

CMTK AC MOTOR SERIES

OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL



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CMTK Series AC Motors Description

This manual concerns normal three phase induction motors with an output varying from small to middle size; they are externally cooled, totally enclosed, supplied in a cast iron or aluminium frame and provided with ball bearings or roller bearings, lubricated with grease.

Electrical Motor Identification

All motors shall be fitted with a plate in which the data necessary for their identification can be collected. The layout of these data is described below.

COMOT
Every rotation, built to last

IE3 |  

3 PHASE INDUCTION MOTOR

TYPE: CMTK 355M-4	IM B3	IP55	NR: CMTK002526A00
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Hz	kW	r/min	V	A	CONN	EFF	COS
50	250	1470	400/690	14.3/8.3	Δ / Y	94.4 %	0.88
60	282	1764	460/795	14/8.1	Δ / Y	93.8 %	0.87

DUTY: S1	INS: F	PTC 150°C	43 KG	IEC 60034-1
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Ambient Temp: -20°C ~ +40°C	BRGS DE 6308 2RS	BRGS NDE 6308 2RS
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TYPE: Motor Product Code

IM: Mounting Position

IP: Protection Class

NR: Serial Number

Hz: Frequency

kW: Motor Power

r/min: Motor Speed

V: Motor Voltage

A: Motor Current

CONN: Motor Connection type

EFF: Motor Efficiency

COS: Power Factor

DUTY: Load Cycle

INS: Insulation Class

PTC: PTC Thermistor

BRGS: Drive end and Non Drive end Bearings

Safety Precautions



WARNING

High voltage and rotating parts can cause serious or fatal injuries.

- Installation, Operation and Maintenance of electric motors should be performed by qualified personnel.
- For equipment covered by this instruction book, it is important to observe safety precautions to protect personnel from possible injury. Among the many considerations, personnel should be instructed to:
- Avoid contact with energized circuits or rotating parts.
- Avoid bypassing or rendering inoperative any safeguards or protection devices.
- Do not step on the motor.
- Do not open the terminal box while energized.
- Be sure the shaft key is fully captive before the motor is energized.
- Avoid extended exposure in close proximity with high noise levels.
- The temperature of the outer frame of the motor may be hot to the touch during normal operation and especially after shut-down. Avoid to touch outer frame of the motor during the motor is under voltage. Use proper care and procedures in handling, lifting, installing operating and maintaining the equipment. The motor should be lifted by the lug provided. Safe maintenance practices by qualified personnel are imperative.
- **FAILURE TO PROPERLY GROUND THE FRAME OF THE MOTOR CAN CAUSE SERIOUS INJURY OR DEATH TO PERSONNEL.** Make sure the motor grounding connections are done correctly.
- **NOTE:** These instructions do not purport to cover all of the details or variations in equipment or to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to Comot Motors EU. Installation, Operation and Maintenance of electric motors should be performed by qualified personnel.

Delivery

- 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.

Mounting

- 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 of more than 15 degrees 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 °C, unless otherwise agreed upon at the time of ordering.

Coupling

• Direct Coupling:

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.

• Indirect Coupling:

Flat belt or V-belt

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.

Coupling

Spur gear drives

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.

• Shaft Couplings:

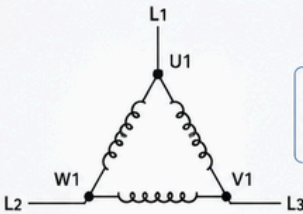
Remove the corrosion protection from the shaft extension and the coupling elements. The coupling parts, belt pulleys and gear wheels need to be dynamically balanced and fit easily on the shaft and to be provided with good fitting keyway. In the factory the rotor has already been dynamically half-key balanced. 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 be 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 heat elements; therefore the part to be mounted has to be heated till $\pm 100^{\circ}\text{C}$. 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.

Electrical Connections

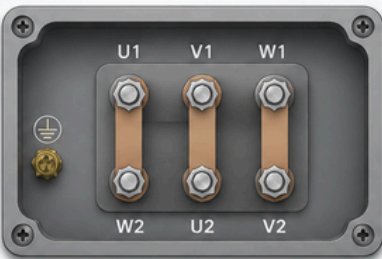
THREE PHASE INDUCTION MOTOR CONNECTIONS

DELTA (Δ) CONNECTION

LOW VOLTAGE CONNECTION



APPLICATION
For low voltage supply
(e.g. 400 V)



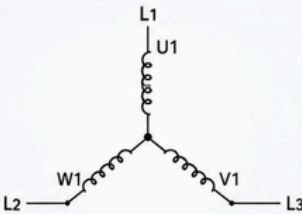
TERMINALS	SUPPLY
U1 - U2	U1 → L1
V1 - V2	V1 → L2
W1 - W2	W1 → L3

i In Delta connection, the line voltage is equal to the phase voltage.

$I_L = \sqrt{3} \times I_{ph}$, $V_L = V_{ph}$

STAR (Y) CONNECTION

HIGH VOLTAGE CONNECTION



APPLICATION
For high voltage supply
(e.g. 690 V)



TERMINALS	SUPPLY
U1 - W2	U1 → L1
V1 - U2	V1 → L2
W1 - V2	W1 → L3

i In Star connection, the line voltage is $\sqrt{3}$ times the phase voltage.

$I_L = I_{ph}$, $V_L = \sqrt{3} \times V_{ph}$

IMPORTANT NOTES

- Change the connection only when the motor is disconnected from power.
- Ensure the motor terminal box links are tightened properly.

U: Phase U V: Phase V W: Phase W
L1, L2, L3: Supply Lines

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.

1. Dust:

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.

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.

3. Wear & Vibrations:

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.

4. Greasing:

Before the motor leaves the factory, the bearings are filled with a high quality Lithium base grease. This grease can be mixed with most of the commonly used ball bearing greases that are lithium-based so that nearly every grease can be used for regreasing.

Motors from frame size 56 up to frame size 250 are fitted with both sides sealed ball bearings (2RZ) those filled with grease by the bearing manufacturer "for life time". The bearings for those frame sizes without regreasing-divices are completely free of maintenance. Regular checks can be limited only towards temperature and noise.

Motors from frame sizes 280 up to frame size 400 are equipped with open bearings, that are filled for 2/3 when the motor leaves the factory. The drive-end shields are fitted with bearing covers. The lubrication must take place when the machine is running. The old grease ejects from the grease valve thus maintaining the correct level and avoiding overfilling which would be harmful.

5. Replacement of ball or roller bearing:

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. After the new ball bearing resp. the inner ring of a roller bearing has been heated-up to ca. 80°C till 90°C, it must be mounted on the shaft very soon. If necessary, a short pipe In no case, it is allowed to blow on the outer ring of the bearing. that fits onto the inner bearing ring can be used to push the bearing to its correct position. Do not mount the end shield until the bearing has cooled down.

Maintenance

Bearing Types:

MOTOR TYPE	POLES	DRIVE END	NON DRIVE END
CMTK 112	2-4-6-8	6306 2RZC3	6306 2RZC3
CMTK 132	2-4-6-8	6308 2RZC3	6308 2RZC3
CMTK 160	2-4-6-8	6309 2RZC3	6309 2RZC3
CMTK 180	2-4-6-8	6311 2RZC3	6311 2RZC3
CMTK 200	2-4-6-8	6312 2RZC3	6312 2RZC3
CMTK 225	2-4-6-8	6313 2RZC3	6313 2RZC3
CMTK 250	2-4-6-8	6314 2RZC3	6314 2RZC3
CMTK 280	2	6314 C3	6314 C3
CMTK 280	4-6-8	6317 C3	6317 C3
CMTK 315	2	6317 C3	6317 C3
CMTK 315	4-6-8	6319 C3	6319 C3
CMTK 355	2	6317 C3	6317 C3
CMTK 355	4-6-8	6322 C3	6322 C3
CMTK 400	2	6320 C3	6320 C3
CMTK 400	4-6-8	6326 C3	6326 C3

Maintenance

Regreasing interval of bearings:

The greasing interval is the operating period after which the bearing lubricant must be renewed. Since electric motors operate under a wide variety of conditions including dust, moisture, vibration, temperature, chemicals, marine environments, mounting position, and load the lubrication life varies accordingly.

Under normal operating conditions, factory-filled grease provides bearing lubrication for approximately 20,000 hours in 2-pole motors and 40,000 hours in multi-pole motors. These intervals apply only at rated speed.

When regreasing, clean the bearings thoroughly, use the specified or an equivalent grease, and fill the bearing cavity to approximately 2/3 of its free volume. For motors with grease fittings, regrease while the motor is running according to the values given in the following table.

Shorter regreasing intervals may be required under severe operating conditions, such as high humidity, chemical exposure, excessive vibration, or extreme ambient temperatures.

Frame size	Motors with 2 poles	Motors with 4 and multi-poles
from 280 up to and incl. 400	2.000 hours	4.000 hours

Tightening Torques:

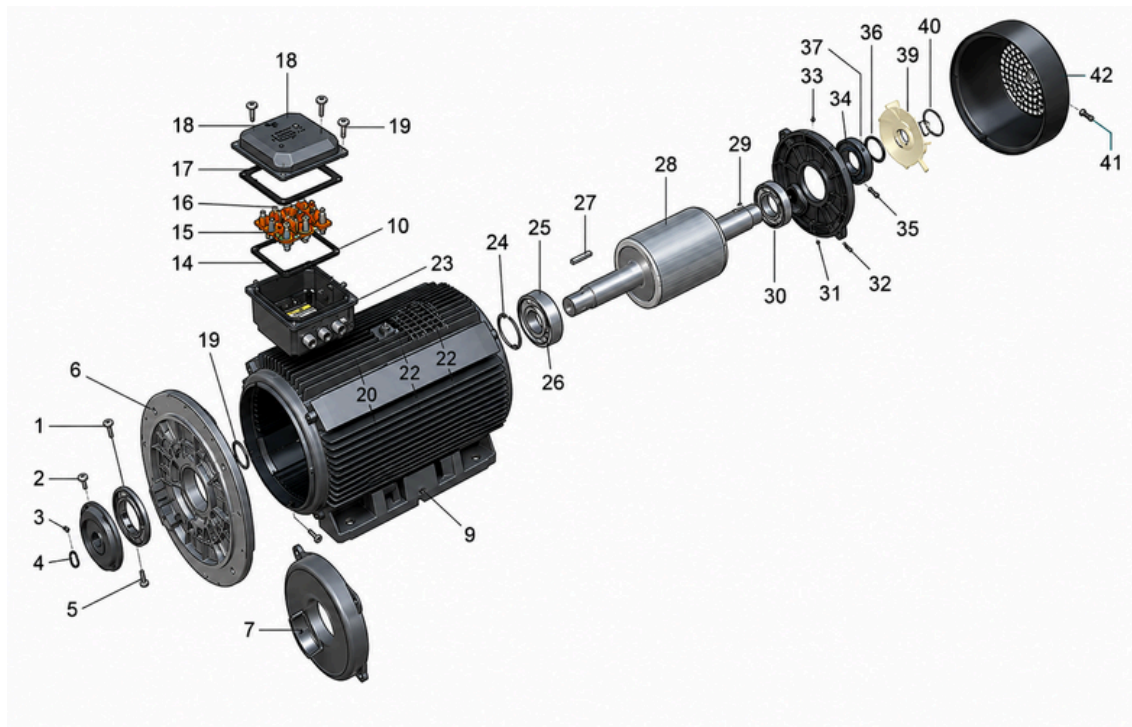
For electrical connections;

	Thread Ø		M 4	M 5	M 6	M 8	M 10	M 12	M 16
	Nm	min	0,8	1,8	2,7	5,5	9	14	27
		max	1,2	2,5	4	8	13	20	40

For cables;

SIZE	METAL ±10% [Nm]	PLASTIC ± 10% [Nm]	Clamping Range [mm]		O Ring Cord Diameter [mm]
			Standard -30°C ... 100°C EX -30°C ...90°C	EX -60°C ...105°C	
M12X1.5	8	1,5	3,0 ... 7,0	-	2
M16X1.5	10	2	4,5 ... 10,0	6,0 ... 10,0	
M20X1.5	12	4	7,0 ... 13,0	6,0 ... 12,0	
M25X1.5			9,0 ... 17,0	10,0 ... 16,0	
M32X1.5	18	6	11,0 ... 21,0	13,0 ... 20,0	
M40X1.5			19,0 ... 28,0	20,0 ... 26,0	
M50X1.5	20		26,0 ... 35,0	25,0 ... 31,0	
M63X1.5			34,0 ... 45,0	-	

Motor Spare Parts List



No	Description
1	V-ring, oil seal DE
2	Mounting screw bearing cover DE
3	Outside bearing cover DE
4	Grease-inlet for regreasing device DE
5	Grease-outlet for regreasing device DE
6	B3-shield DE
7	Mounting screw shield DE
8	Motor housing
9	Gasket terminal box / motor housing
10	Terminal box
11	Mounting screw terminal box
12	Terminal board
13	Mounting screw terminal board
14	Terminal box
15	Connector pin
16	Nut for connector pin
17	Gasket terminal box / terminal box cover
18	Terminal box cover
19	Mounting screw terminal box cover
20	Adoption plate for cable glands
21	Cable gland

No	Description
22	Mounting screw adoption plate
23	Circlip bearing DE
24	Bearing DE
25	Bearing DE
26	Inside bearing cover DE
27	Key DE
28	Rotor
29	Shaft
30	Inside bearing cover NDE
31	Bearing NDE
32	Non-drive-end shield
33	Mounting screw shield NDE
34	Outside bearing cover NDE
35	Mounting screw outside bearing cover DE
36	V-ring, oil seal NDE
37	Grease inlet for regreasing device NDE
38	Grease outlet for regreasing device NDE
39	Fan
40	Circlip fan
41	Fan cover
42	Mounting screw fan cover