Keeping Industry Turning

Installation & Maintenance

Series 30 AC motors

Series 30

BROOK CROMPTON
Keeping Industry Turning

2022-06 EN iss 1

WOLONG
Power your future

Installation & Maintenance

2

Introduction / Storage

Introduction

Your Brook Crompton motor is designed for long life, and low running costs.
Careful installation and maintenance will ensure that you achieve reliable operation and optimum efficiency

Pre-installation requirements

⚠

WARNING
Handling and lifting of electric motors must only be undertaken by authorised personnel. Full product documentation and operating instructions must be available together with tools and equipment necessary for safe working practice.

Receipt
Before any motor is accepted on site it should be inspected carefully for damage or loss incurred during transit.
Packing materials may be damaged including sheeting and crate timbers.
Handling operations may have damaged fan cowls, terminal boxes or auxiliaries.
Where an instance of droppage or loss is evident or suspected, it may be necessary to unpack the goods to establish the full extent of the problem.
Wherever possible, damage should be recorded, photographed and witnessed.
Report any damage to the carriers and
Brook Crompton as soon as possible,
quoting the item number and consignment note reference.

⚠

Lifting
Eyebolts and/or lifting trunnions supplied with the motor are designed to support only the weight of the motor, not the weight of the motor and any ancillary equipment attached to it. Be absolutely sure that cranes, jacks, slings and lifting beams are capable of carrying the weight of equipment to be lifted.

Where an eyebolt is provided with the motor, this should be screwed down until its shoulder is firmly against the face of the stator frame to be lifted. Eyebolts are normally designed for a vertical lift.

Storage

If motors have to be stored before installation, precautions should be taken to prevent deterioration.

Environment
Depending on the site conditions it may be necessary to create a suitable stores area to hold the motor prior to installation.

Packing cases are not waterproof.

Motors should be stored in a dry, vibration free and clean area at normal ambients (–20°C to 40°C), unless other arrangements have been agreed with Brook Crompton.

Where low temperature ambient storage is anticipated, special precautions should be taken with the type of grease, no plastic parts etc. to ensure trouble free start-up.

Motors must be stored away from
corrosive or chemically damaging fumes.

Before placing motors into storage, machined components should be carefully inspected. Bearings and shafts are normally covered with a corrosion resistive barrier. If this coating is damaged it should be made good. The component should be cleaned and the protective coating reapplied.
Under no circumstances should rust be merely covered over.

Drain holes
Motors provided with drain holes have drain plugs.

Bearings
To avoid static indentation the storage area should be vibration free. If this is not possible it is strongly recommended that the motors be stood on thick blocks of rubber or other soft material. Shafts should be rotated by hand one quarter of a revolution weekly.
Where the exposure to some vibration is unavoidable the shaft should be locked in position to avoid static indentation of the bearings. Roller bearings may be fitted with a shaft locking device. This should be kept in place during storage.

Grease
Factory fitted bearings use a Polyurea based grease with a recommended shelf life of two years. If stored for a longer period, grease may need to be replaced.*
Shielded bearings have a storage life of five years and a further two years operational life following installation.
* Wash all bearing parts with a noncontaminating solvent. Lightly pack the bearings with grease applying a 33% fill by volume into the bearing and housings.

Heaters
Where space heaters are fitted, and the storage environment has wide humidity and temperature variations, it is strongly recommended they be energised.
Warnings should be placed on the motors to make operatives aware of the live heaters.
A low voltage DC supply could be used as an alternative.

Insulation resistance
During extended storage a three monthly insulation test is recommended to avoid possible lengthy drying out periods when installing. Use a 500 volt d.c. Megger. The insulation resistance between phases and between the windings and the frame should be checked.
The insulation resistance should be maintained above 10 megohm. If a lower reading is measured, use one of the drying out methods recommended on page 3 until an acceptable reading is obtained.
If heaters are fitted but not energised, they should be used in future.

Location
Motors must be installed with adequate access for routine maintenance. A minimum of 0.75m of working space around the motor is recommended. Adequate space around the motor, particularly at the fan inlet is also necessary to facilitate airflow. See table 1 for minimum distance.

Where several motors are installed in close proximity, care must be taken to ensure that there is no recirculation of exhausted warm air.

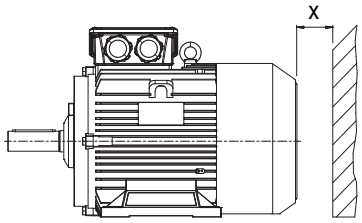


Table 1 - Minimum distance between the fan inlet and an obstruction

Frame size	minimum distance 'X'
80 to 90	25 mm
100 to 132	30 mm
160 to 180	45 mm
200 to 225	60 mm
250 to 280	90 mm
315 to 355	110 mm

Foundations
Foundations must be solid, rigid and level.

Mechanical / Electrical connection

Mechanical

Drain holes
Prior to installation remove drain plugs if fitted. If any water has accumulated, the integrity of all gaskets, sealants etc. should be checked. Drain plugs should be put back into place after draining.

Alignment
When the application calls for direct coupling, the shafts must be correctly aligned in all three planes. Bad alignment can be a major source of noise and vibration. Allowance must be made for shaft end-float and thermal expansion in both axial and vertical planes. It is preferable to use flexible drive couplings.

Noise levels
The noise levels published in current Sales Specifications are equal to or less than the limiting values for rotating machines specified International Standards IEC 60034-9.

In most cases noise levels also meet limiting values for exposure to noise in the work place.
It is the responsibility of the purchaser to ensure that other overriding lower noise levels if required, eg Machinery Directive, are specified at the time of order, or that the installation incorporates noise attenuating measures.

Free rotation
The shaft must be free to rotate.
Where uneven or bumpy rotation occurs the bearings should be inspected to establish that they have not been damaged during transportation or storage.

⚠ B14 (IM3601) & B34 (IM2101)
Where a motor is fitted with a 'C' face flange, ie B14 or B34 mounted, care must be taken to ensure mounting bolts do not protude beyond the 'C' face casting thickness. See table 2.

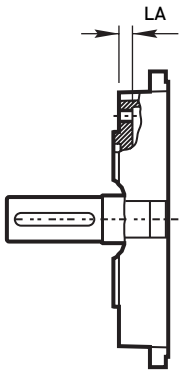


Table 2 - C face casting thickness

Frame size	casting thickness 'LA'
80	12 mm
90 to 112	16 mm
132	20 mm
160	24 mm

Electrical connection

The connection diagram is shown on the leaflet enclosed in the motor terminal box or the diagram inside the terminal box lid (copy on page 5).
The cables used should be capable of carrying the full load current of the motor (see motor name-plate) without overheating or excessive voltage drop under starting conditions.

Cable terminations
All cable terminations should be tightly secured (see Table 3 for tightening torques).
Mains lead terminal lugs should be in face to face contact with the motor lead lugs and securing nuts and lockwashers screwed firmly over the connection (where possible).
There should be no nuts or lockwashers fitted between the mains and motor lugs.
Wiring should be carried out or checked by a qualified electrician and equipment must be earthed in accordance with current regulations.
The equipment must be correctly fused and isolated.

Table 3 - Terminal tightening torques

Frame size	Terminal size	Torque (Nm)
80 - 112	M4	0.8 - 1.4
132	M5	1.5 - 3.5
160 - 180	M6	3 - 6
200 - 225	M8	5.8 - 8.5
250 - 280	M10	10 - 16
315 - 355	M12	16 - 25

All covers must be in position prior to running.

⚠ **WARNING**
Isolate power supply to motor before commencing any routine cleaning or maintenance work.

Drying out procedures
It is preferable to dismantle the motor to the point where the rotor is removed. This is not essential but the drying out process will take longer in the assembled state.
The temperature of the windings and the insulation resistance should be monitored at regular intervals.
On initial application of heat the insulation resistance will drop quickly and then start to rise slowly until level. On discontinuation of the drying process, a further rise in resistance will occur.
There are several methods which can be used:

1 place the motor in a warm (typically 40°C), dry airstream (fan or convector heater) or in a warm oven with a temperature not exceeding 80°C. This method is preferred if the motor is dismantled.

2 connect the motor to a low voltage* three phase supply and inject a current not exceeding 50% of the full load current into the stator winding (*approximately 10% of the line voltage). If this is carried out on an assembled motor, it is possible though unlikely that the motor will turn. If so the rotor should be locked in position.

3 connect two phases in parallel, and the third in series. Apply a low voltage a.c. or d.c. supply up to a maximum of 50% of full load current. The stator winding temperature must not be allowed to exceed 80°C. In practice the frame should not be hot to the touch, to guard against internal overheating and consequent damage to the insulation.

4 where heaters are fitted these can be energised.

Supply
It is important that a motor is operated within the limits of its design voltage and frequency.
Standard motors for the UK will operate without damage on any voltage in the range 94% to 106% of the nameplate voltage.
The supply cables must be capable of carrying the full load current of the motor (see motor name-plate) without overheating or excessive voltage drop under starting conditions.

Earthing
All motors are fitted with an earthing terminal, in or adjacent to the terminal box, to enable connection to an effective earthing bond. The terminal is designed for connecting the correct size of copper earth connector. If a different material is to be used please refer to Brook Crompton.
The motor must be earthed by connecting the shortest possible length of cable to the earth terminal.
The cable must have a capacity at least that of the main connections up to 16mm² phase conductors. Between 16 and 35mm² phase conductors, the earth should be a minimum of 16mm² . Above 35mm² phase conductors, the earth conductor should be a minimum of half the phase conductor.

An earthing bond should not be terminated under the motor fixture bolts or terminal cover screws. The earth lead could be over-looked on reconnection after maintenance

Auxiliary electrical items (where fitted).

Heaters should be checked for continuity prior to connection to their appropriate supply.
Heaters must be **switched off** when the motor is running.

Thermistor continuity (**PTC**):
Do not apply a megger across the thermistor.
Do not apply more than 6V across the thermistor.

It is recommended that thermistors are connected to an appropriate protection relay.
(Thermistors provide good thermal overload protection).

Resistance Temperature Detector (**RTDs**) should have rsistance checked against manufacturers data.

Thermostats (**PTO**)
These are 'Normally closed' device for connection into the motor control circuit.

It is imperative that any overload trips and emergency shutdown circuits are working correctly before the motor is energised.
All covers must be in position.

Where a motor is fitted with a separately driven fan unit, the interlocks and thermal overload protection circuits must be operative.

Connection diagrams
Refer to the motor rating plate for supply details for the required winding connection.

Installation & Maintenance

4

Electrial connection / Maintenance

Rotation
Before coupling the motor to the drive, run the motor briefly to check rotation.

All covers must be in place

Motors fitted with angular contact or duplex bearings must be run in the correct mounting position eg vertical.
To reverse rotation interchange any two supply lines.

Starting
Motors are rated by the output required, the number of starts per hour, the load curve/ inertia, and environmental considerations.
Operating outside the contractual parameters may thermally overload the motor eg too many starts per hour, or mechanically stress components eg overspeeding.
Correct starter to be chosen for the method of start required.

Running
After one hour of running, check the general vibration levels. If these are excessive, check alignment (and belt tensioning if belt driven).
Some initial bearing noise may be present during the running in period. This is normal because the grease has to settle down within the bearing. The noise should disappear after a few hours of operation.
Check that the motor runs up smoothly and within the permitted run-up time. Note that repeated starting in quick succession may lead to a thermal overload of the motor.

Bearings, grease
Bearings are prepacked with a polyurea based grease, Polyrex EM.

Regreasing
Standard regreasing facilities, where provided, are situated on the periphery of the drive end and non drive endshields.

An overgreased bearing will cause overheating of the bearing with the possible escape of the grease, loss of lubrication qualities, leading to ultimate bearing failure.
See relevant tables on page 5 for regreasing intervals and grease quantity.

Maintenance

On-going maintenance
Induction motors by their very nature require very little maintenance. However a regular regime of inspection is recommended to ensure minor problems do not escalate to breakdowns. Typical intervals would be 2000 hours of operation or 3 months, whichever is the sooner.

Checklist
- no visible damage ie fans cracked, fan cowls bent, foot cracked etc
- no accumulation of dust or fibres on the frame or around the fan inlet
- no significant corrosion of the lifting lugs/ eyebolts
- no excessive vibration
- no loose fasteners
- cables and earths are sound
- sealing of the motor and gland plate in good condition
- insulation resistance adequate, imperative this is checked after a prolonged shutdown
- regrease required, particularly large output 2 pole motors
- bearing condition

Spares and repairs
When ordering spares it is important to state the motor item / serial number to ensure that the correct spares will be supplied.

Notes
a) fixing bolts, nuts, studs, screws, spacers or washers are not included with these parts and, if required, should be clearly specified on the order in addition to the part description number.
The fixing duty and part description reference number for which they are required should also be clearly stated.
b) if ordering bearings direct from a bearing manufacturer, then please check the motor nameplate for the correct bearing size, type and fit.

Periodic maintenance
Remove the cover and the fan which is keyed, clamped, pinned or knurl located to the shaft extension. Loosen and remove bearing cover screws and endshield bolts/studs. The endshields should then be eased off their spigots.

The rotor can now be carefully withdrawn from the stator, taking care not to damage the stator bore or the stator windings.

Having dismantled the motor, maintenance can be carried out to remove all dirt. For this purpose, the use of an air line supplying dry compressed air under comparatively low pressure is best, as a high velocity air-stream can force dirt into the spaces between the windings and insulation, etc.
Greaseremoving solvents should only be used very sparingly to avoid damage to impregnating varnish or insulation.
Motors should be re-assembled in the reverse order from dismantling, remembering to ease endshields onto bearings and spigots.
Do not use force.

Before starting, check that the shaft revolves freely. Ensure that the electrical connections are correct and terminal nuts tight (see Electrical Connection).

Enquiries

Please contact Brook Crompton for information on any aspects of the motor performance that need clarifying.

Any attempt at remedial action and/or modification without the prior written consent of Brook Crompton may invalidate the warrant / guarantee offer on this product

Please quote the item number / serial number in all such cases with full details of the problem.

Policy
Our policy is one of continuous improvement and we reserve the right to alter any detail of our products at any time without giving notice.

Installation & Maintenance

Regreasing intervals.

Generally standard motors frame sizes 80 to 225 are sealed for life bearings. Sealed for life bearings can be identified on the motor name plate with 'ZZ' or '2Z' appearing after the bearing size, for example 6310ZZ

Motor frame sizes 250 to 355 are supplied with re-lubrication facilities, breaings are pre-greased with Mobil Polyrex EM. The re-lubrication interval and grease quantity are shown in the tables below.

Relubrication intervals - ball / ball arrangement

	Quantity (gms)		Lubrication intervals (hours)			
Frame size	DE brg	NDE brg	3000 min^{-1}	1500 min^{-1}	1000 min^{-1}	750 min^{-1}
250	30	30	1800	3900	6500	9000
280	33	33	1800	3500	6000	8000
315	33	33	1500	-	-	-
315	45	45	-	3000	5000	7500
355	45	45	1500	-	-	-
355	60	60	-	3000	4000	6000

Figures above are based on a horizontal mounted motor for both standard design & alternative design.
Bearings are filled with a high quality Polyurea based grease.
The regreasing time should be reduced if the bearing operating temperature is in excess of 70°C.
For vertical applications, the above figures should be halved.

Relubrication intervals - Roller bearing at drive end

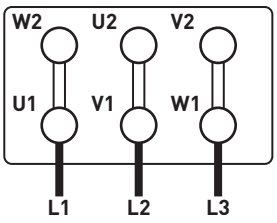
	Quantity (gms)		Lubrication intervals (hours)			
Frame size	DE brg	NDE brg	3000 min^{-1}	1500 min^{-1}	1000 min^{-1}	750 min^{-1}
250	30	30	1200	3900	6500	9000
280	33	33	1000	3500	6000	8000
315	33	33	1000	-	-	-
315	45	45	-	3000	5000	7500
355	45	45	500	-	-	-
355	60	60	-	2500	3500	6000

Figures above are based on a horizontal mounted motor for both standard design & alternative design.
Bearings are filled with a high quality Polyurea based grease.
The regreasing time should be reduced if the bearing operating temperature is in excess of 70°C.
For vertical applications, the above figures should be halved.

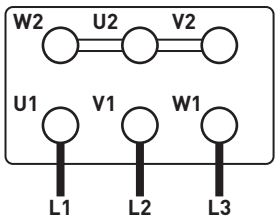
Connection diagram - Dual voltage (Δ/Y) single speed motors

Mains supply

Low voltage (Δ)



High voltage (Y)

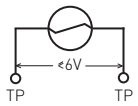


To reverse direction of rotation, change over any two supply lines

Auxiliaries (where fitted)

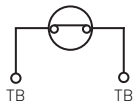
Thermistors

Connect to thermistor control unit.



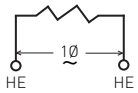
Thermostats

Connect to overload protection circuit.



Single voltage heater

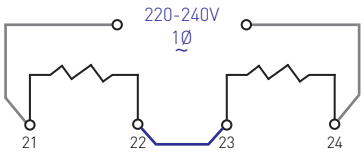
Connect to single phase supply.



Dual voltage heater - (220-240V)

Fit jumper lead across: **22** & **23**.

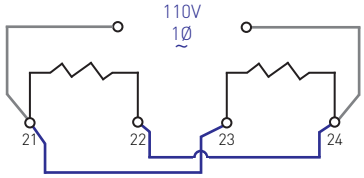
Connect to single phase 220-240V supply.



Dual voltage heater - (110V)

Fit jumper leads across: **21** & **23** and **22** & **24**.

Connect to single phase 110V supply.



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