YASKAWA ELECTRIC

TOE-S606-1B

SMALL-CAPACITY DIGITAL TRANSISTOR INVERTER

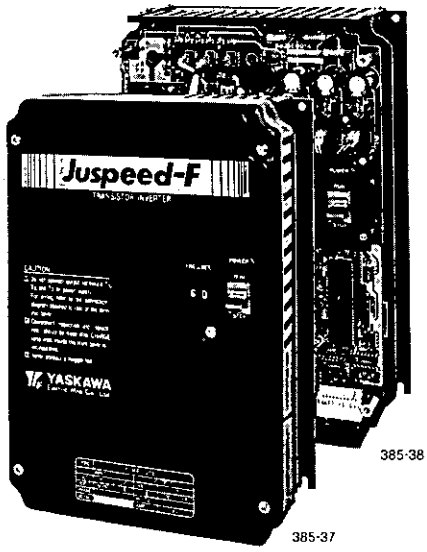
Juspeed-F™

1.5 TO 6 kVA
MODEL CIMR-G08C TO -G37C 208/230 V 1 TO 5 HP
MODEL CIMR-08C TO -37C 200/220 V 0.75 TO 3.7 kW

INSTRUCTION MANUAL

Before initial operation read these instructions thoroughly, and retain for future reference

When properly installed, operated and maintained, this equipment will provide a lifetime of optimum operation. It is mandatory that the person who operates, inspects, and maintains this equipment thoroughly read and understand this manual.



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385-37

Juspeed-F
Model CIMR-G08C

DANGER

- Do not touch circuit components until CHARGE lamp extinguishes after turning off AC main circuit power. The capacitors are still charged and can be quite dangerous. Wait approximately five minutes after AC main circuit power is OFF.
- Do not connect or disconnect wires and connectors while AC power is applied.
- Do not check signals during operation.
- If Juspeed-F inverter protective circuit activates, inverter output is stopped and, motor is coasting. Take positive action to protect personnel and machines from damage caused by motor coasting. If used with brake motor, be sure that motor power supply is separate from braking power supply.

IMPORTANT

- Be sure to ground Juspeed-F using the ground terminal Ⓔ on the casing of Juspeed-F.
- Do not provide magnetic contactor (MC) or capacitor between Juspeed-F and motor.
- All the potentiometers of Juspeed-F have been adjusted and paint-locked at the factory. Do not change their settings unnecessarily.
- Do not perform the following tests in the field:
  - Withstand voltage test on any part of the Juspeed-F unit. It is an electronic device using semi-conductors and vulnerable to high-voltage.
  - Insulation resistance test with a megger. This test has been made at the factory and need not be conducted at test run. Exception: If megger-testing is required for inspection and maintenace purposes, it should be applied only to main circuit and the ground and never to the control circuit.
  - Conduction test on control circuits.

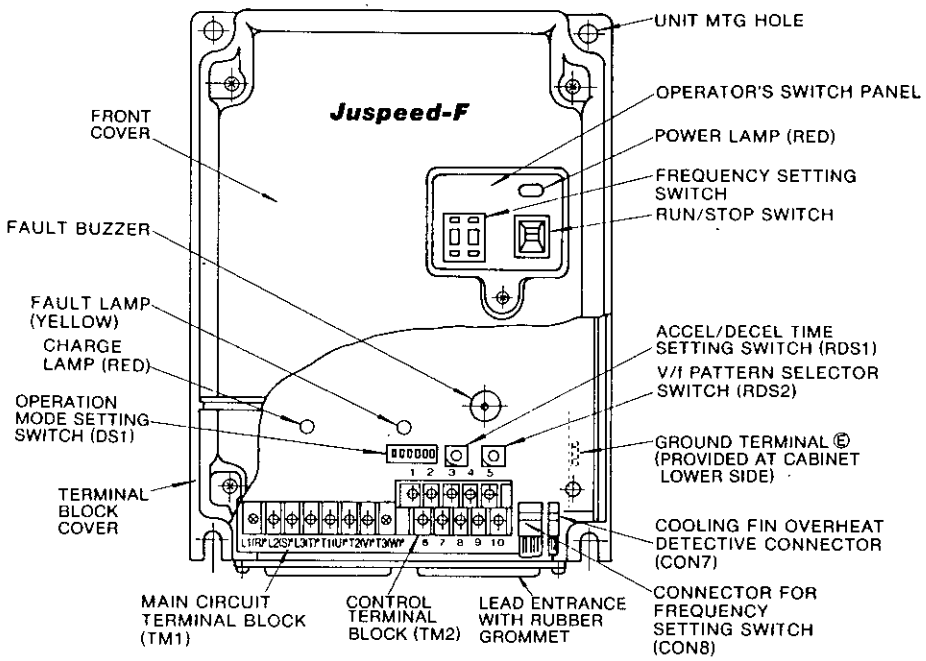
RECEIVING

This Juspeed-F has been put through stringent tests at the factory before shipped. After unpacking, however, check and see the following.

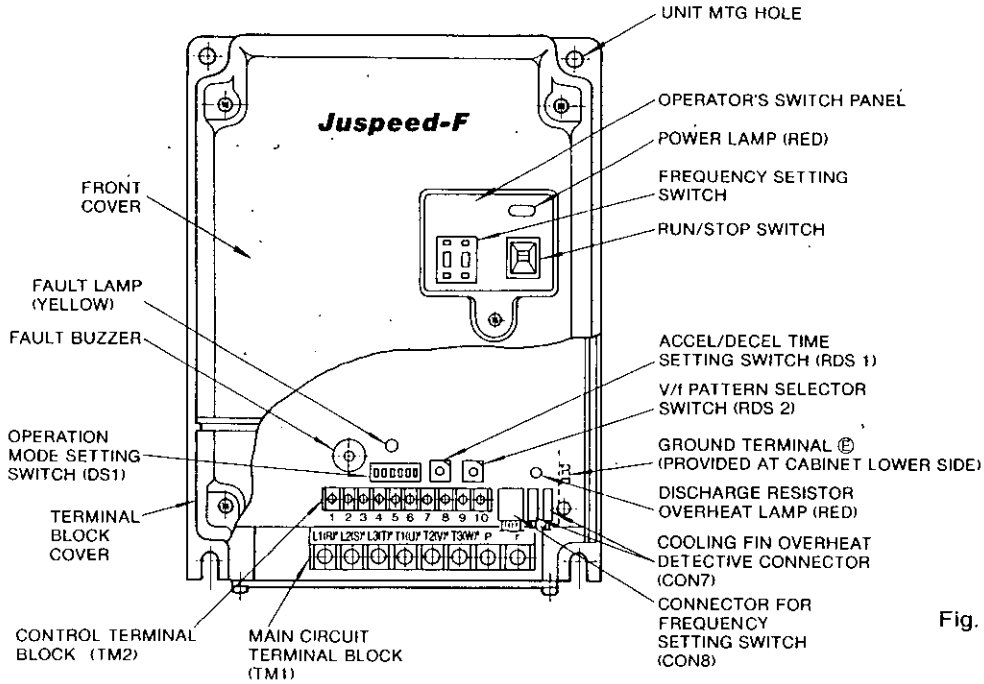
- Nameplate ratings meet your requirements.
- Leads and connectors are not disengaged.
- No damage while in transit.
- Bolts and screws are not loose.

If any part of Juspeed-F is damaged or lost, immediately notify us giving full details and nameplate data.

Juspeed-F MAJOR CONTROL COMPONENT LAYOUT



(a) Model CIMR-G08C (-08C)



(b) Models CIMR-G22C (-22C), -G37C (-37C)

*For models CIMR-08C, -22C and -37C.

Fig. 1 Major Control Component Layout of Juspeed-F

INSTALLATION

LOCATION

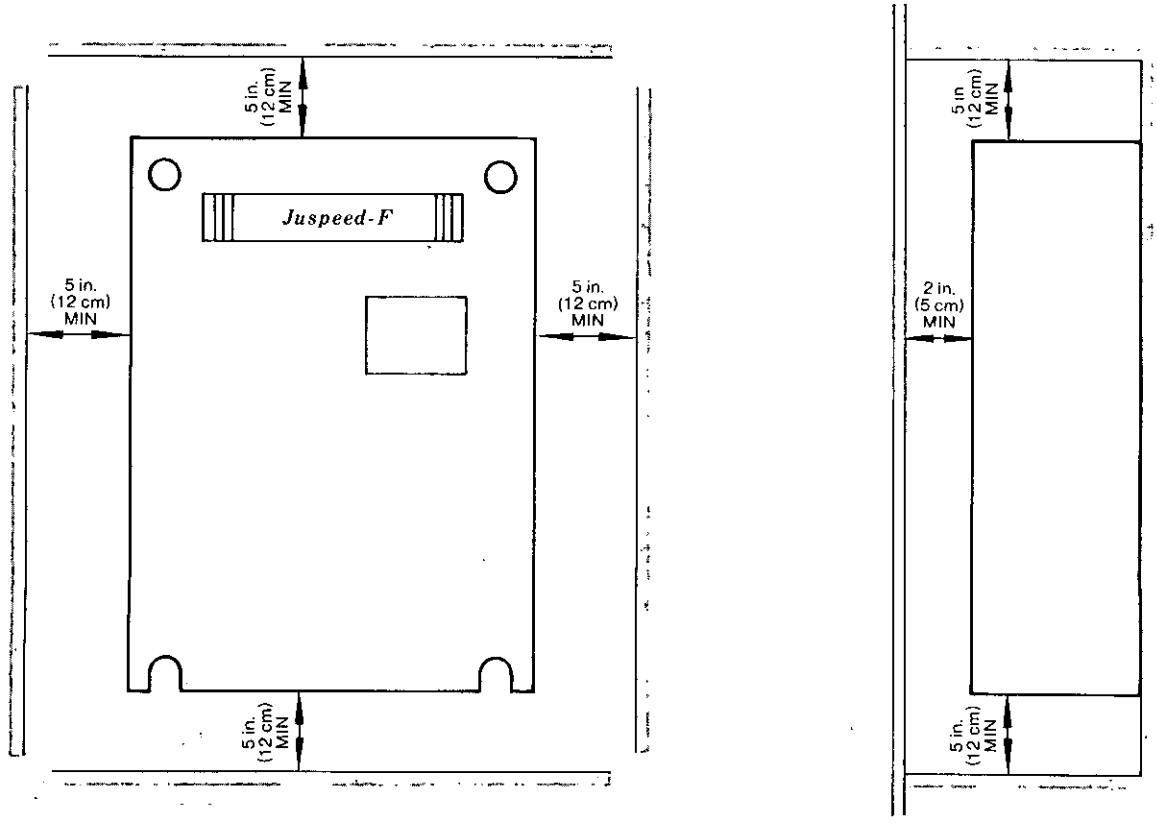
Location of the equipment is important to achieve proper performance and normal operating life. The units should be installed in areas where the following conditions exist.

- Ambient temperature: -10 to +40℃; -10 to +50℃ with cover removed
- Protected from rain or moisture.
- Protected from direct sunlight.
- Protected from corrosive gases or liquids.
- Free from airborne dust or metallic particles.
- Free from vibration.

POSITIONING

For cooling and maintenance purposes, make sure that there is sufficient clearance around the equipment whether it is enclosed in a cabinet or not, as shown in Fig. 2. Keep 5 in. (12 cm) clearance between wiring duct and Juspeed-F also.

To maintain effective cooling conditions, it must be installed vertically to the ground so that product name can be read correctly using the four mounting screws.



(a) Front View (b) Side View

Fig. 2 Juspeed-F Clearance Requirements for Proper Cooling and Maintenance

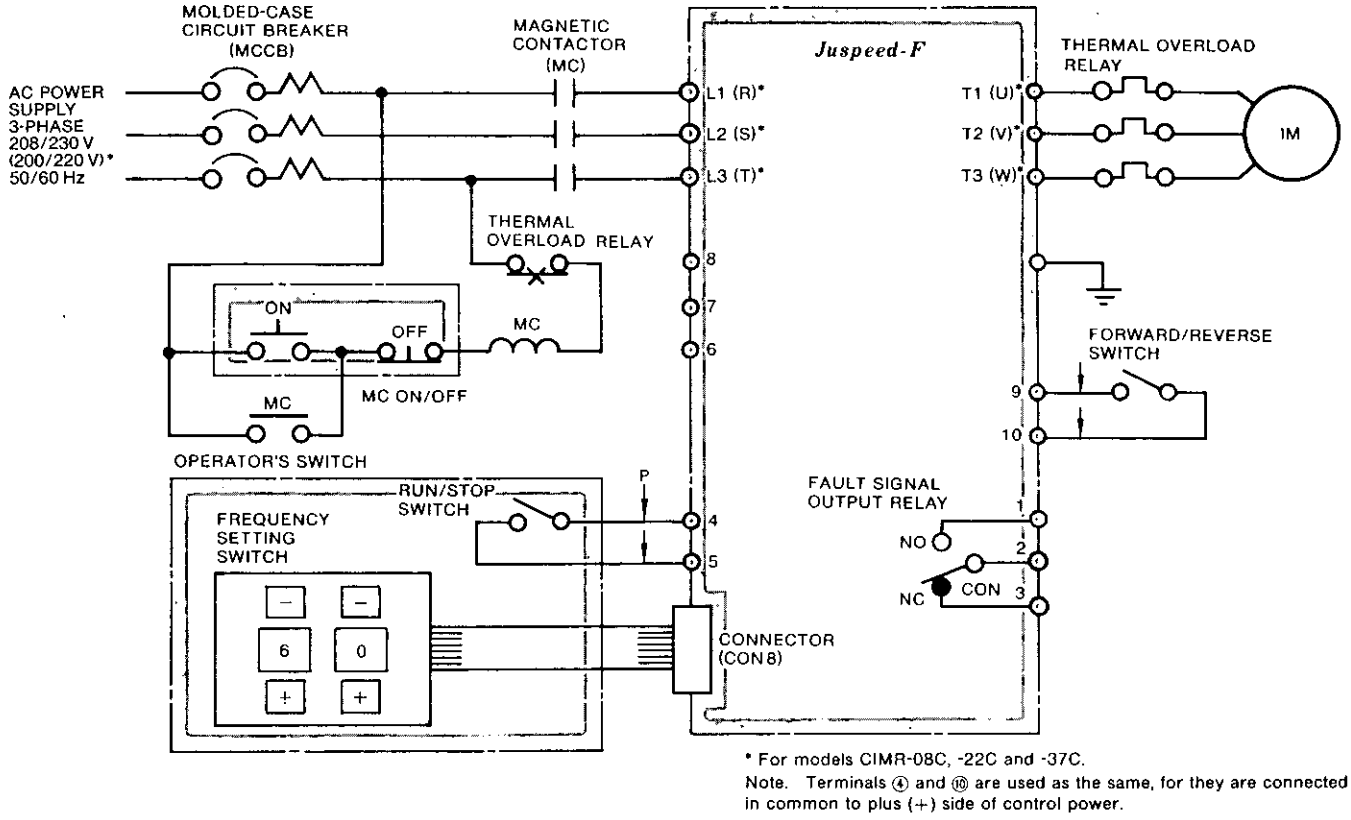
WIRING

INTERCONNECTIONS

Fig.3 shows the connection diagram for Juspeed-F drive. Connections should be made correctly, referring to Fig.3. Before wiring, remove terminal block cover, run the leads through the lead entrance at the Juspeed-F bottom and connect them at the terminal block.

Wire size must be:

- 14 AWG (2mm²) with M4 terminal screw for main circuit terminals L1 (R), L2 (S), L3 (T), T1 (U), T2 (V), T3 (W), and E.
- 18 AWG(0.75 mm²) with M3 terminal screw for signal circuit terminals 1 to 10.



* For models CIMR-08C, -22C and -37C.
Note. Terminals 4 and 10 are used as the same, for they are connected in common to plus (+) side of control power.

Fig. 3 Example of Juspeed-F Interconnections

Main Circuit Connections

(1)MOLDED CASE CIRCUIT BREAKER (MCCB) AND MAGNETIC CONTACTOR (MC)

Be sure to connect MCCBs rated 30AF, 10A between power supply and Juspeed-F input terminals L1 (R), L2 (S), L3 (T). To ensure safety, it is recommended that MC rated 250V, 10A or more containing a self-holding circuit be provided at power supply.

Do not connect MC between motor and Juspeed-F output terminals. Turning on or off the magnectic contactor flows full-voltage starting current into the controller and causes to Juspeed-F to stop. Frequent ON/OFF operations of MC may cause irreparable damage to Juspeed-F.

(2) Input terminals L1 (R), L2 (S), L3 (T), can be connected in any combination of power supply phase.

(3) Never connect AC power supply to output terminals T1 (U), T2 (V), T3 (W).

Failure to do so may cause irreparable damage to the controller.

(4) DIRECTION OF MOTOR ROATION

When inverter output terminals T1 (U), T2 (V), and T3 (W) are connected to motor terminals T1 (U), T2 (V), T3 (W), respectively, upon forward operation command, motor rotates forward.

(5) POWER FACTOR CORRECTION CAPACITOR

Never connect power factor correction capacitor between inverter output terminals T1 (U), T2 (V), T3 (W), and motor.

Control Circuit Connections

(1) SIGNAL LEADS

Use the twisted lead for connections to signal terminals ④ to ⑩. The signal line must be separated from main circuit terminals T1 (U), T2 (V), T3 (W), L1 (R), L2 (S), and L3 (T) and large-current electrical circuit (230 V, 120 V relay sequence circuit). See Fig. 4. Lead length should be 66 feet (20 meters) or less.

The operator's switch, consisting of RUN/STOP switch and frequency setting switch, can be separated from Juspeed-F unit if specified so. For separate mounting contact Yaskawa representive. Frequency setting switch is plugged-in by Japan Molex connector and terminals No. 5659.

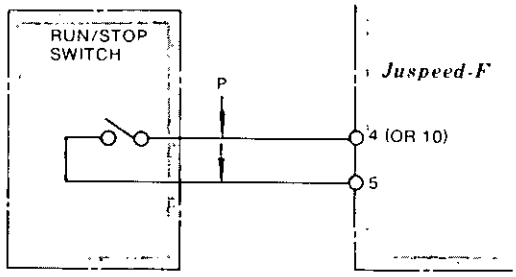


Fig. 4 Connections of RUN/STOP Switch

(2) USE WITH BRAKE MOTORS

When used with brake motors, power supply of brake must be separated from that of motor. Make a sequence so that brake engages after Juspeed-F main circuit is shut off. This provides positive motor stop when inverter protective circuit is shut off.

Grounding

Make a positive grounding using ground terminal Ⓔ on the casisng of Juspeed-F.

(1) Ground resistance should be 100Ω or less.

(2) Never ground Juspeed-F in common with welding machines, motors, and other large-current electrical equipment, or ground pole. Run the ground lead in a separate conduit from leads for large-current electrical equipment.

Molded-case Circuit Breaker (MCCB) and Power Supply Magnetic Contactor (MC)

Recommended MCCB and MC are listed below.

Juspeed-F Model CIMR-		G08C 08C	G22C 22C	G37C 37C
Molded-case Circuit Breaker (MCCB)		Type NF-30, 10A	Type NF-30, 20A	Type NF-30, 30A
Magnetic Contactor (MC)		Type HI-7E	Type HI-10-2E/21A2	Type HI-20E/22A2
Main Circuit Terminals	Lead Size	2 mm²	3.5 mm²	3.5 mm²
	Terminal Screw	M4	M4	M4
Signal Terminals 1 to 11		Lead size: 0.75 mm² or more; Terminal screw diameter: M3		

TEST RUN

CHECKS BEFORE TEST RUN

After completing mounting and connection of units, check for:

- Correct connections
- No short-circuit conditions
- No loose screws (Check especially for loose wire clippings)
- Proper load conditions
- Correct input power (No voltage drop or voltage imbalance, power supply capacity: 3kVA or more)

PRESETTING AND ADJUSTMENT

Operation Mode Setting Switch

Operation mode setting switch (DS1) consists of six ON/OFF slide switches printed on a base board. Select the operation modes from Table 1 according to the application. All the ON/OFF slide switches have been preset at factory as shown in Fig.5.

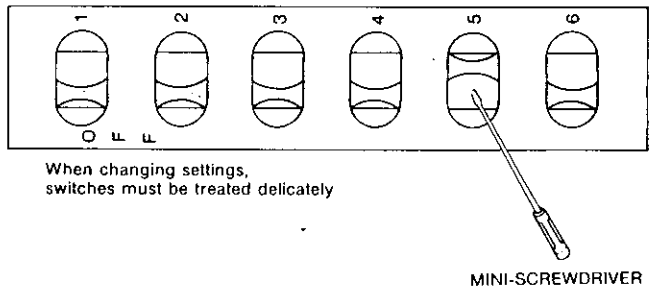


Fig. 5 Operation Mode Setting Switch (DS1) (ON/OFF Slide Switches)

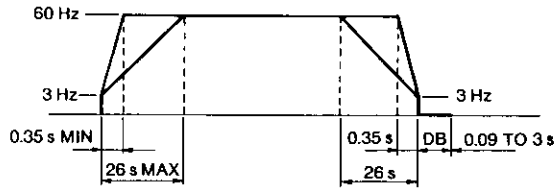
Operation Mode Setting Switch (Cont'd)

Table 1 Selection of Operation Modes

Slide Switch No.	ON/OFF	Operation Mode
1	ON	Motor is coasting to a stop. (Motor is coasting to a stop by turning off the operation switch, or setting RUN/STOP switch to STOP.)
	OFF	Motor is braked to a stop (Frequency braking→3 Hz→Dynamic braking→Motor stop)
2	ON	Signal terminals ⑥ to ⑧ used as low-speed limit operation
	OFF	Signal terminals ⑥ to ⑧ used as multi-speed operation
3 or 4*	3: ON 4: OFF	High-speed limit frequency 50 Hz
	3: OFF 4: OFF	High-speed limit frequency 60 Hz
	3: OFF 4: ON	High-speed limit frequency 90 Hz
	3: ON 4: ON	High-speed limit frequency 120Hz
5	ON	Fault warning buzzer used
	OFF	Fault waring buzzer not used
6	OFF	Always OFF

*Switches ③ and ④ must be set in combination.

Acceleration/Deceleration Time Setting Switch (RDS1)



Accel/Decel Time Setting

Set the acceleration and deceleration times using accel/decel time setting switch (RDS1) according to applications and load conditions. Table 2 shows the settings of RDS1 notches, acceleration and deceleration time and dynamic braking time at maximum frequency of 60 Hz. RDS1 has been preset at the factory to notch ③.

Acceleration time and deceleration time synchronize and are set by RDS1 at the same time. Acceleration and deceleration times represent the range of time of output frequency from 0 Hz to 60 Hz and 60 Hz to dynamic braking, respectively. For maximum frequencies other than 60 Hz, notch positions should be determined by finding the corresponding accel/decel times in Table 2. Calculate the corresponding time from the formula:

$$\text{Accel/decel time to be set} = \text{Time in Table 2} \times \frac{\text{Max Frequency}}{60}$$

Example

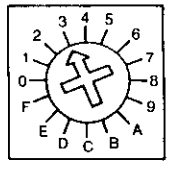
At maximum output frequency of 50 Hz or 90 Hz, the following calculation will be applied.

At 50 Hz, accel/decel time to be set

$$= \text{Accel/decel time in Table 2} \times \frac{50}{60}$$

At 90 Hz, accel/decel time to be set

$$= \text{Accel/decel time in Table 2} \times \frac{90}{60}$$



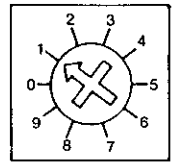
Accel/Decel Time Setting Switch (RDS1)

Table 2 Accel/Decel Times and Dynamic Braking Time at RDS1 Notches

Notch	⓪	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ
Accel/Decel Time (s)	0.35	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.30	3.80	4.40	5.30	6.50	8.60	12.8	26.0
Dynamic Braking Time (s)	0.09	0.10	0.11	0.12	0.13	0.15	0.16	0.19	0.21	0.25	0.30	0.37	0.50	0.75	1.50	3.00

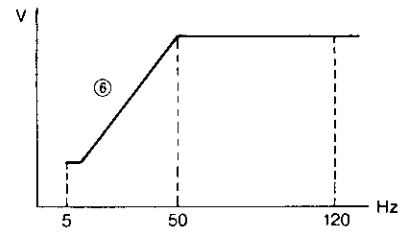
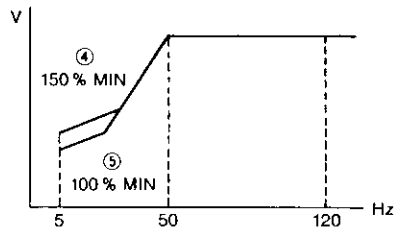
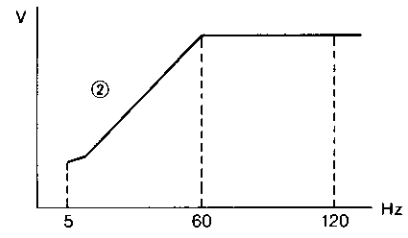
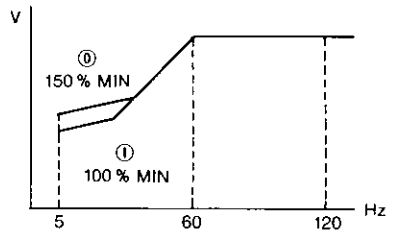
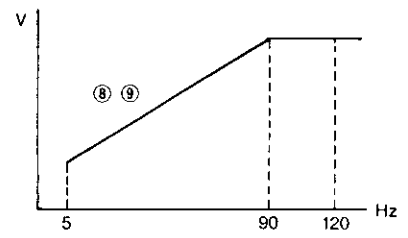
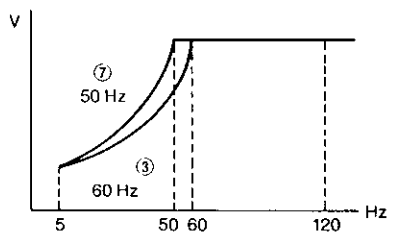
V/f Pattern Selector Switch

V/f pattern selector switch (RDS2) sets the voltage corresponding to the output frequency. For smooth motor running, select the optimum V/f pattern from nine types listed in Table 3. The V/f pattern selector switch has been preset at the factory at notch ①. Setting excessively high votage at low frequency may cause overcurrent and result in activating overcurrent protective function to shut off the transistor power.



V/f Pattern Selector Switch (RDS2)

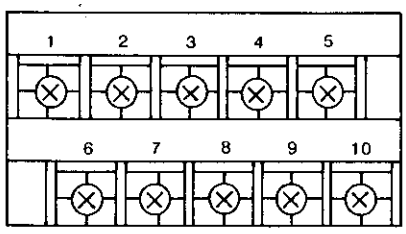
Table 3 Nine Types of V/f Patterns

Application	Hz	V/f Pattern	Application	Hz	V/f Pattern
General Purpose (Start at 50% torque of the rating)	50 Hz		High-start Torque (Start at more than 100% torque of the rating)	50 Hz	
	60 Hz			60 Hz	
	90 Hz		Fans and Pumps (At variable torque)	50/60 Hz	

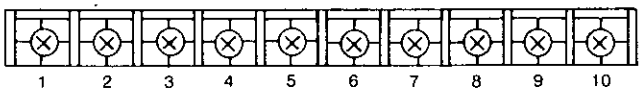
Note:
1. Circled numbers in the table above indicate the notch to be set by the V/f pattern selector switch and their respective pattern curve.
2. For notch ④ or ⓪, use with Juspeed-F motors.

Signal Terminals

Control circuit terminal block for signals is shown in Fig. 6. Terminals ④ and ⑩ are connected in the circuit.



(a) Model CIMR-G08C (-08C)

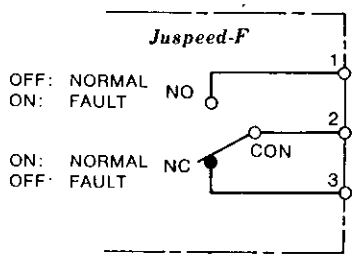


(b) Models CIMR-G22C (-22C), -G37C (-37C)

Fig. 6 Control Circuit Terminal Block

Fault Signal Terminals ①, ②, ③

Give the contact output if the inverter is tripped.



CONTACT RATING:
250 VAC, 1 A RESISTANCE LOAD
30 VDC, 1 A RESISTANCE LOAD

Fig. 7 Connections of Fault Signal Output Relay

RUN/STOP Terminals (⑤ and ④ or ⑤ and ⑩)

Terminals for motor run/stop switch. They are connected as shown in Fig. 8.

For remote running or stopping of motor, use a toggle switch (30 VDC, 3A, contact resistance: 0.010Ω or less) and connect with twisted lead to prevent erroneous operation due to noise. Terminals ④ and ⑩ are connected within the circuit.

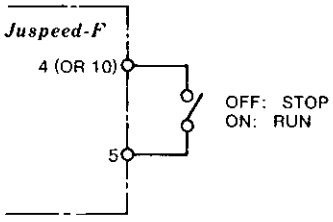


Fig. 8 Connections of RUN/STOP Switch

Forward/Reverse Terminals (⑨ and ④, or ⑨ and ⑩)

Terminals for motor forward/reverse operation switch. See Fig. 9. Motor runs forward by turning off terminals ⑨ and ④ and reverses by turning on. Use a toggle switch (30 VAC, 3A, contact resistance: 0.010Ω or less) or equivalent.

Forward/reverse running can be changed during operation. For forward operation only, forward/reverse switch need not be connected.

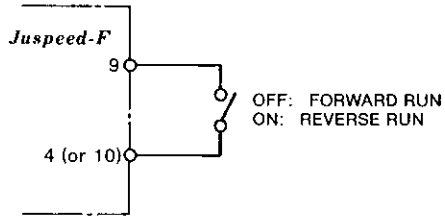


Fig. 9 Connections of Forward/Reverse Switch

Multispeed/Low-speed Limit Terminals (⑥, ⑦, ⑧, ④ or ⑩)

Terminals for contact input for multispeed or low-speed limit operation. See Fig. 10. Set the operation mode selector switch (DS1) ② to select multispeed or low-speed limit operation: ON for Low-limit, OFF for multispeed. Then, set the operation frequency by setting the external switches S1 to S3 ON or OFF referring to Table 4.

Use model MY relay made by OMRON, or equivalent for external switches S1 to S3.

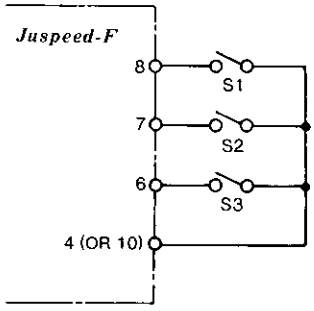


Fig. 10 Connections of External ON/OFF Switches for Multispeed and Low-speed Limit Operation

Table 4 Setting of External Switches

External ON/OFF Switch / Operation Mode			Multispeed (DS1 switch ② OFF)	Low-limit (DS1 switch ② ON)
S1	S2	S3	Output Frequency	Minimum Frequency
OFF	OFF	OFF	Frequency set by frequency setting switch	5 Hz
OFF	OFF	ON	10 Hz	10 Hz
OFF	ON	OFF	20 Hz	15 Hz
OFF	ON	ON	5 Hz	20 Hz
ON	OFF	OFF	30 Hz	25 Hz
ON	OFF	ON	40 Hz	30 Hz
ON	ON	OFF	50 Hz	35 Hz
ON	ON	ON	60 Hz	40 Hz

Setting Frequency

Set the frequency using the frequency setting switch on the front of Juspeed-F. Digits can be set by pressing pluse or minus levers of each digit. Frequency setting lever must be opened before they can be depressed.

Pressing the upper levers (-) decreases the counter by one; pressing the lower levers (+) increases the counter by one. Right-hand dial can be freely set from 0 to 9. Left-hand dial can be set from 0 to 12 or from 12 to 0, it locks at 0 or 12 position. After setting the required frequency, return the levers to the neutral positions (closed).

Set high-speed limit frequency according to Table 1 and low-speed limit frequency according to Table 4. They take priority over the frequency set by the frequency setting switch.

Fig. 12 shows setting frequency and output frequency. For example, when high-speed limit frequency is set at 90 Hz, and low-speed limit frequency, at 20 Hz, any frequency between 20 and 90 Hz can be set in steps of one hertz using the frequency setting switch.

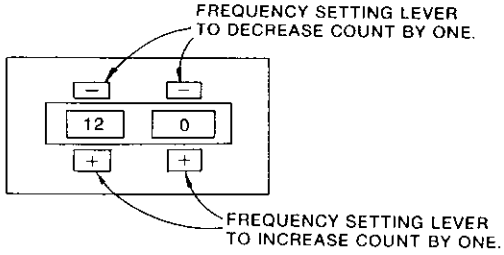


Fig. 11 Frequency Setting Switch

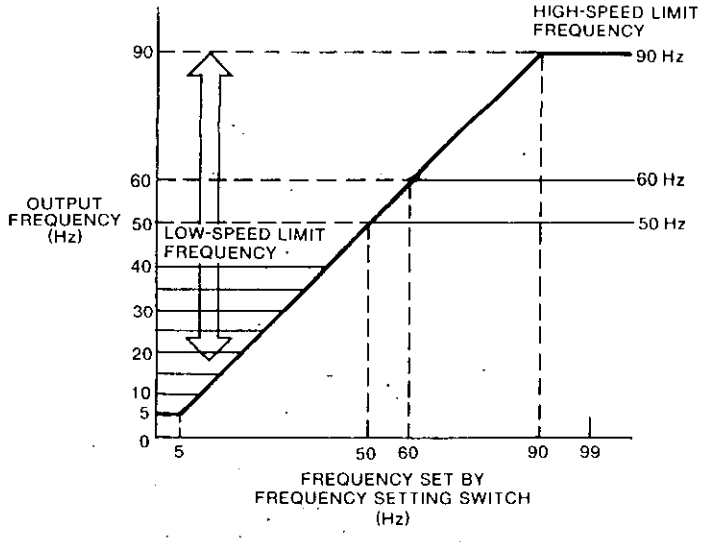


Fig. 12 Setting Frequencies for High- and Low-speed Limits

TEST RUN

Uncouple the motor from the driven machine to insure safety. Start the operation following the procedures below.

1. Move RUN/STOP switch to STOP. Turn off the external sequence swicthes, if used.
2. Set the frequency setting switch to 5Hz or below. When the frequency set by the switch is between 0 to 5Hz, 5Hz command is given and motor rotates at 5 Hz when the RUN/STOP switch is set to RUN. If the low-speed limit frequency is set, the frequency is set as minimum.
3. Turn on Juspeed-F AC main circuit (MCCB) and then the magnetic contactor (MC). Check to be sure that the POWER lamp (red) on the front of Juspeed-F lights. At this time, motor still does not start unless the operation circuit malfunctions. Check the motor for any noise or vibration (by hand) to make sure no malfunction has occured.
4. Change RUN/STOP switch to RUN. Make sure that the motor is running forward. If shaft rotation is incorrect, change FORWARD/REVERSE switch to REVERSE or reverse any two of motor leads (T1) (U), (T2) (V), (T3) (W).
5. Juspeed-F output frequency increases or decreases according to the preset accel/decel time. Motor accelerates or decelerates according to the frequency as well. If the motor does not run smoothly during acceleration or deceleration, or fault buzzer sounds, the accel/decel time is assumed to have been set too short for the load level. After turning off the AC main circuit power, extend the accel/decel time. Repeat this until fault buzzer stops.
6. Accel/decel time and V/f pattern can be changed during motor operation. See para. "Setting of Acceleration and Deceleration Times" and "Selection of V/f Pattern."
7. If any of the protective functions activates fault buzzer sounds and Juspeed-F is stopped. Turn off the AC main circuit power by turning off the circuit breaker (MCCB) or magnetic contactor (MC) and turn on the power again.

When the fault buzzer is not used, trouble can be located by the blinking fault lamp on the lower part of the printed board. If Juspeed-F stops, remove the terminal board cover and identify the trouble with the blinking lamp, referring to Table 5.

OPERATION

After the test run is over, start the operation keeping the following in mind.

(1) For general purpose motors combined with Juspeed-F controller, motor temperature rises noise and vibration increase as compared with commercial power.

(2) Operate the motor at the temperature below the allowable temperature rise level, for motor cooling effects decrease at low speed operation.

(3) Motor ratings

- When two or more motors are controlled by a single Juspeed-F, check to be sure that the total motor current is not larger than the inverter rating.
- When multipole motors of more than 8 poles or special purpose motors are used, make sure that motor current is within the inverter rating.
- Even with small load, never use a motor whose current exceeds the inverter rating.

(4) Never connect a capacitor at the inverter output, for it may cause activation of overcurrent protective function.

(5) To start and stop the motor, use RUN/STOP switch on the front of Juspeed-F, not the magnetic contactor (MC) or circuit breaker (MCCB) which are used only for emergency stop.

(6) If supply voltage changes at momentary power failure, protective functions may operate and stop Juspeed-F, resulting in motor coasting to a stop. Turning on the AC power supply within one second after the activation of protective functions will not restart the motor. Power input after approximately one second will restart the motor. For the application requiring positive motor stop in an emergency, provide magnetic contactor (MC) including self-holding circuit at power input as shown in Fig. 3.

(7) Restart the motor after making sure that the motor has come to a full stop. If the operation is started during motor coasting, overcurrent protective function may be activated.

(8) Motor runs at output frequency of 5 Hz by setting RUN/STOP switch to RUN even if the frequency is set at 0. When the low-speed limit frequency is set, the motor starts at the minimum frequency set.

MEMO

MAINTENANCE

Juspeed-F requires almost no routine checks. It will function efficiently and longer if it is kept clean, cool and dry, observing precautions listed in para. Location. Especially check for tightness of electrical connections, discoloration or other signs of overheating. Use Table 5 as the inspection guide. Before servicing inspection, turn off AC main circuit power and be sure that POWER lamp (red) is off.

The capacitors are still charged and can be quite dangerous. Allow five minutes for the capacitors after the input power is removed from the control.

Insulation Resistance Test

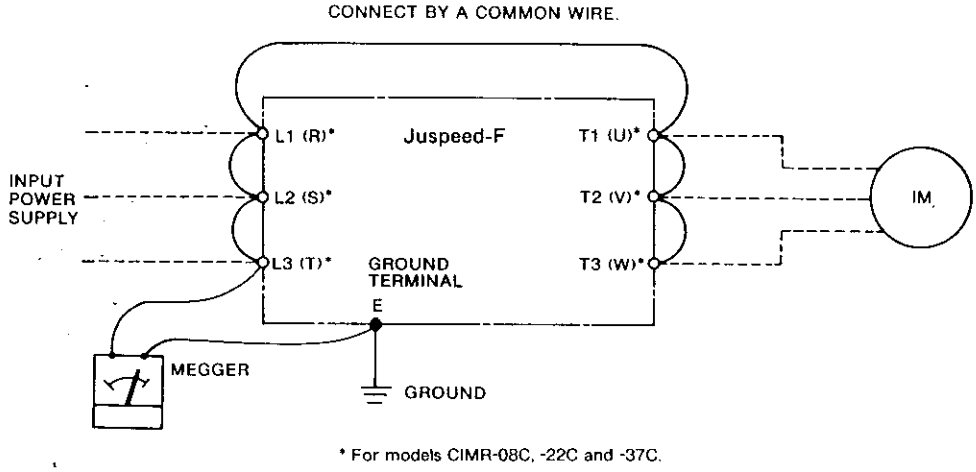
- For megger-testing the external circuit, remove all the Juspeed-F terminals and do not apply the test voltage to the inverter.
- For megger-testing the inverter, measure the insulation resistance of the main circuit only with a 500 VDC megger.

Connect the AC main circuit terminals (L1) (R), (L2) (S), (L3) (T), (T1) (U), (T2) (V), and (T3) (W) by a common wire as shown in Fig. 13. After that, measure the insulation resistance between the common wire and ground with a megger. If reading is above 1MΩ, it is considered satisfactory. Never measure the insulation resistance of the control circuit.

- Never make a conduction test of the control circuit.

Table 5 Periodical Inspection

Component	Check	Corrective Action
Terminal screws, unit mounting bolts, connectors, etc.	Loosened screws	Tighten.
	Loosened connectors	Tighten.
Cooling fins	Build-up of dust and dirt	Blow with a dry compressed air of 57 to 85 lbs·in² (4 to 6 kg·cm²) pressure.
Printed circuit board	For attachment of conductive dust and oil mist.	Clean the board. If dust and oil cannot be removed, replace the inverter unit.
	Discoloration to brown	Replace the the inverter unit.
Power elements	Accumulation of dust and dirt	Blow with a dry compressed air of 57 to 85 lbs·in² (4 to 6 kg·cm²) pressure.
Smoothing capacitor	Discoloration or odor	Replace the inverter unit.



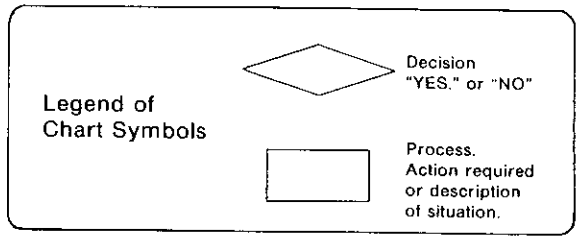
* For models CIMR-08C, -22C and -37C.

Fig. 13 Connections for Megger-testing

TROUBLESHOOTING

If Juspeed-F malfunctions, find the cause and take the corrective actions by following the flowcharts given in Fig. 14 to Fig. 16.

If the causes cannot still be located by the flowcharts, the inverter or some parts are damaged, or any other problem occurs, contact Yaskawa representative.



(1) Motor will not run

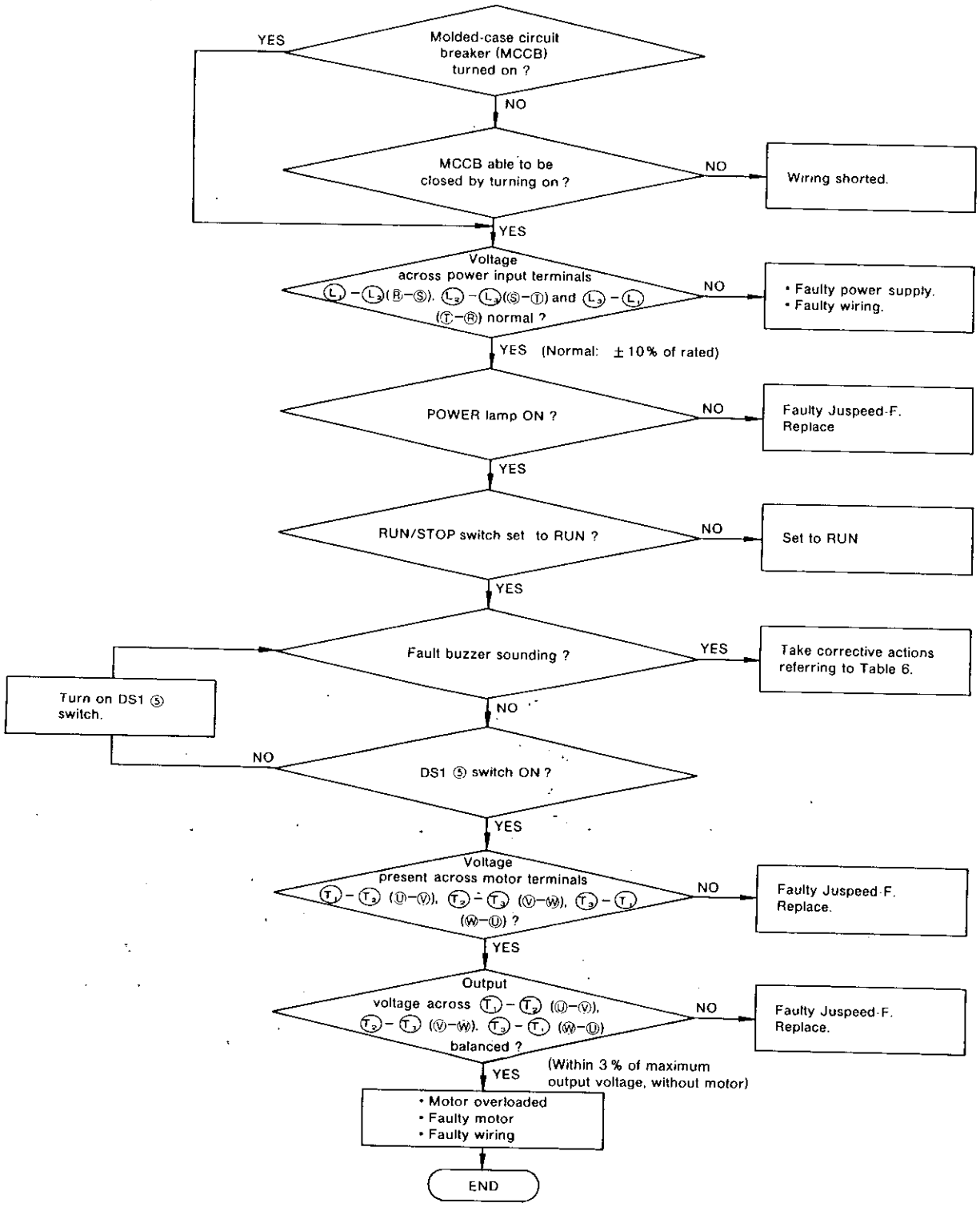


Fig. 14 Motor will not Run.

(2) Motor overheat

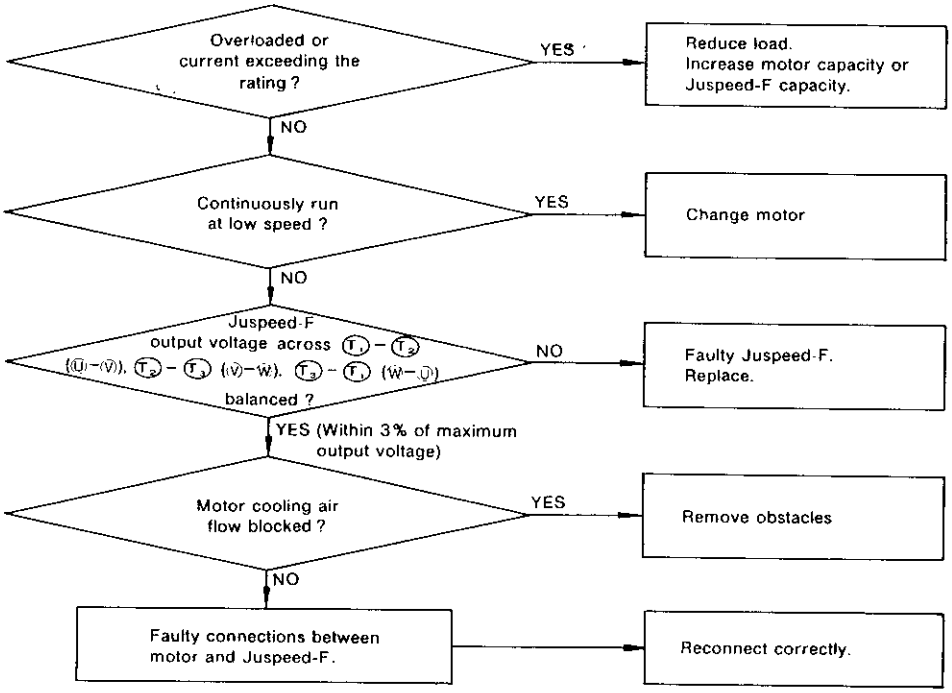


Fig. 15 Motor Overheat

(3) Motor hunting

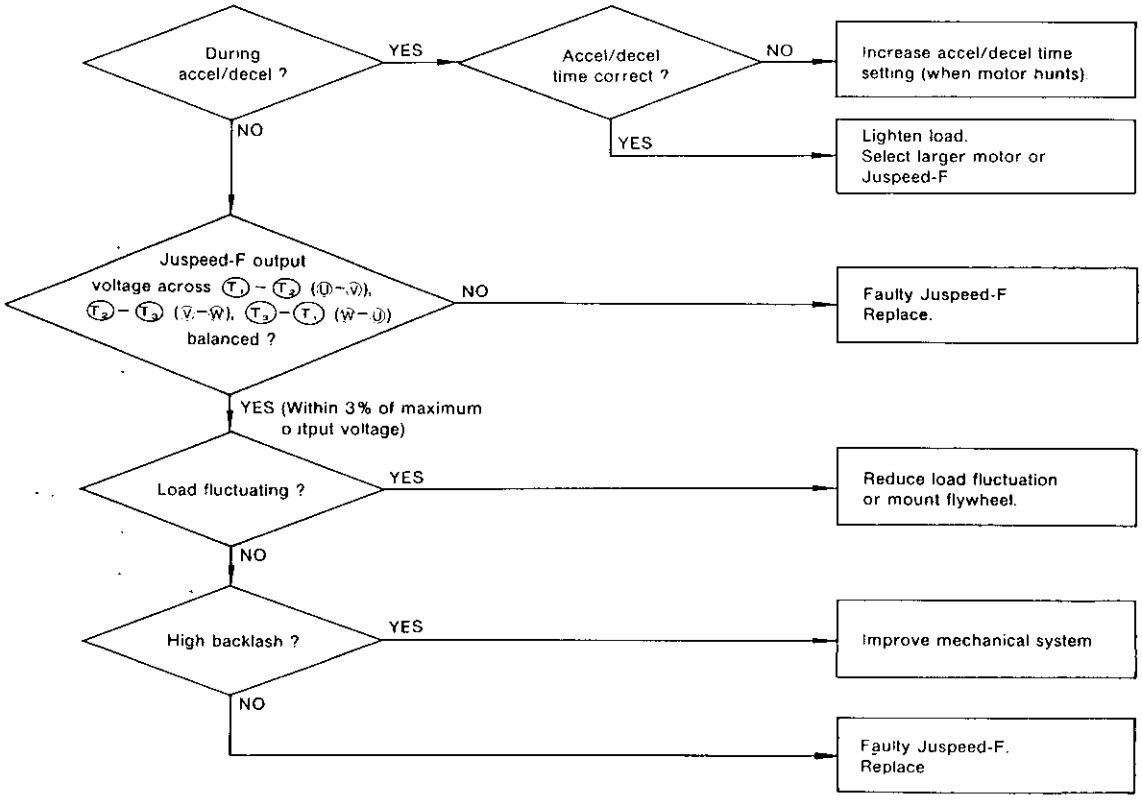
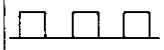
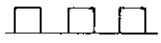
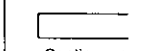
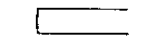
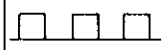
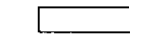
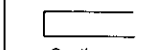
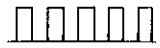
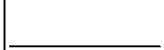


Fig. 16 Motor Hunting

CAUSES FOR BUZZER AND FAULT LAMP ACTIVATION AND REMEDIAL ACTIONS

If Juspeed-F malfunctions, fault buzzer sounds and fault lamp lights. Depending on the type of malfunction, the buzzer and lamp will operate continuously or they will pulsate/blink. When the buzzer and the lamp operate, check for continuous or intermittent operation and whether the operation switch is ON or OFF.

Table 6 Failure Indication of Juspeed-F

Operation of Fault Buzzer and Lamp RUN/STOP Switch RUN (ON)	Operation of Fault Buzzer and Lamp RUN/STOP Switch STOP (OFF)	Cause	How to Check	What to Do
		Instantaneous overcurrent protection		
 Intermittent	 Intermittent	• Juspeed-F output circuit shorted or ground fault.	• Remove Juspeed-F output terminals and measure the resistance across motor leads or motor leads and ground: Use an ohmmeter across motor leads, and a megger across any one of motor lead and ground.	If less than IMΩ, correct the short-circuit conditions.
		• Accel/decel time set too short.	• Extend the accel/decel time and operate the motor.	• Extend the accel/decel time until overrcurrent protective function stops.
		• Load too heavy	• Run motor without load. • Check load conditions.	• Change V/f pattern. • Reduce load.
		• Power factor correction capacitor connected to Juspeed-F output.	—	Remove.
		• Incorrect V/f pattern selection.	• Run motor with frequency set at 5Hz, and V/f pattern selector switch at notch ③ or ⑦.	• Select the optimum V/f pattern.
 Intermittent	 Continuous	Overload protection • Juspeed-F cooling fin temperature detection relay trip. • Ambient temperature too high.	• Measure fin temperature of center with thermometer (Normal if it is 70°C or less).	• Mount Juspeed-F correctly. • If air flow is blocked, remove obstacles. • Take some action to lower ambient temperature.
 Continuous	 Intermittent	Overvoltage protection • Accel/decel time set too short	• Increase accel/decel time and run motor.	• Increase the accel/decel time until overvoltage protective function stops.
 Continuous	 Continuous	Undervoltage protection • Supply voltage too low • Momentary power failure (15 ms or more)	Measure supply voltage with voltmeter and restart motor.	Eliminate the cause of voltage drop.
 Intermittent	 No operation	• Ground fault • Transistor module damaged.	Remove all Juspeed-F terminals and check continuity across any one of motor leads and ground with a 500 V megger.	If less than 1MΩ, eliminate the cause of ground fault.

Note:
1. If fault buzzer sounds, set RUN/STOP switch to STOP, find the cause, and turn off MCCB and MC.
2. If the cause cannot be found, disconnect leads from Juspeed-F and motor.
3. Protection circuits may activate due to external noises. Should the buzzer sounds because of the causes other than listed above, check for influence of noise.
4. For any other problem, contact Yaskawa representative

REFERENCE

Example of Juspeed-F Adjustment

The operation conditions and adjusting methods for the operation of squirrel-cage induction motors rated 1HP(0.75 kW), 4-pole are as follows.

Example 1

Operation conditions:

- Frequency range: 5 to 60 Hz
- Starting torque: 50% (For 60 Hz)
- Motor accel time: Approx. 2 seconds (acceleration from 0 to 60 Hz)
- No braking required (coasting to a stop)

Adjusting

1. Operation mode setting switch DS1
   See Table 1.
   - Set DS1 ① to ON for motor coasting to a stop.
   - Set DS1 ③ and ④ to OFF to set high-speed limit frequency set to 60 Hz.
2. Setting accel/decel time setting potentiometer RDS1. See Table 2.

   Set RDS1 to notch ⑤ to obtain accel/decel time from 0 to 60 Hz within 2 seconds.
3. V/f pattern selector switch RDS2
   Set RDS2 to notch ② for 50% starting torque for 60 Hz.

Example 2

Operation conditions:

- Frequency range: 30 to 90 Hz (less than 30 Hz)
- Starting torque: 100% (for 60 Hz)
- Accel/decel time: Approx. 4.5 seconds (from 0 to 90 Hz or from 90 to 0 Hz)
- Braking stop required

Adjusting

1. Operation mode selector switch DS1
   See Table 1.
   - Set DS1 ① to OFF for motor braking to a stop.
   - Set DS1 ③ to OFF and ④ to ON to set high-speed limit frequency to 90 Hz.
   - Set DS1 ② to ON to get low-speed limit frequency operation.
2. Low-speed limit operation terminals
   See para. Multispeed/Low-speed Limit Terminals.
   - Set low-speed limit frequency at 30 Hz. Connect external switches S1 to S3 to signal terminals ⑥, ⑦, ⑧, ④ for low-speed limit frequency operation. Turn on S1 and S3 and off S2. If the external switches are not used, short-circuit any two of ⑥, ⑧, ④.
3. Accel/decel time setting switch RDS1
   See Table 2.

   Set RDS1 to notch ⑦ to obtain accel/decel operation from 0 to 90 Hz within 4.5 seconds.
   Select the notch referring to Table 2 listing accel/decel time between 0 to 60 Hz.

   Time in Table 2 × 90/60 = 4.5 s

   Time in Table 2 = 4.5s × 60/90 = 3 s

   Then RDS2 should be set at notch ⑦.
4. V/f pattern selector switch RDS2
   Set RDS2 to notch ① for 100% rated torque for 60 Hz.

Example 3

Operation conditions:

- 2-speed operation at 30 Hz or 5 Hz
- Reversible operation
- Starting torque: 50% (for 50 Hz)
- Accel time: Approx 1 second (acceleration from 0 to 30 Hz)
- Fault buzzer not used

Adjusting

1. Operation mode setting switch DS1
   - Set DS1 ① to OFF for motor braking to a stop.
   - Set DS1 ⑤ to OFF to neglect fault buzzer function.
   - Set DS1 ② to OFF for multispeed operation.
2. Frequency setting switch
   Set frequency to 5 Hz using the frequency setting switch on the front of Juspeed-F.
3. Terminals for multispeed operation
   Connect signal terminals ⑧ and ④ by closing the external switch S1 for multispeed operation: 5 Hz operation at OFF, and 30 Hz operation at ON. For details, see Table 4.
4. Accel/decel time setting switch RDS1
   Set RDS1 to notch ⑤ to obtain accel/decel operation between 0 to 30 Hz within 1 second.
   Select the notch referring to Table 2 listing accel/decel time between 0 and 60 Hz.

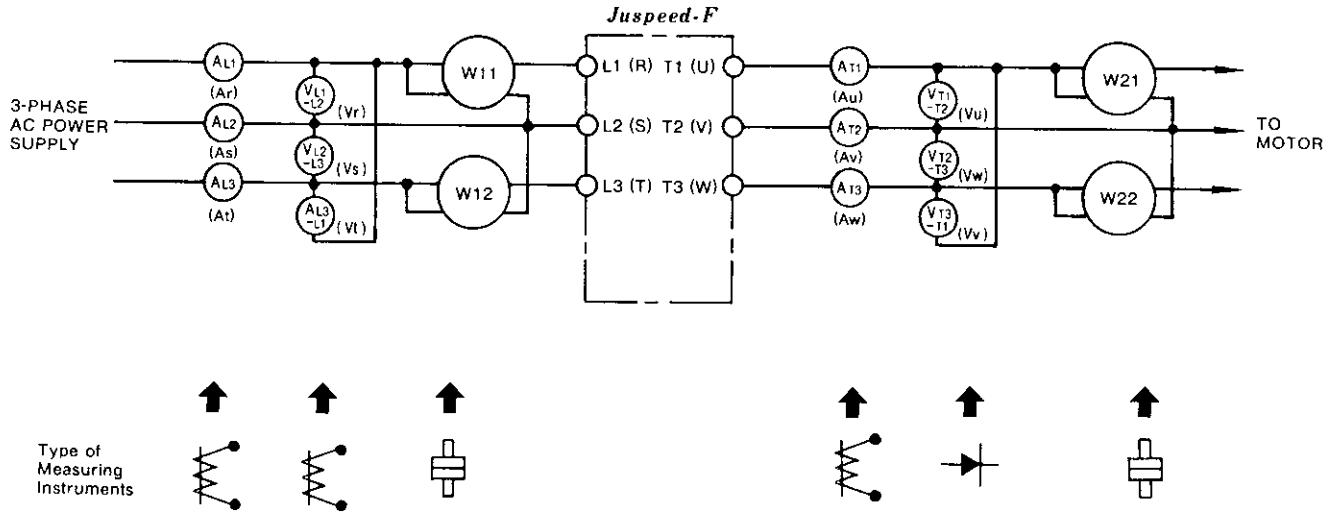
   Time in Table 2 × 30/60 = 1 s

   Time in Table 2 = 1 s × 60/30 = 2 s

   Then RDS2 should be set at notch ⑤.
5. V/f pattern selector switch
   Set RDS2 to notch ⑥ for 50% starting torque for 50 Hz.
6. Forward/reverse terminals
   Connect ON/OFF switch to signal terminals ⑨ and ④ : Forward at OFF and reverse at ON.

Measuring Points and Instruments

The measuring points and measuring instruments, when measured at commercial frequency, are shown below. Measured data may differ depending on the instruments and circuit, for Juspeed-F primary and secondary voltage and current include higher harmonic.



Measuring Points and Instruments

Item	Points	Instrument	Note
Supply Voltage V_1	Across L1-L2 (R-S), L2-L3 (S-T), L3-L1 (T-R); V_{L1-L2}, V_{L2-L3}, V_{L3-L1} (Ⓥ$_R$, Ⓥ$_S$, Ⓥ$_T$)	Moving-iron type	Commercial power supply: 187 to 253 V at 50 Hz/60 Hz
Power Supply Current I_1	Line current L1, L2, L3 (R, S, T) A_{L1}, A_{L2}, A_{L3} (Ⓐ$_R$, Ⓐ$_S$, Ⓐ$_T$)	Moving-iron type	–
Power Supply Power* P_1	L1, L2, L3 (R, S, T) and across L1-L2 (R-S), L2-L3 (S-T), L3-L1 (T-R); W_{L1}, W_{L2}, W_{L3} (Ⓦ$_R$, Ⓦ$_S$, Ⓦ$_T$)	Electrodynamometer	$P_1 = W_{11} + W_{12}$
Power Supply Power Factor Pf_1	Calculate from measured supply voltage, supply current, and supply power $Pf_1 = \frac{P_1}{\sqrt{3}V_1 \cdot I_1} \times 100\ (\%)$		
Output Voltage V_2	Across T1-T2 (U-V), T2-T3 (V-W), T3-T1 (W-U); V_{T1-T2}, V_{T2-T3}, V_{T3-T1} (Ⓥ$_U$, Ⓥ$_V$, Ⓥ$_W$)	Rectifier type (YOKOGAWA 2017 or equivalent) Moving-iron type cannot be used.	Difference between each line and max output voltage: 3 % or below
Output Current I_2	Line current at T1, T2, T3 (U, V, W); A_{T1}, A_{T2}, A_{T3} (Ⓐ$_U$, Ⓐ$_V$, Ⓐ$_W$)	Moving-iron type	Rated current of Juspeed-F or below (±10% or below at each line)
Output Current P_2	T1, T2, T3 (U, V, W) and across T1-T2 (U-V), T2-T3 (V-W), T3-T1 (W-U); W_{T1}, W_{T2}, W_{T3} (Ⓦ$_U$, Ⓦ$_V$, Ⓦ$_W$)	Electrodynamometer type, Three identical rating single-phase meters are used.	$P_2 = W_{12} + W_{12}$
Output Power Factor Pf_2	Calculated same as power factor on supply side. $Pf_2 = \frac{P_2}{\sqrt{3}V_2 \cdot I_2} \times 100\ (\%)$		

Juspeed-F Ratings and Specifications

Item \ Model CIMR-		G08C	08C	G22C	22C	G37C	37C
Max Motor Output		1 HP (0.75 kW)		3 HP (2.2 kW)		5 HP (3.7 kW)	
Rated Capacity		1.5 kVA		3.5 kVA		6 kVA	
Rated Current*		4.2 A (2.0 A)	4.5 A	9.7 A (5 A)	10.5 A	16.7 A (8.5 A)	17.5 A
Input Power Supply		208/230 V ±10%	200/220 V ±10%	208/230 V ±10%	200/220 V ±10%	208/230 V ±10%	200/220 V ±10%
		3-phase, at 50/60 Hz ±5%					
Max Output Voltage†		208/230 V ±10%	200/220 V ±10%	208/230 V ±10%	200/220 V ±10%	208/230 V ±10%	200/220 V ±10%
		3-phase					
Control Method		Sinusoidal sine wave PWM					
Output Frequency Range‡		5 to 120 Hz (Frequency setting available every 1 Hz)					
Frequency Resolution		±0.5 Hz					
Frequency Accuracy		±0.5 % (−10 to +40°C)					
Allowable Overload Capacity		150 % for two minutes					
Accel/Decel Time		0.35 to 26 sec (16 selections available)					
Braking Torque		20 % rating		100 % rating			
Input Signal	Run and Stop	Running reference from 1NO contact (holding)					
	Forward/Reverse Running	Reverse running reference from 1NO contact (holding)					
	Frequency Setting	3-digit digital switch					
	Multi-speed	7 steps (5, 10, 20, 30, 40, 50 and 60 Hz) by contact signal					
	Low-speed	8 steps (5, 10, 15, 20, 25, 30, 35 and 40 Hz) by contact signal.					
Protective Functions	Instantaneous Power Failure	Protective circuit functions if power failure is detected.					
	Undervoltage	Stopped at 185 V or less					
	Overcurrent	Stopped by overcurrent caused by short circuit and/or ground fault					
	Fin Overheat	Protected by thermo switch					
	Stall Prevention	Stall prevention of overcurrent and overvoltage					
Environmental Condition	Location	Indoor (free from corrosive gases and dust)					
	Ambient Temperature	+50° to +104°F (−10° to +40°C)					
	Humidity	95 % max relative (non-condensing)					
	Elevation	3300 feet max (1000 meters)					
	Vibration	0.5 G max					

* Parenthesized values are for single-phase power input.

† Inverter input voltage and output voltage equalize:
208 V output at 208 V input and 230 V output at 230 V input.

‡ Maximum frequency can be set at 50, 60, 90, or 120 Hz.

Note:

1. Operator's switch can be installed separate from inverter proper. For separation, contact Yaskawa representative.
2. Noise filter to eliminate radio wave interference is available on request.
3. For excessively high load inertia or repeated rapid deceleration, built-in braking resistor capacity may not be sufficient. For this application, contact your Yaskawa representative.

A Better Tomorrow for Industry through Automation

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