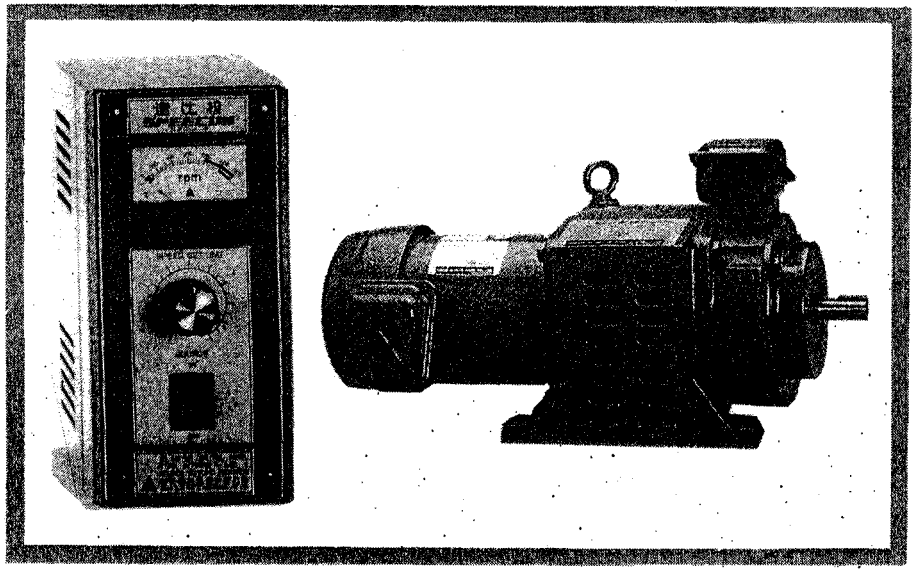
TECO ED MOTOR

INSTRUCTIONS FOR INSTALLATION/CONTROL PANELS (MODEL JVTMBSTER400YN---)



1. CHECK UPON ARRIVAL

This motor has been thoroughly tested at the factory before delivery. However check and see the following upon receipt:

a. Are nameplate ratings or model identical with what you ordered?
b. Has the motor sustained any damage during transit?
c. Are there any bolts and screws not in place?

If there is any defect, immediately notify us or our liaison office, giving full details and nameplate data.

2 CONSTRUCTION AND CHARACTERISTICS OF ED MOTOR

2-1 Construction

The construction of ED motor is shown in Fig 1.

The prime mover is a flange type squirrel-cage induction motor mounted on the frame of the ED coupling. It is thus called a common frame ED motor.

Squirrel-cage induction motor is of a totally enclosed fan-cooled type. The ED coupling is of a semi-enclosed protected type, and is cooled by the wind from the rolling drum when operating.

The ED coupling consists of a frame, an inductor, a drum and an excitation coil. Except for the excitation coil, every component is spaced radially with airgap in between.

A direct current excitation coil is installed between on the yoke and the inductor. The tacho-generator is fixed on the output shaft of the ED coupling. Its induced voltage is in proportion to the ED motor output speed.

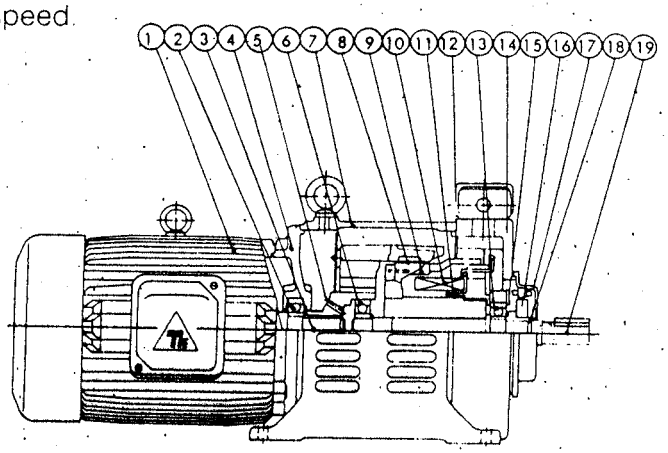


Fig. 1 Construction of ED Motor

① Squirrel-cage Induction Motor
② Motor Bearing
③ Induction motor shaft
④ Flange
⑤ Stop Ring
⑥ NDE. Bearing of ED coupling
⑦ Frame
⑧ Rolling Drum
⑨ Inductor
⑩ Excitation Coil
⑪ Yoke
⑫ Air Guide
⑬ DE Bearing
⑭ Bracket
⑮ Bearing Cover
⑯ Tacho Generator
⑰ Bracket of Tacho Generator
⑱ Stop Ring
⑲ Output Shaft

2-2 Characteristics

Characteristics of ED motor when used in combination with control panel (see Fig 10) are shown in Table 1.

Table 1 Characteristics

Control panel	Type JVTMBSTER400YN---		
Speed regulation	Under no voltage fluctuation of AC source and using built-in type tacho-gen: 1% (adjustable range: 2% to 20%) Note: The load torque is changed from 100% to 10%		
Speed range	HP	60Hz	50Hz
	½—5	1500—150 rpm	1200—120 rpm
	7½—15	1650—150 rpm	1200—120 rpm
	20—50	1550—140 rpm	1200—120 rpm
	60	1650—165 rpm	1350—135 rpm
	75	1600—265 rpm	1275—215 rpm
	100	1500—600 rpm	1200—600 rpm
	125~150	1650—165 rpm	1300—130 rpm
Output	The output of ED motor is about 80% of driver motor for continuous operation at maximum speed		
Load characteristics	Suitable for constant torque or torque reduced in proportion to speed.		

2-3 Starting:

Generally, induction motor is started under no direct current excitation i.e. no load starting. But it can be started under direct current excitation when starting time is short enough and starting surge to the source is negligible.

3. INSTALLATION

3-1 Location

ED motor is generally located indoors. It should not be used under the following circumstances:

- Dusty places
- Where corrosive gases are present
- Where highly combustible,or explosive gases are present
- Outdoors

3-2 Mounting Method of ED Motors

Take care that your mounting selection will preclude any thrust from the driven machine

3-3 Connection by Direct Coupling

The shaft of ED motor and that of the machines driven should be correctly aligned. Misalignments will have undue stress occurred and cause vibration during operation. even when a flexible coupling is used.

3-3-1. Rough Check

As shown in Fig. 2 (a), apply a ruler to the upper, lower, right and left sides of the coupling rims and align the centers of both shafts until any run-out cannot be detected by the naked eye.

3-3-3. Accurate Check

- Check for angular misalignment

Angular misalignment may be adjusted by the use of a dial indicator as shown in Fig. 2 (b). Rotate both shafts simultaneously (after screw is inserted into the coupling, but leave enough clearance between them) and check the readings on the indicator dial at each one-quarter revolution until the difference of each reading is adjusted to below 0.05mm.

- Check for run-out

Attach the dial indicator on one coupling rim and place the finger of the dial indicator on the other coupling rim as shown in Fig. 2(c). Rotate both shafts simultaneously. keeping the finger of the indicator at one point on the rim and register the readings on the indicator at each one-quarter revolution as shown in Fig. 2(d).

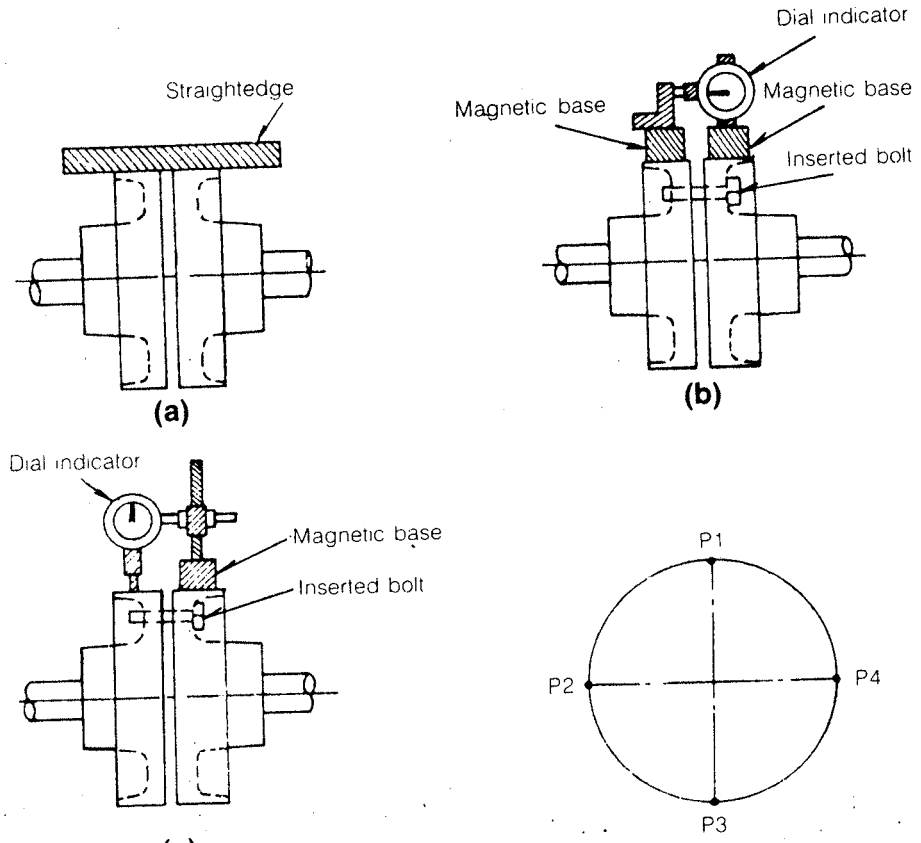


Fig. 2 Shaft Alignment

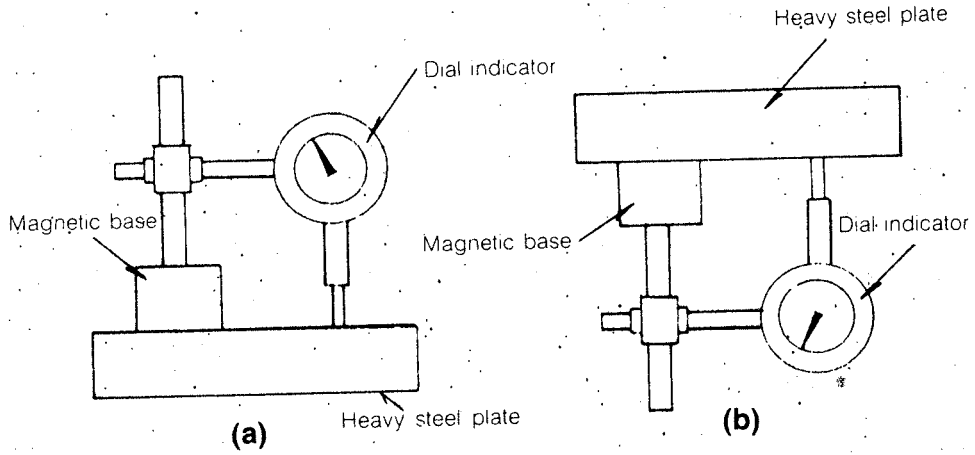


Fig. 3 Measurement of Distortion Error

Angular misalignment is $[(P1 - df) - (P3 + df)] \times ½$

Axis misalignment is $(P2 - P4) \times ½$

Where P1 – P4 : indicator readings

df : error due to indicator support distortion

Determine df as follows: Mount the indicator on heavy steel plate (as in Fig. 3) and register reading on the indicator positioned as in (a) and (b). The difference between these two readings will be 0.03 mm to 0.05 mm, df is half this difference.

3-4. Belt Coupling

3-4-1. Levelness Checking

Set a level on the surface of slide rail, and adjust the slide rail to make the bubble in the level move to the horizontal position. Accordingly, the height difference between slide rail can also be adjusted by the level.

3-4-2. Alignment

Alignment between the sheave of the ED motor and of the machine driven can be checked by stretching a wire as shown in Fig. 4.

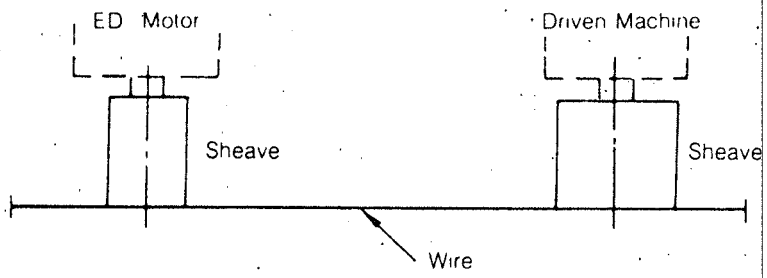


Fig. 4 Checking Alignment Between Driven Machine Sheave and ED Motor Sheave

3-4-3. The Diameter of Driven Machine Sheave

The diameter of driven machine sheave(mm) = Diameter of ED motor sheave(mm) $\times \frac{\text{Max. rpm of ED motor}}{\text{Max. rpm of driven machine}}$

Note: 1. For the speed range of ED motor, please refer to Table 1.
2. For dimensions of the ED motor sheave, please refer to Table 2.

3-4-4. Belt Tension

Belt tension should not be too great as it would shorten the life expectancy of the bearing and even cause the shaft to break. Therefore the belt should be kept slightly slack, but not so slack as to cause slippage.

3-4-5. Notes on Design of Belt Sheave (V-Pulley)

The distance L (in Fig. 5) between the center of the bearing and that of the pulley should be as small as possible to ensure load reduction on the bearing.

3-4-6. Number of V-belts:

The number of V-belts: $N = E \times \frac{1+K}{F}$

Where E: Correction factor (refer to Table 2)
F: Correction factor for contact arc (refer to Table 3)
K: Service factor (refer to Table 4)
Count fractions of N below decimal point as one.

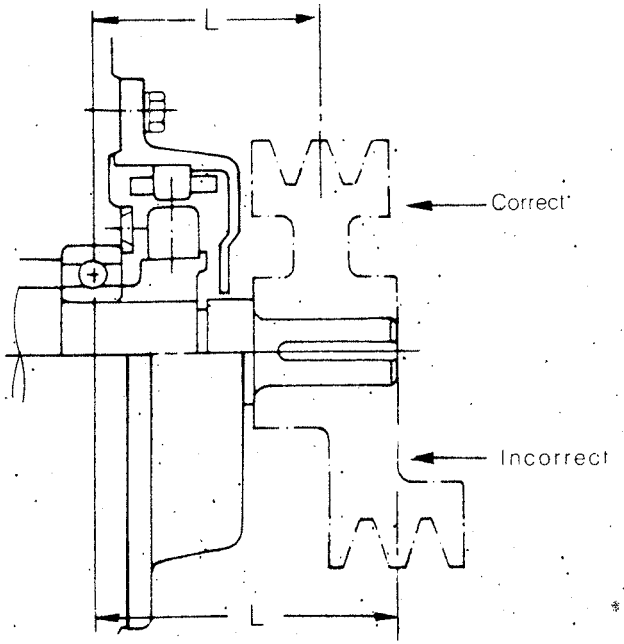


Fig. 5 Position of V Pulley

Table 2 Application of V-belt Sheave and V-belts

Motor Output (HP)	V-belt Type	V-belt Dimension(mm)	Min. Diameter of V-belt Sheave (mm)	Factor E for Min. no of Belts
1.0	A Type	12.5, 9, 40°	100	0.83
2.0			100	1.70
3.0	B Type	16.5, 11, 40°	150	1.00
5.0			150	1.70
7.5			150	2.50
10			150	3.40
15			150	5.50
20	C Type	22, 14, 40°	230	2.70
30			230	4.00
40			230	5.50
50			230	6.80

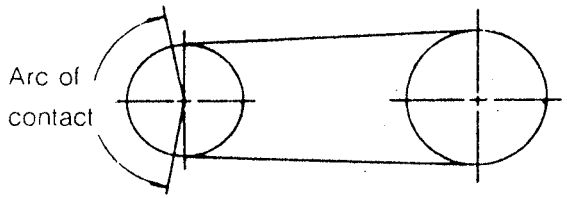
Table 4 Service Factor K for V-belt Drive

Operating Condition	Service Factor
① Acceleration or reversible operation	0.20
② 16—24 hours per day operation	0.30
③ Dusty place	0.25
④ Ambient temperature lower than 60°C	0.20
⑤ Ambient temperature lower than 90°C	0.40
⑥ Where liquid other than oil is present	0.20
⑦ Horizontal drive	0.20

Note: When two or more conditions given in Table 4 are involved, "K" can be obtained by adding the service factors together, and then multiply the sum by the following value:
When involving two conditions: 0.85
When involving three conditions: 0.7
When involving four conditions: 0.6
When involving five conditions: 0.5

Example: When conditions ① and ③ are involved
$K = (① + ③) \times 0.85$
$= (0.2 + 0.25) \times 0.85$
$= 0.382$

Table 3 Correction Factor F of Contact Arc

Measurement of Contact Arc	Contact Arc(deg.)	Correction Factor F
 Contact arc depends on ratio between diameters and center-to-center distance between sheaves	120	0.82
	125	0.84
	130	0.85
	135	0.88
	140	0.89
	145	0.91
	150	0.92
	155	0.94
	160	0.94
	165	0.97
	170	0.98
	175	0.99

Example: If a 5 HP ED motor is to be connected to a driven machine by V-belt, the number of V-belt required is obtainable according to the following method.

Sheave dia. = 150mm from Table 2. E = 1.7 from Table 2

F = 0.92 from Table 3 assuming that contact arc is 150

K = 0.382 (same as example in Table 4). Consequently, the number of belts will be determined by:

$$N = E \times \frac{1+K}{F} = 1.7 \times \frac{1+0.382}{0.92} = 2.55$$

Taking 0.55 to be 1, the resulting answer is 3 belts.

4. MAINTENANCE

4-1. Dust Removal

Take care to prevent dust accumulation on the frame of the ED motor. Dust may get into the ED motor, and accumulate between pole and drum, pole and bracket or drum and frame. The accumulation will hamper the operation of ED motor and make speed control difficult. When the ED motor is stopped by dust accumulation in its empty places, please disassemble and clean it thoroughly.

When a motor is not in operation for a long time, please draw a conver over it to avoid dust accumulation.

4-2. Measurement of Bearing Temperature

The bearing temperature is considered normal when the temperature rise at the surface of the bracket cover is not higher than 50°C at an ambient temperature of lower than 40°C. If the temperature rise registers higher than 50°C, this indicates that either grease quality has deteriorated or undue stress on bearing has occurred. Unproper belt tension often causes bearing temperature rise.

4-3. Bearing Grease

There are two types of ED motor bearings:

(1) Regreasable bearing (60 HP and above)
This type of bearing can be regreased from the grease nipple, and the old grease will be automatically squeezed out when fresh grease is added. In this way the grease can be easily changed.

(2) Sealed ball bearing (50 HP and below)
With this type of bearing, the ED motor can operate for quite a some time without regreasing.

4.4. Belt Drive Maintenance

The belt may slip when it gets stretched and the tension decreases. In such a case adjust the belt tension to ensure good motor operation.

4-5 ED Motor Control Panel and Autopack Auto Series Controllers

make sure that all connections are correct and securely fastened.

5. DISMANTLING, CLEANING AND REASSEMBLY

ED motor has to be dismantled for interior cleaning and inspection every year.

Notes on dismantling:

(1) Do not dismantle the motor in a dusty or humid place, or where water drips.
(2) Place screws and other small parts in a box to avoid their loss during dismantling.
(3) Dismantled parts should be placed on a clean wooden board, paper or cloth, not directly on the floor.
(4) See if bearing is intact. Avoid hammering the outer face of bearing or applying undue force to it.

5-1 Dismantling:

Dismantle the ED motor according to the following steps (refer to Fig-1)

(1) Disconnect the ED motor from the power source.
(2) Separate the bracket⑭by removing the fastening bolt⑬. Take the bracket ⑭ together with the inductor⑨, output shaft⑲, yoke ⑪, excitation coil⑩, and tacho generator⑯⑰from the frame⑦ as one body.
(3) Loosen the induction motor①and the frame ⑦by removing the fastening bolt, then remove the induction motor ① from the frame ⑦.
(4) Use tools to remove the stop ring ⑤ and pull out the rolling drum ⑧from the induction motor①. See "Removing drum or inductor" (Fig. 6).
(5) Loosen the bolt of the air ring ⑫, remove the air ring ⑫. (If there is no air ring, omit this step).
(6) After loosening the leads of the tacho generator ⑯, remove the tacho generator bracket⑰.
(7) Use tools to remove the stop ring⑱. take the tacho generator⑯ off the shaft ⑲.
(8) Use tools to take the inductor⑨and the output shaft⑲off together, detaching the bracket ⑭. (Before taking off these parts, please remove the tacho generator key to avoid damage to the motor bearing ②).
(9) Remove the bearing cover⑮.
(10) After loosening the excitation coil ⑩ leads, remove the yoke's⑪ fastening bolt and take off the yoke.
(11) When the motor bearing ② must be changed, please use a jack to take it off.

(12) Note: The inductor⑨and the output shaft⑲are fitted snugly together; please do not pull out the line yourself.
(13) Note: The excitation coil⑩ system and the yoke⑪ are attached to each other; please do not separate them yourself.

5-2. Cleaning of Parts

After the ED motor is dismantled, clean the parts according to the following:

- Wipe away dust.
- Wipe away grease with gasoline or thinners.

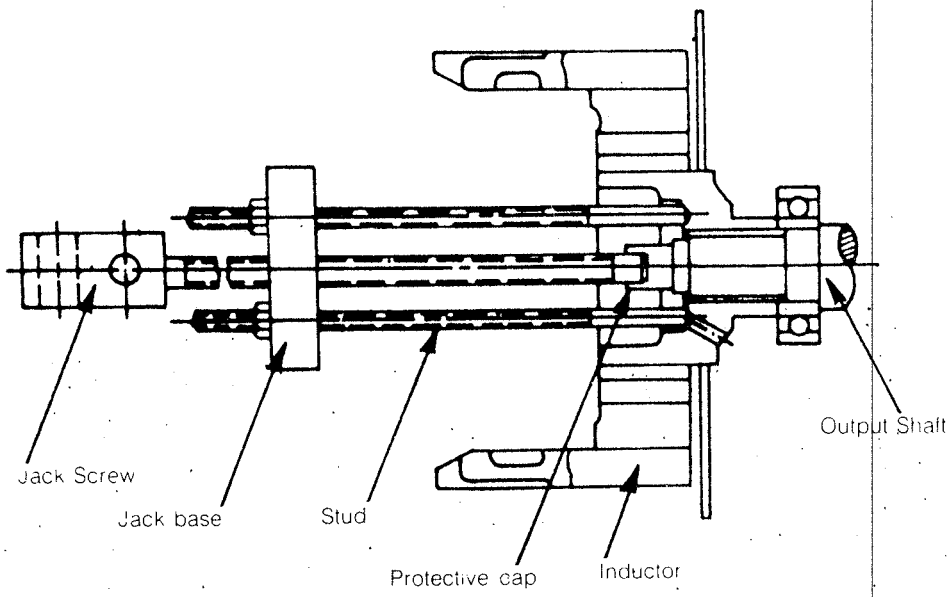


Fig. 6 Removing Drum or Inductor

5-3. Reassembly

The parts, after cleaning, should be reassembled in reverse steps to those of dismantling. Please pay special attention to these notes on reassembly:

5-3-1. Safe Bearing Installation

Take care not to damage oil seals. Squeeze the bearing back to original position on the shaft by pressing the inner ring to avoid scoring of the raceways and ballfaces. The outer L-bracket is the gold oil seal; the other (F) is latex oil seal; the two may not be mounted backwards.

5-3-2. Drum Mounting

When the drum is being mounted, you may press it back to original position on the shaft with jack screw (by taking advantage of screw holes on the hubs of drum) or heat it with a heater and then squeeze it back to the original position. The adequate temperature of the heater should be approx. 50°C. Take note that deformation may occur if drum is overheated; at worst, a permanent deformation may take place.

5-3-3. Ensuring Mounting is Secure

Every bolt should have a washer to ensure secure placement. Where four or six bolts are used to hold one part (such as the bracket, bearing cover, etc.) they should be tightened gradually and evenly. Take note that no one bolt should be tighter than the others.

6. ED MOTOR & CONTROL UNITS

6-1. ED MOTOR

This ED motor, consisting of a prime move induction motor and a ED coupling, provides an adjustable speed drive.

When the prime mover motor is started and the ED coupling is energized by d-c current, motoring torque caused by magnetic flux and eddycurrent in the ED coupling transmits rotation from the prime mover motor to the driven machine.

The output torque generated in the ED coupling can be controlled smoothly by adjusting excitation current of the ED coupling. Automatic adjustment of the excitation currenty by means of speed feedback, enables the speed of the ED motor to remain constant regardless of load changes. See Fig. 7.

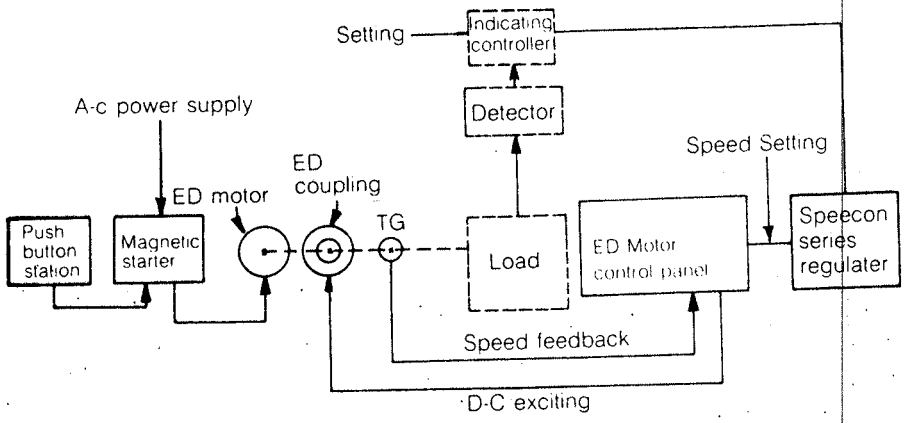


Fig. 7 ED Motor Control Equipment Block Diagram

The ED motors most basic control mechanism is a JVTMBSTER400YN---control panel; in addition, there are many control panel input devices in the "SPEECON" control device series-for example, the JVEP manual controller; the JUVR range driver, the JUVB time starter; the JUVA operational amplifier; the JUVD deflection detector; the SVMR range driver, the JUVM displacement detector; and the JUVV motor-operated speed setting rheostat. We recommend taking full advantage of this series.

6-2. TACHO-GENERATOR

The ED motor has either a tacho generator mounted inside the drive end bracket or a V-belt driven tacho generator mounted at the top of the bracket or on the motor bed.

In the former case, (4 pole, 60Hz, 1800rpm) the tacho generator will produce 35V, 720Hz when the operating speed of the ED motor is made equal to 60Hz synchronous speed of the prime mover induction motor.

The generated voltage is introduced to the control panel by leads marked (U-V) in the terminal box on ED coupling. And speed regulation of the ED motor with the use of the type JVTMBSTER400YN---control panel will be 1 percent or less of maximum ED motor speed.

The generator has two leads, U and V, which are for connection to the control panel.

6-3. SPECIFICATION OF TYPE JVTMBSTER400C ED MOTOR CONTROL PANEL

This control panel is designed to control a ED motor used as an actuator in an electric control loop. Its input level is so determined as to facilitate matching with an electronic speed command device such as PJD regulator. JVTMBSTER400YN--- Suitable for 1HP to 150HP use.

Specifications of this control panel are shown in Table 5.

TABLE 5 Specifications of control panel

TYPE		JVTMBSTER400YN---
Power Supply		230V (+10%, −15%) 50/60Hz
Output Circuit	Capacity	400W
	Voltage	80V d-c
	Current	5A d-c
	Connection of SCR	1-Phase, half wave with fly-wheel diode
Speed setting input (d-c)		10V d-c
Speed setting powersupply (built-in)		12V, 10mA
Speed Feedback Voltage		35V a-c, 720Hz (at 1800rpm)
ED Motor Speed Regulation (In case load change from 100% to 10%).		1. Less than 2% of max. speed (P). 2. Less than 1% of max. speed (PI).
Soft-start time adjusting range		0.1—30 sec

Notes: Potential transformer must be furnished for power supply other than 230V. 50/60Hz as shown in Table 6.

Table 6 Transformer for regulator use.

TYPE	TAA-3915
Rated Capacity	1.5KVA
Regulator	JVTMBSTER400YN---
Reated Voltage	440-420-400-380-350- 220-200
Frequency of Power	50/60 Hz

Notes: 1. Rated capacity means secondary voltage 230V of transformer.
2. Secondary voltage of transformer is 0-230V.

7. JVTMBS SYSTEM BLOCK DIAGRAM

7-1. Type JVTMBSTER400YN---Control panel

Fig. 8 shows a connection diagram of type **JVTMBSTER400YN---** synthesized control panel.

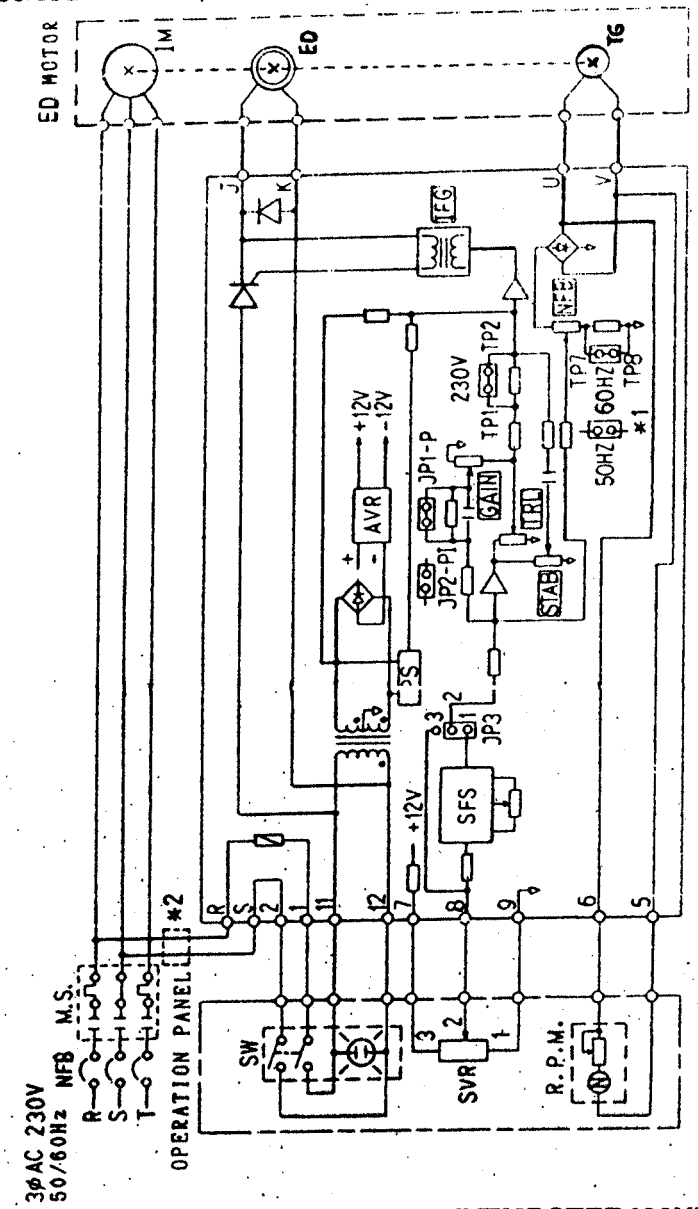


Fig. 8 Connection Diagram of Type JVTMBSTER400YN--- Synthesized Control Panel

Notes: 1. Please cut off the jumper wire on "TP7, TP8" of PC board when 50Hz source.
2. When power supply voltage is different from rated voltage of regulator, connect transformer here as to supply 230V at 50Hz to the requlator. Please refer to Table 6.
3. TG and signal wire should be connected with shield wires in order to avoid interference.

7-2. Instructions for Check Pin

(1) TP1,2: 230V a-c makes TP1, TP2 short.
(2) TP3 : Speed controller output
Voltage range: 0~−10V d-c
(3) TP4 : +12V d-c
(4) TP5 : 0V d-c
(5) TP6 : −12V d-c
(6) TP7,8: 60Hz makes TP7, TP8 short.
50Hz makes TP7, TP8 open.
(7) JP1 : Please short JP1 when P control is used.
(8) JP2 : Please short JP2 when PI control is used.
(9) JP3 : Please short JP3-1,-2 when the soft starter is used.
Please short JP3-2,-3 when the soft starter is not used.

7-3. Instructions for Terminal

Symbol	Contents	Voltage Range
R	Main circuit power supply input	1ø AC 230V 50/60Hz
S		
J	ED motor field (+)	0~80V d-c
K	ED motor field (−)	
U	AC TG feedback	35V a-c/1800 rpm
V		
1	Connective terminal of AC Source switch	Switch type: DPST (built-in neon lamp)
2		
11		
12		
7	+10V input of speed command	+10V d-c
8	Speed command input	0~10V d-c
9	PCB 0V reference	0V d-c
5	Connective terminal of R.P.M. Meter	35V a-c/1800 rpm
6		

8. WIRING AND TEST RUN

Be sure to follow directions under "IMPORTANT" given at the beginning of these instructions.

IMPORTANT

8-1-1. Energizing of Ed coupling

Excite ED coupling after starting prime mover induction motor.
Where main circuit and control circuit are fed from two separate power sources, interlock should be provided so that power is supplied to control circuit after the main circuit magnetic starter is closed.

8-1-2. Megger test and dielectric strength test

Test voltage for meggering or dielectric strength test should never exceed 500V. Insulation resistance should be above 1M Ω.
Before starting, short-circuit all of the control panel terminals as shown in fig 9.

8-1-3. Grounding and short circuiting

Grounding or short circuiting between terminals "J" and "K" during operation may cause damage to fly-wheel diodes or thyristor in control panel.

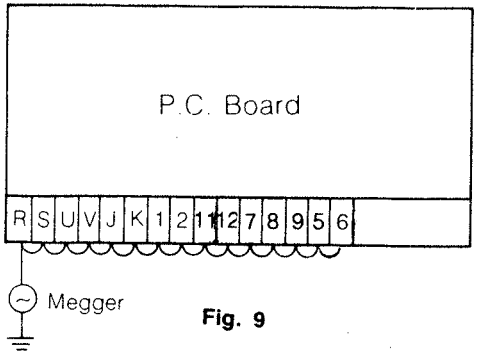


Fig. 9

8-2-1. Installation Safety

Choose, if possible, a place which is clean and has suitable temperature.
Avoid locations subjected to high temperature, moisture or corrosive gases.

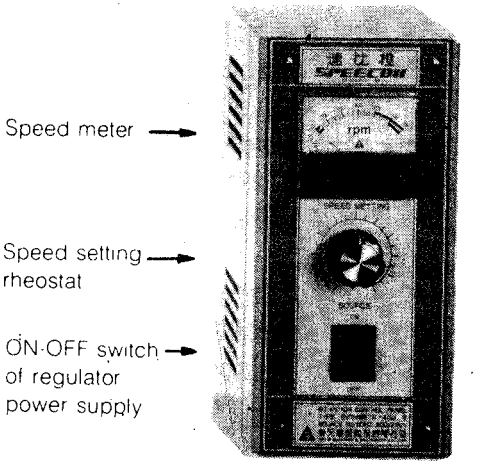


Fig. 10 Adjusting Parts of control panel
TYPE JVTMBSTER400YN---

8-2-2. Wiring

1) Wiring of synthesized control panel should be made correctly according to the wiring diagram specified.
2) Conductors having sufficient current carrying capacity should be used for main circuit wiring.
3) The terminal (J) on ED motor exciting coil must be connected to terminal ⓙ on control panel, and so must (K) be to ⓚ.

   The terminal (U) on ED motor tacho-generator must be connected to terminal ⓤ on control panel, and so must (V) be to ⓥ
4) On completion of wiring check to see that wiring is correct and that all terminals screws are tight.

8-2-3. Test Run

Adjustable parts of control panel are shown in Fig. 10.

1) Set the controller ON-OFF switch to "OFF", and start the prime mover of the ED motor.
2) Turn the speed setting rheostat on the control panel completely counterclockwise, and set the ON-OFF switch to "ON".
3) Slowly turn the speed setting rheostat clockwise, and the ED motor will increase its speed.
   Turning the speed setting rheostat counterclockwise will decrease the ED motor speed.
4) Setting the ON-OFF switch on the control panel to "OFF" will stop the ED coupling.
5) Stopping the prime mover will stop the ED motor.

8-2-4. Adjustment of Control Panel

(1) VR1 (STB): Stabilization adjustment
Turn the rheostat VR1 (STB) fully counterclockwise. Then turn it slowly clockwise until the motor fluctuation is eliminated.

(2) VR2 (GAN): Gain adjustment
Turn the rheostat VR2 (GAN) clockwise to decrease the speed regulation.
If hunting is happened, adjust the VR1 (STB) to minimize the speed fluctuation.
The maximum speed of Motor may change when the GAIN is adjusted, then adjust the VR5 (NFB).

(3) VR3 (TRL): Torque Limit adjustment
Turn the rheostat VR3 (TRL) clockwise to increase the output of torque limit.

(4) VR4 (SFS): Soft-start time adjustment
Turn the rheostat VR4 (SFS) clockwise to increase the soft-start time.

(5) VR5 (NFB): Maximum rated speed adjustment
Turn the rheostat VR5 (NFB) clockwise to increase the speed of ED motor.

Notes: 1. Never operate the motor at the speed exceeding max. rated speed by adjusting VR5 (NFB), because the exciting coil may be brunt out.
2. All these rheostats have already been set in factory tests, please try to avoid altering the scales.

9. CHECK LIST OF ED MOTOR CONTROL PANEL

9-1. Connection and voltage between terminals of control panel

(1) When performing megger test and dielectric strength test be sure to follow instructions under "IMPORTANT".
(2) Connect terminals R and S to power supply. 230V, 50/60Hz.
(3) Terminals J and K are output terminals 0 to 80V d-c. Connect terminals J and K to terminals (J) and (K) respectively of ED motor exciting coil.
(4) Terminals U and V are output terminals for tachometer generator. They should be connected to terminals U-V on built in tachometer generator (output voltage 0-35V a-c).
(5) Terminals ⑦, ⑧, and ⑨ are to be connected to speed setting rheostat, and terminal voltage between ⑦ ⊕ and ⑨ ⊖ is approximately 10V d-c. Insert tester between terminals ⑨ ⊖ and ⑧ ⊕, and turn clockwise speed setting rheostat (1KΩ) Terminal voltage of about 10V d-c should be obtained.

9-2. Adjusting rheostat

Methods of adjustment refer to "adjustment of control panel".

9-3. The adjustment of speed meter

Speed meter on control panel has been pre-set at factory. However, speed meter may not follow exactly the actual speed of Motor due to variation of TG voltage. If the actual measured speed does not be according with speed meter reading, adjust the rheostat (10kΩ) at back side of speed meter on control panel to make them the same.

ED MOTOR AND REGULATOR TROUBLE SHOOTING CHART

Trouble	Cause
Starting prime mover motor cause Ed coupling to rotate without being excited	1) Incorrect Wiring, Check wiring according to diagram 8. 2) Excessively light load. In this case, rotating prime mover motor alone might cause ED coupling to rotate. 3) Foreign matter stuck between drum of ED coupling and pole or inductors. Inductor contacting drum. 4) Speed setting rheostat (1kΩ) reversely wired. Voltage across terminals ⑨(−) and ⑧(+) should be zero when measured by tester with speed setting rheostat at zero position. Then turning the speed setting rheostat slowly, will increase the testing voltage, and DC10V at maximum.
With prime-mover motor rotating. exciting Ed coupling does not cause it to rotate.	1) Output voltage across regulator terminals R and S are incorrect. It should be 230V ±10% Protective fuse damaged. Check fuse by taking off fuse holder. 2) Speed setting voltage not correct. It should measure approx. 10V across terminals ⑦(+) and ⑨(−). 3) Check externally wired exciting circuit resistance with tester by removing either terminal J or K. Also see that exciting winding resistance is proper (rated value). 4) Output voltage not sufficient. By turning clockwise speed setting rheostat check to see that control panel output voltage of 0 to 80V is obtained between terminals J and K.
Speed of ED motor cannot be reduced	1) No load or light load. 2) Terminal voltage between terminals U and V should be approx. 30V at 1500 rpm. 3) If rated voltage is detected, check components of speed detecting circuit in control panel. 4) Load driving Ed motor. In this case, ED motor control be controlled.
ED coupling speed will not increase	1) ED motor overloaded. Check exciting current and prime move current of ED coupling, and compare with their reated currents respectively. 2) Exciting winding of ED coupling short-circuited Compare current of prime mover motor with ED coupling exciting current. 3) Check to see that ED motor is not so interlocked as to rotate in accordance with output shaft speed.
Protective fuse 1FU & 2FU in control panel will be blew out every time when it is replaced	1) SCR or fly-wheel diode short circuited. 2) Control panel grounded. Check with tester between each terminal and grounding. 3) Capacitor C21, C22 in surge absorber circuit is short-circuited. Check capacitor with tester. 4) Exciting winding of ED coupling grounded or short-circuited.
How to check control panel characteristics	To measure output voltage of control panel stop prime mover motor and connect tester between control panel terminals J and K then turn clock-wise slowly speed setting rheostat. In this case, it is normal that output voltage increase smoothly from 0 to 80V in proportion to the voltage set.

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