IDA BRAKE MOTORS

IMAB Electromagnetic Brake Three Phase Asynchronous Motors

Ⅰ. General Description:

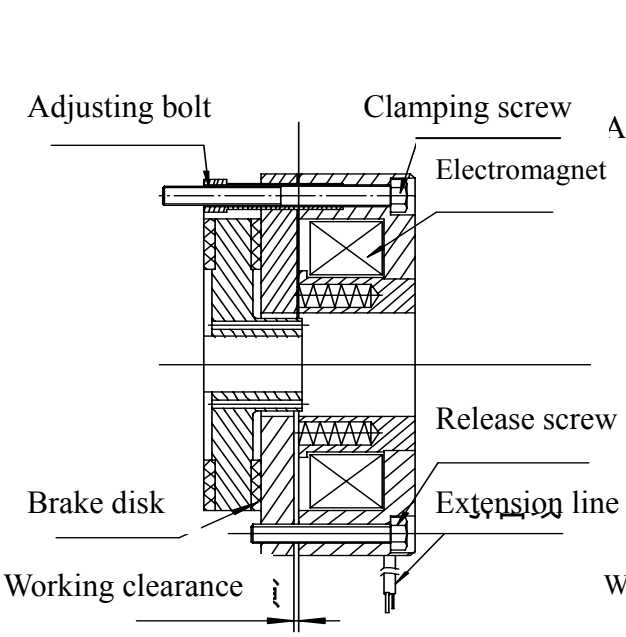
1) The IMAB series motors are the combination of three phase asynchronous motors and electromagnetic brakes. The degree of protection of motor casing is IP55, the magnetic brake IP23. The structure and installation of frame IMAB63-180 are B3, B5, B35. The rated working voltage of electromagnetic brake is direct current, which has been commutated by a rectifier then being used by magnetic (the brake commutation is half-wave). For details of connection , please refer to the voltage and connection shown on the nameplate and the rectifier label (**Do not connect rectifier with variable frequency drives, a separate supply is required**).

2) Operating Principle & Structural Diagram of brake are as follows:

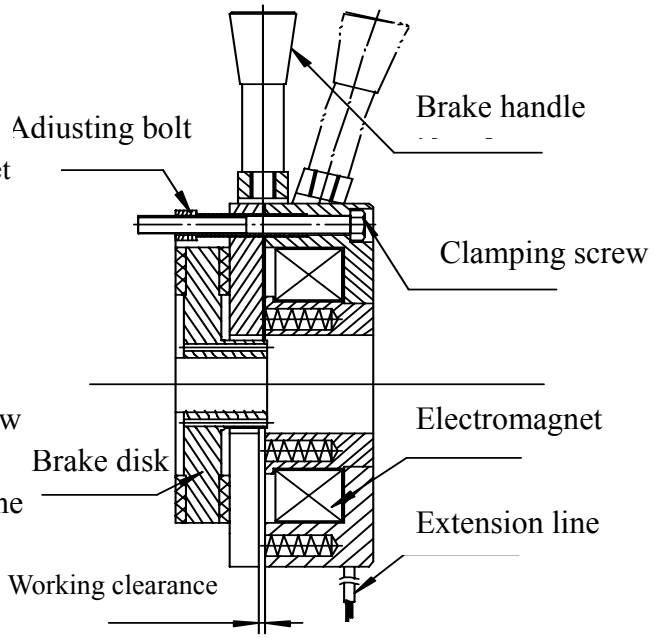
Brake is composed of a frame yoke, field coil, spring, brake disk, armature, spline housing, hand release, mounting screws. Fix the brake on non-drive end shield or the flange on drive end of motor and adjust the mounting screw to the correct air gap. The spline housing being fixed on the axis, with its external tooth cooperating with internal tooth of spline, transmits torque while operating; the brake disk can be movable on the spline housing.

When exciting the coil, a magnetic field is generated to pull the armature towards the frame yoke and to separate armature from the brake disk, meanwhile the transmission shaft makes the brake disk start and operate.

When power to the coil is removed, the magnetic flux will disappear, the armature will be released and the spring presses the armature to fasten friction disk thus generating the friction to brake the motor.



Brake Fig-1



Brake Fig -2

The Brake Graph-1 applies to IMAB-180 frame and above, the input voltage of rectifier is 380V~415Vac.

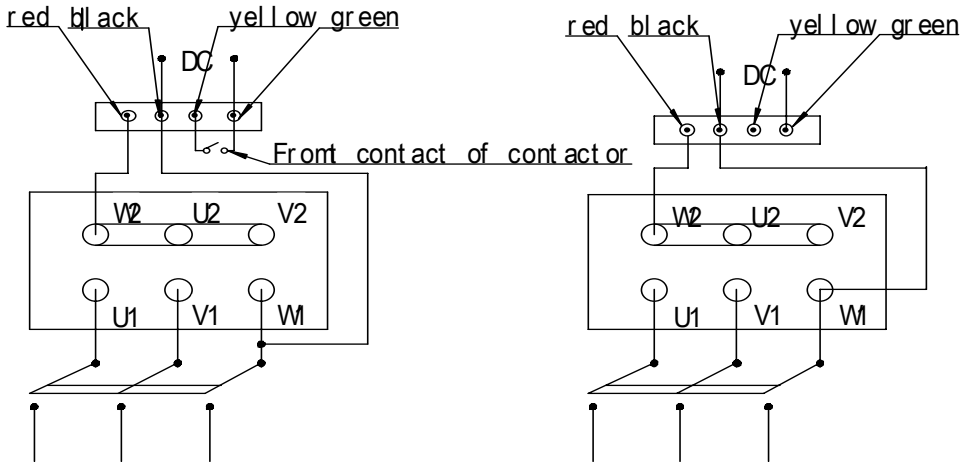
The Brake Graph-2 applies to IMAB-63~160 frame.

For 63~100 frame, =<3kW, the input voltage of the rectifier is 220~240Vac, the output voltage is 100~120Vdc.

For 112~180 frame, =>4kW, the input voltage of the rectifier is 380~415Vac, the output voltage is 168~205Vdc.

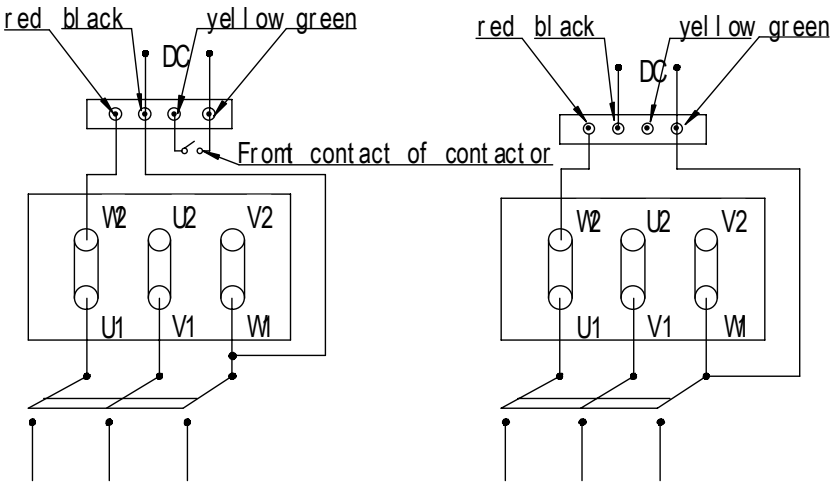
3) The terminal connection are as follows (if there is no special requirement, we normally connect for fast brake operation for final products):

A. When the input voltage of rectifier is 220~240V, the corresponding voltage **▲/Y** is 220~240Vac / 380~415Vac, the terminal connection are as follows:



Graph of Fast brake **Graph of Slow brake**

B. When the input voltage of rectifier is 380~415Vac, the corresponding voltage▲/**Y** is 380~415Vac / 660~720Vac, the terminal connection are as follows:



4) The IMAB electromagnetic brake three phase asynchronous motor should be used under the following conditions:

A. The surrounding temperature varies with the seasons but should not be higher than 40°C or lower than -15°C;

B. The elevation should be higher than 1,000m;

C. The surroundings should keep away from acidic and alkaline gas which is corrosive to the conductor insulation;

D. Frequency: 50/60Hz;

E. Voltage: 380Vac, it can made as 220/380V, 230/400V, 240/415V, 386/660V, 400/690V, 415/720V, according to the customers requirements and will be marked on the nameplate;

F. Terminal connection: =< 3kW, use **Y** connection; =>4kW, use ▲ connection; double voltages use ▲/**Y** connection. Details of connection will be marked on the nameplate;

G. Operation mode (S1), if it is started frequently, the working hours should be shortened. When the load exceeds 7%, it can not be started more than once in every 2 minutes; less than 7%, it can not be started more than once in every 1 minute;

H. The limit of temperature rise of stator winding is 80K (electrical resistance method).

Ⅱ. Inspection prior to Installation:

1) Before removal of motor from packing, inspect whether there is damage or moisture ;
2) After removal, clean any dust on the motor and the anti-rust coating from the shaft extension.
3) Inspect whether the data on the nameplate meets the operating requirements.
4) Inspect the motor carefully for any damage. Release the electromagnet by operating the hand release lever and rotate the motor to see whether shaft turns smoothly.
5) Measure the insulation resistance with the 500V megger and the value should not be below 0.5Mohms, otherwise the stator should be dried. While drying, the temperature is not allowed to be higher than 120^{o}C.

Ⅲ. Motors Installation:

1) Motors can be driven with shaft coupling, spur-gear and belts, for 2 pole motors with power exceeding 4KW and 4 pole motors with power exceeding 90kW, these should not be belt driven. The double shaft extension fan is allowed to be driven with shaft coupler only.
2) When driven with belt, the centre line of shaft should be parallel with load shaft centre line and the shaft centre should be perpendicular with the belt centre line; when driven with spurgear, the pitch circle of the gear should not be less than three times of shaft diameter in length.
3) For upright assembled motors, the shaft extension is not allowed to drive any axial direction load service except drive wheel.
4) The operating ambient should be assured with good air draft and cooling conditions.
5) When assembling the motors, users can adjust the handle through hand operation to release the electromagnet and insert the standard internal hexagonal span into the axial hole of fan (with the matched hexagonal screw) to turn the shaft for easier installation (for frame 180 and above, there is no adjusting handle, while assembling, fasten the brake, release screw so as to release electromagnet, then turn the shaft for easier installation, then tighten the screw after assembly).

Ⅳ. Motors Operation:

1) Motors should have safe earth terminal.
2) The 6 posts on the terminal board are labeled U1/V1/W1, U2/V2/W2. For connection of wires, refer to the nameplate. When the phase sequence ABC of power supply corresponds with the connection marks: U1/V1/W1, the direction of rotation of motors, judging from the shaft, is clockwise; changing the phase sequence will also change the direction of rotation.
3) IMAB electromagnetic brake three phase asynchronous motors are only allowed to be started at full load voltage, starting current is about 5~7 times of the rated current. Starting the motors at low voltage will cause the brake to fail. A separate supply to the rectifier must be used when using with a soft starter or variable speed drive.
4) Over load is not allowed for continuously working motors. The temperature of bearing should not be above 95^{o}C.

V. Maintenance & Repair:

1. Keep the operating ambient dry all the time .The user should check and clean motor periodically. The dust, fabric and others should be kept away from the fan cover inlet. Do not jet the motor with tap.
2. When the thermal protect and short circuit work repeatedly, the user should find out the cause of malfunction and restart the motor until the user has removed the cause.
3. Assure good lubrication when the motors in working condition. In general, after running for 2,500 hours, the motor and electromagnetic brake should be checked out once. The checking period should be shortened when the motor has been started frequently.

   A. Add and replace grease in time. Clean the bearing with the petrol before regreasing, then use the L-XBCHA3 grease to fill 1/2 (2-pole motors) or 2/3 (4-pole motors) the interstice between the internal and external circle of the bearing.

   B. For the wearing of brake disk, the thickness of one-sided brake disk should not be less than 1mm, or the user should replace the brake disk.

   C. Clean the dust inside the parts of electromagnetic brake and keep its surface clean.

   D. The electromagnetic brake should be able to be moved freely.

   E. The user should adjust the clearance in time, when working clearance of disk of the electromagnetic brake increases

owing to normal wearing, which will cause failure of the electromagnetic brake.

The Method: Adjust the three adjusting bolts evenly to reduce the working clearance in order to reach the gap as given in chart Ⅵ, fasten the clamping bolts of the electromagnetic brake for correct operation.

4. When the life span of bearing ends and the vibration noise increases obviously, users should replace the bearing.
5. While disassembling the motor, users can take the rotor out from shaft extension end or non-shaft extension end, but should be careful not to damage the stator winding or insulation.

Ⅶ. Motors Storage and Transportation:

1) During motor storage, it should be kept dry and away from abrupt change of surroundings.
2) During the storage and transportation, the motor should not be stored in horizontal position.
3) Pay attention to protect the shaft extension and don't carry the motors with a rope binding to the shaft extension.

Ⅵ. When the electromagnetic brake is in good working order, the related data to the table below:

Frame	Working Clearance (mm)	Static Braking Torque (Nm)	Max. Working Clearance (mm)	Unload Braking Time (S)	
				Fast Brake	Slow Brake
63~71	0.3~0.6	4	0.8	<0.20	<0.50
80	0.3~0.8	7.5	1.0	<0.20	<0.50
90	0.3~0.8	15		<0.20	<0.50
100	0.3~0.8	30		<0.20	<0.50
112	0.3~0.8	40		<0.25	<0.60
132	0.4~0.9	80	1.2	<0.25	<0.60
160	0.4~1.0	150		<0.35	<1.00
180	0.4~1.0	200		<0.40	<2.00

Ⅷ. Main Technical Parameters & External Installation Dimension:

4) **1.** Refer to **Table-1** for main technical data of brake; see **Fig-1** for the corresponding curves of field current and brake torque while the brake is in working condition.

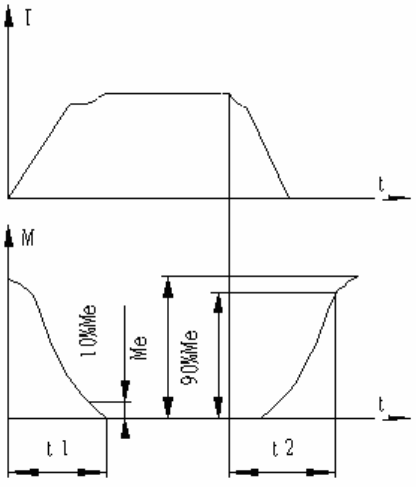


Fig-1. Curved Diagram

Data / Frame / Title	71	80	90	100	112	132	160	180
Rated Braking Torque MC (Nm)	5	7.5	15	30	40	75	150	200
Excitation Power P20°C (W)	25	50	60	80	110	130	150	150
Turn on time t_1(ms)	63	87	110	140	152	165	214	252
Turn off time t_2(ms)	55	75	95	120	130	140	180	210
Excitation Voltage DC (V)	110				186			
Maximum Rotation Speed n (rpm)	3000							

Table-1

2. See Table-2 Installation Dimensions;

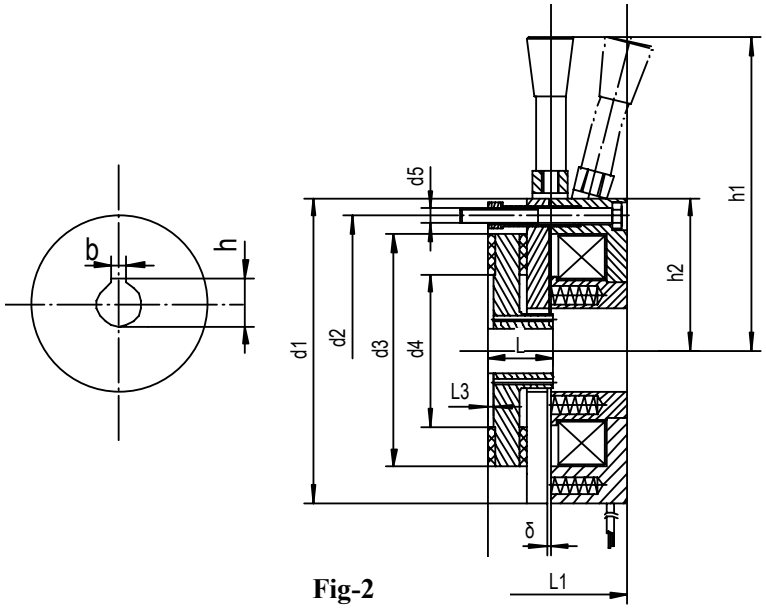


Fig-2
IMAB-71~160

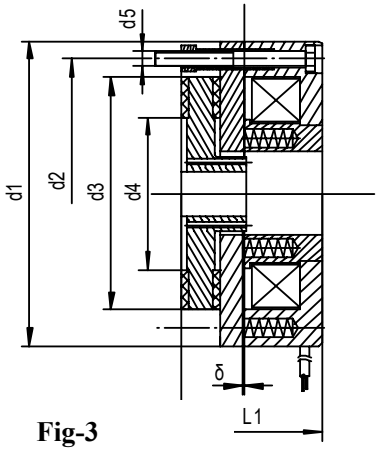


Fig-3
=> IMAB-180

Table-2

Dimension / Model	d1	d2	d3	d4	d5	d6	d	L1	L2	L3	L	h1	h2	h	b	δ
71	101	90	78	53	3xM5	10	14.8	47.2	25	2	20	104	59	16.2	5	0.2
80	117	105	93	65	3xM5	10	19.8	54.3	31	3	20	124	71	21.6	6	0.3
90	127	114	98	65	3xM6	10	24.8	60	36	3	25	126	73	28.1	8	0.4
100	147	133	118	80	3xM6	10	29.5	60	36	3	30	134	83	32.8	8	0.4
112	166	150	131	90	3xM8	12	29.5	62	39	3	30	162	96	32.8	8	0.5
132	187	170	151	104	3xM8	12	39.5	75.2	48	3	30	175	105	42.8	12	0.5
160	222	202	181	120	4xM10	12	44.5	90.2	58	3.5	35	232	130	47.8	12	0.6
180	265	244	220	150	4xM10		49	103		3.5	40			52.8	14	0.6