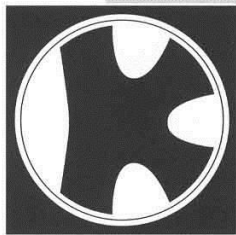


Antriebstechnik:

- Drehstrommotoren
- Gleichstrommotoren
- Bremsmotoren
- Sondermotoren
- Tachogeneratoren
- Impulsgeber
- Getriebe
- Sondergetriebe

Verfahrenstechnik:

- Vertrieb  
und Konstruktion  
von Maschinen  
und Apparaten  
für Grundoperationen
- Elektronik
- Anlagenbau



**E. KRETZSCHMAR**

**Installation  
and maintenance**

**for IP-54/55  
DC-motors**

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# INTRODUCTION

Kretzschmar DC motors are of substantially designed and manufactured to high standards. These motors will work satisfactorily for many years as long as they are maintained following the instructions.

Before putting the motor into service, read these instructions carefully and carry them out precisely.

## GENERAL GUIDELINES

The environmental conditions agreed when the order was placed should be adhered to. The motors must be set up on a good foundation. At all times ensure that the air intake and exhaust openings are not obstructed or reduced by leads, pipes or other parts. Hot exhaust air should be conducted away and must not be recirculated.

Penetration by water or foreign bodies which could cause damage must be prevented.

In the case of flanged motors, ensure that the location spigot fits correctly and that the securing bolts are evenly tightened. The inspection openings for the carbon brushes should be easily accessible in order to permit regular inspection.

Air ducts should be connected directly to the bracket concerned by means of a seal.

During assembly, the intake and exhaust openings should be covered over so as to prevent foreign matter entering the inside the motor. Do not forget to remove these covers before commissioning the motor.

## ATTACHING THE DRIVE PARTS

Before fitting couplings, pinions, pulleys etc. the rust inhibitor must be removed from the shaft end and this must be oiled or greased.

The motors are balanced with a half key, so that the parts to be fitted should be balanced without half key too.

Re-balancing after assembly should not be necessary.

As the motors are equipped with ball bearings, they should be connected to the unit to be driven by means of flexible couplings (bolted couplings, claw couplings etc.). The coupling halves should have sufficient clearance between the faces to allow for thermal expansion as any axial forces can damage the bearings. Damage can also occur due to misalignment for the idling and driven shaft end. Equally, driven and idler pulleys should be correctly aligned in respect of each other.

Take into account the maximum axial and radial forces, which can be obtained from Kretzschmar on request.

Pinion drives in commercially available reduction gear units can also be used.

## CYLINDRICAL SHAFT ENDS WITH KEYWAY

Hubs provided with a key seat should be fitted on with a device suitable for the purpose (fig. 1); or by heating the hub to approx. 80 – 100 °C.  
Never hammer couplings or pulleys onto the shaft.

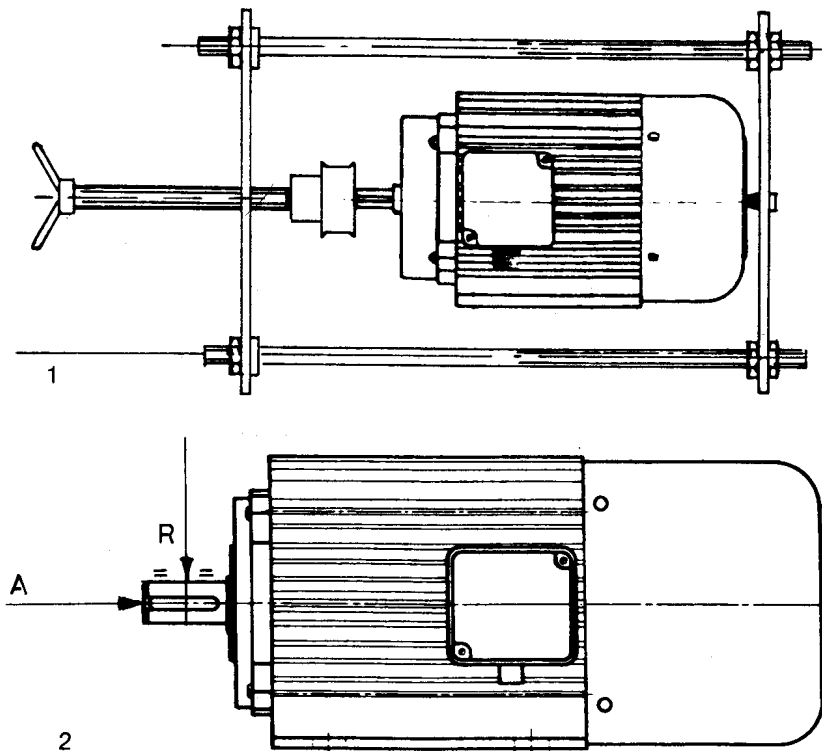


Fig. 1

## INSTALLATION

Foot mounted motors must be mounted on a level and rigid foundation; shims should be used if necessary to achieve alignment.

The drive and driven shafts must be aligned to each other within  $\pm 0,25$  mm.

## CONNECTIONS, WIRING

The terminals of the motor should be connected to the supply leads as shown in the connection diagram provided.

The terminals are marked according to wiring diagram. Tighten the terminal screws firmly in order to ensure good contact.

## EARTHING

If insulated erection is not stipulated, the motor and its associated equipment must be earthed in accordance with the applicable regulations.

The earth screw is located in the terminal box and is marked with the international earth symbol.

# COMMISSIONING AND OPERATION

## DIRECTION OF ROTATION

Either directions of rotation can be used, on all standard motors.

If in special cases the direction of rotation is indicated by an arrow on the motor, then the motor may rotate only in this direction.

The relationship between rotation and connection is given in the motor connection diagram.

## COOLING ARRANGEMENT

The supply and exhaust ducts must be brushed clean before initial commissioning; remove any foreign matter. The cooling air must be clean and dry. Penetration by dust, oil, water or steam must be prevented. Make sure that the supply and exhaust air can flow unhindered and respect the minimum distance to the supply duct.

For forced-ventilated motors with three-phase external fan motor, the correct sense of rotation must be ensured. If the alphabetical order of the terminal designations U1, V1, W1, U2, V2, W2, corresponds to the chronological sequence of the phases, the forced-ventilation motor rotates clockwise (looking at the shaft end of the forced-ventilation motor). For counter-clockwise rotation, two outer connection cables must be interchanged to avoid a change of the terminal designations. The prescribed direction of rotation of the forced ventilation motor is marked by an arrow.

## INSULATION RESISTANCE

If the motor has been idle for a prolonged period, the insulation resistance of the windings should be checked. In order to measure this insulation resistance, all supply leads must be disconnected. It is usual to carry out the measurement using a megger with a test voltage of 500 – 1000 V.

The insulation resistance of the rotor and stator winding with respect to the motor housing should be in the order of 1 – 5 Megaohms. If lower values are measured as a result of leakage paths due to soiling or moisture, the windings and the brush holders must be cleaned and the motor dried using hot air.

## BRUSH HOLDER, CARBON BRUSHES

The brush holders are correctly set during testing prior to delivery and must remain in this exact position. If in exceptional cases the brushes are damaged during transport or when the motor is being installed, the brushes concerned should be replaced (see Maintenance).

## STARTING, RUNNING

Before starting up the motor, ensure that it rotates freely.

In case of motors with external cooling, the cooling fan must be energised so that the motor can be run. When starting up for the first time, check the mechanical rotation.

If vibrations occur, check the alignment.

Once the motor is running satisfactorily, it is advisable to observe it for some minutes in a no-load state before applying full load. The nameplate ratings must not be exceeded.

## **Attention:**

The armature voltage must not be applied without field excitation or if the shunt circuit is broken, the motor can fail. (The speed may increase without limitation and cause serious damage).

## **SWITCHING OFF THE FIELD**

During normal operation of the motors with power converter units, the field power supply takes place directly when the mains voltage is switched on via rectifiers. In the case of open-circuit ventilated motors, circuitry measures must be taken to ensure that the field winding is sufficiently cooled as long as it is energized. For forced-ventilated motors, the field may only be energized when the forced fan is operating. For self-ventilated motors, the field must be switched off when the motor is not running.

For non-ventilated motors (IP44/54 surface cooling) the field may be energized continuously, regardless of the operating state of the motor.

When switching on the field, it is important to note that this must be done before applying the armature voltage. This condition is fulfilled when operating via converter units with integrated field power supply. If this time sequence cannot be insured (operation as shunt motor with direct switch-on to a fixed voltage), an auxiliary series-wound winding must be provided, which can be installed at extra cost.

## **THERMAL PROTECTION**

A Klixon can be fitted to all motors. The permissible current load is 2,5 A at 230 V, 50 Hz.

A Klixon will only be fitted to order at an extra charge.

# MAINTENANCE

## MAINTENANCE SCHEDULE

Careful maintenance of the motor is the best safeguard against malfunction and breakdown. It is advisable to draw up a schedule for preventive maintenance and to provide maintenance cards. Experience has shown that the following maintenance schedule will ensure a long and troublefree life.

The time schedule relates to an eight-hour working day. For other working conditions the schedule should be altered accordingly.

<b>Maintenance action</b>	<b>Maintenance times</b>
Check carbon brushes for wear and movability within the holders also check the condition of the commutator.	semi-annually
Clean thoroughly, check insulation.	annually

## CLEANING THE COMMUTATOR WITH PUMICE STONE

Under normal operating conditions the commutator requires no special maintenance. If the running surface becomes rough, it can be treated with a medium hard pumice stone while the motor is running (be careful in order to avoid an accident).

## REQUIREMENTS

The commutator should be cleaned with pumice stone or abrasive rubber stone when:

- new brushes are fitted
- the commutator has been slightly damaged due to flashover
- an excessively thick carbon film has formed on the running surface
- streaks show up on the commutator surface in the direction of rotation due to soiling

The procedure described below does not make sense if there are local, massive traces of fire on the collector at one or more single points (normally short circuit or interruption of the winding: armature winding must be replaced), or if there are deep grooves in the collector surface (more than 2/10 - 3/10 mm deep: overwind the collector).

## FOR YOUR SPECIAL ATTENTION

The actions described are carried out on bright, live parts.

They should therefore be performed by specially trained personnel, taking into account the precautionary measures laid down locally. If the commutator is excentric (the brushes jump in the holders) or if it is heavily burned, it may be necessary to turn it down on a lathe with a tungsten carbide or diamond too (ensure good true-running accuracy of the shaft bearing seating. The centre hole may be damaged, thereby impairing the true-running accuracy).

After this, the mica insulation between the laminations should be milled out. These activities must also be carried out by qualified personnel in a workshop equipped for the purpose.

The commutator bars edges must be chamfered to avoid excessive brush wear.

## **PREPARATIONS**

Switch off the power to the motor, remove the cover strip over the commutator side and examine the bright commutator surface. Remove burrs occurring locally and caused by flashover using a triangular scraper. Secure a dust extractor with insulated nozzle provisionally to the brush space.

If necessary, fit new brushes.

Fix a soft pumice stone to a non-conducting handle, or use abrasive rubber stone. Ensure all dust is removed before returning the motor to service.

## **SMOOTH POLISHING OF THE COMMUTATOR**

Run the motor at a speed of 1000 to 1500 rpm and press the pumice stone or abrasive rubber stone obliquely against the commutator surface in the direction of rotation.

The pressure exerted must be sufficient to create dust, which should be sucked up by the extractor.

Continue this process until the commutator has a uniform bright surface and at least 80 % of the surface of the brushes rests against it.

Then switch off the power to the motor and with the extractor running use a dry brush to remove the last remains of dust from the commutator, brushes and brush holders. Remove the dust extractor and replace the cover strip.

## **CARBON BRUSHES**

The carbon brushes have to be checked regularly. (See maintenance schedule). They should be replaced when they have reached a minimum length of about 10 mm.

Use only the same brush type as was fitted originally.

The brush quality is engraved in them. When exchanging the brushes, ensure you tighten the securing screws connecting the brush leads to the brush (Embedding of brushes).

If brushes with brush wear detection litz wire are used, make sure that first the detection litz wire of the new brush is leaded into the hose, before pulling out the detection litz wire of the old brush. Carbon brushes should usually be ground to the collector diameter. We supply some carbon brushes with a preformed running surface. If you have any questions regarding the grinding of carbon brushes, please contact Kretzschmar.

## **CLEANING**

All motors must be kept clean. The motor must be thoroughly examined from time to time.

For this purpose, the cover and cover strip have to be removed. Any accumulated dust must be removed with a dust extractor and if necessary, a brush; this also applies to the windings of the stator and armature which may have become soiled.

The inside of the terminal box should also be cleaned, and the nuts of the terminals checked to ensure they are sufficiently tight. If the motor has a forced cooling fan, make sure that the existing filters are clean. Water coolers must be cleaned or checked according to special instructions when the cooling effect decreases.

## BRUSH PRESSURE

The springs of the brush holders are manufactured to ensure that the brush pressure changes by only 5 % during the entire life of the brushes. No readjustment is therefore necessary.

## BEARINGS

The deep-groove ball bearings fitted are filled with sufficient grease around 20.000 hours operating rated speed and load. After this time the bearings should be renewed.

Terminal markings for direct-current motors	Designation following DIN 42401 part 3	VDE 0570
Armature	A 1 – A 2	A/B
Armature with symmetrically connected auxiliary	B 1 – B 2	A/G – B/H
Shunt winding	E 1 – E 2	C – D
Series winding	D 1 – D 2	E – F
Auxiliary pole winding, internal compensating winding, internal compensating winding connected in series	B 1 – B2 / C 1 – C 2	G – H
Externally excited field winding	F 1 – F 2	I – K
Direction of rotation looking towards free shaft end		
to the right	⌚	
to the left	⌚	

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