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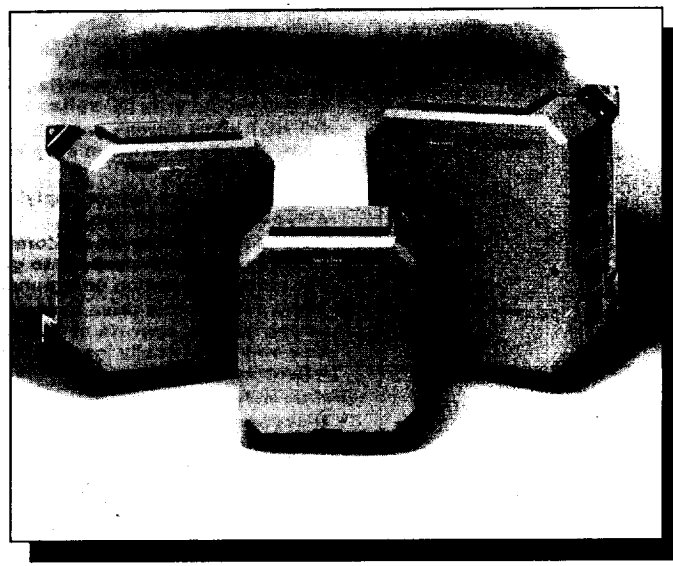

*Micro**5000***

Adjustable Speed AC Drive Controller

⚠ DANGER

HAZARDOUS VOLTAGE.

- **Read and understand this manual in its entirety before installing or operating AC drive controllers. Installation, adjustment, repair and maintenance of these controllers must be performed by qualified personnel.**
- **Disconnect all power before servicing drive controller. WAIT ONE MINUTE until bus capacitors discharge, then measure bus capacitor voltage between J9+ and J8- terminals to verify DC voltage is zero. See page 5.**
- **DO NOT short across capacitors or touch unshielded components or terminal strip screw connections with voltage present.**
- **Install all covers before applying power or starting and stopping the controller.**
- **User is responsible for conforming to all applicable code requirements with respect to grounding all equipment. For more information on grounding, see page 8.**
- **Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools while making adjustments.**

Before installing controller:

- **Disconnect all power.**
- **Place a "DO NOT TURN ON" label on the controller disconnect.**
- **Lock disconnect in open position.**

Failure to observe these precautions will cause shock or burn, resulting in severe personal injury or death.

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RECEIVING AND PRELIMINARY INSPECTION

Before installing the Micro5000 drive controller, read this manual and observe all precautions:

- ❑ Before removing the drive controller from its packing material, verify it is not damaged from shipping. Any damage to the packing carton usually indicates improper handling. If any damage is found, notify the carrier and your Furnas Electric Company representative.
- ❑ After removing the drive controller from its packaging, visually inspect the exterior for shipping damage.
- ❑ Verify that the drive controller nameplate and label conform to the packing slip and corresponding purchase order. Drive controller catalog numbers are explained below.

⚠ CAUTION

DAMAGED EQUIPMENT HAZARD.

Do not operate or install any drive controller that appears damaged.

Failure to observe this precaution can result in equipment damage or personal injury.

Storing

If the drive controller is not being immediately installed, store it in a clean, dry area where the ambient temperature is between -25 and +70 °C (-13 to +158 °F).

Shipping

If the drive controller must be shipped to another location, use the original shipping material and carton to protect the drive controller.

Catalog Number Identification

Figure 1 shows how the Micro5000 drive controller catalog numbers are structured.

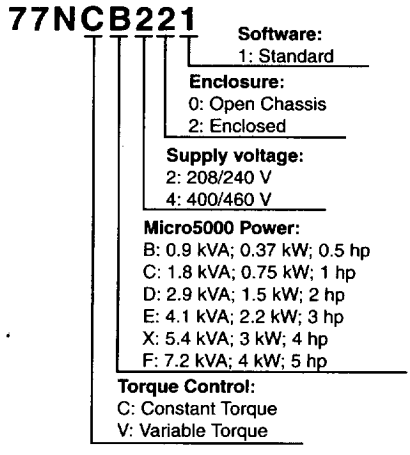


Figure 1 Catalog Numbers for Micro5000 Drive Controllers

TECHNICAL CHARACTERISTICS

Table 1 Technical Characteristics

Supply Voltage	Controller Part No.	Motor Power		Line Current [1]	Rated Output Current	Transient Output Current [2]	Total Dissipated Power @ Rated Load	Fault Withstand Current	Maximum Fuse [3]
		kW	hp	A	A	A	W	A rms sym.	FU1,FU2,FU3
208/240 V ±10% 50/60 Hz 1 phase	77NCB221	0.37	0.5	4	2.2	3.2	22	5000	KTK-R-6
	77NCC221	0.75	1	7	4	5.4	35	5000	KTK-R-10
208/240 V ±10% 50/60 Hz 1 or 3 phase	77NCD221	1.5	2	3ø: 10 1ø: 14	7.5	10	55	5000	3ø: KTK-R-15 1ø: KTK-R-20
	77NCE221	2.2	3	3ø: 14 1ø: 18	10.6	14	65	5000	3ø: KTK-R-20 1ø: KTK-R-25
400/460 V ±15% 50/60 Hz 3 phase	77NCC421	0.75	1	3.3	2.3	3.1	35	5000	KTK-R-5
	77NCD421	1.5	2	6	4.1	5.5	50	5000	KTK-R-10
	77NCE421	2.2	3	9	5.8	7.9	70	5000	KTK-R-15
	77NCZ421	3	4	12	7.8	11	100	5000	KTK-R-20
	77NCF421	4	5	16	10.5	14.2	135	5000	KTK-R-25

[1] Values correspond to the amount absorbed by drive controllers supplied by mains with fault capacity equal to fault withstand indicated in table and under nominal conditions of load and speed of the associated motor.

[2] For 60 seconds.

[3] Bussman or equivalent.

SPECIFICATIONS

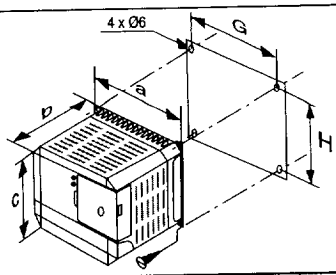
Table 2 Specifications

Input Power									
Rated hp	0.5	1	2	3	1	2	3	4	5
Rated kW	0.37	0.75	1.5	2.2	0.75	1.5	2.2	3	4
Voltage	208 V -15% to 240 V +10%				400 V -15% to 460 V +15%				
Frequency	50/60 Hz								
Input Phases	1		1 or 3		3				
Rated Output Current (A)	2.1	4	7.5	10.6	2.3	4.1	5.8	7.8	10.5
Max. Transient Current (A)	3.2	5.4	10	14	3.1	5.5	7.9	11	14.2
Transient Overtorque	150% of rated motor torque (±5% from 5 to 50/60 Hz)								
Output Power									
Waveform	PWM								
Output Phases	3								
Frequency	0.1 to 50/60 Hz								
Accel/Decel	3 s from 0 to 50/60 Hz (automatic ramp adaptation when transient torque capabilities are exceeded)								
Output Voltage	Maximum voltage equal to input voltage								
Control									
Control Power	24 VDC +25%, -50%								
Speed Reference	0-10 V, 0-20 mA, 4-20 mA								
Run Signal	2 Inputs: FW (Forward) and RV (Reverse)								
Braking	Automatic DC injection braking for 0.5 s if frequency drops below 0.1 Hz								
Display									
	Green LED indicates drive controller supply is on								
	Red LED indicates drive controller fault								
Protection									
Drive Controller Protection	Overvoltage and undervoltage protection								
	Protection against phase loss (77N••421 only)								
	Protection against short circuits between output phases, between output phase and ground								
	Protection against short circuits in internal control supplies (+10 V, +24 V)								
	Overload and overtemperature protection								
Motor Protection	Thermal I^2t if motor I nominal = 0.9 drive controller I nominal (from 25/30 to 50/60 Hz)								
Environment									
Temperature	Operation: +32 to +104 °F (0 to +40 °C) with top plate (NEMA 1 [1]) +32 to +122 °F (0 to +50 °C) without top plate (IP30)								
	Storage: -13 to +158 °F (-25 to +70 °C)								
Humidity	95% max., non-condensing and without dripping (provide heating system if there is condensation)								
Altitude	Up to 3300 feet (1000 m) without derating; derate by 3% for each additional 3300 feet (1000 m)								
Enclosure	NEMA 1 [1], IP30								
Pollution	Protect the drive controller against dust, corrosive gases and splashing liquid [1]								
Standards									
	UL, CSA, IEC, VDE								

[1] Controller electrical creepages are designed for use in a pollution Degree 2 environment per NEMA ICS-111A and IEC 664A.

DIMENSIONS

For Micro5000 dimensions, refer to Figure 2.



Part No.	kW	hp	Voltage	a	b	c	Mounting G	Mounting H	Weight
77NCB221	0.37	0.5 hp	230 V	5.90 (150)	4.72 (120)	6.30 (160)	5.39 (137)	5.91 (150)	3.97 (1.80)
77NCC221	0.75	1 hp	230 V						4.08 (1.85)
77NCD221	1.5	2 hp	230 V	7.09 (180)	5.67 (144)	7.87 (200)	6.61 (168)	7.48 (190)	7.28 (3.30)
77NCC421	0.75	1 hp	460 V						7.50 (3.40)
77NCD421	1.5	2 hp	460 V						7.50 (3.40)
77NCE221	2.2	3 hp	230 V	7.87 (200)	5.98 (152)	9.06 (230)	7.40 (188)	8.66 (220)	9.48 (4.30)
77NCE421	2.2	3 hp	460 V						9.70 (4.40)
77NCZ421	3	4 hp	460 V						9.70 (4.40)
77NCF421	4	5 hp	460 V						11.02 (5.00)

Dimensions are in inches (millimeters). Weights are in pounds (kilograms).

Figure 2 Dimensions

INSTALLATION PRECAUTIONS

- ❑ For NEMA 1 (pollution Degree 2 environment): Do not remove the plastic plate from the top of the drive controller.
- ❑ For IP30: Remove the plastic plate from the top of the drive controller.
- ❑ Figure 3 shows the space that must be allowed around the drive controller; D ≥ 4 in (100 mm), d ≥ 2 in (50 mm)
- ❑ Mount the drive controller vertically, as shown in Figure 4. Avoid placing near any heat sources.

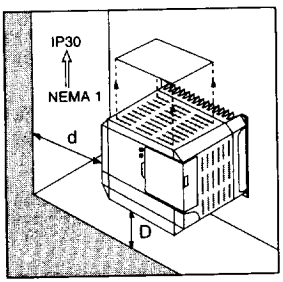


Figure 3 IP30 Installation

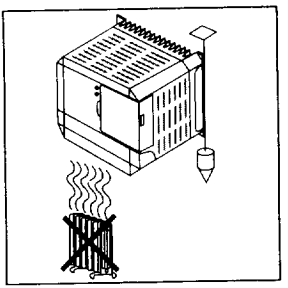


Figure 4 Mounting Precautions

MEASURING BUS CAPACITOR VOLTAGE

DC bus capacitor voltage is measured between the J9+ and J8- terminals of the drive controller. The DC bus capacitors are discharged when input power is removed from the controller. To ensure the capacitors are fully discharged, always disconnect all power, wait 1 minute, then test with a DC voltmeter (1000 VDC scale) before wiring, troubleshooting or working inside the drive controller. If no reading is shown on the voltmeter, reduce scale and test again.

⚠ DANGER

HAZARDOUS VOLTAGE.

- **Read and understand Bus Voltage Measurement Procedure before performing procedure. Measurement of bus capacitor voltage must be performed by qualified personnel.**
- **DO NOT short across capacitors or touch unshielded components or terminal strip screw connections with voltage present.**
- **Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.**

Failure to observe these precautions will cause shock or burn, resulting in severe personal injury or death.

The J9+ and J8- terminals are located on the power board, in the general area shown in Figure 5. To measure the bus capacitor voltage, follow the Bus Voltage Measurement Procedure below.

Bus Voltage Measurement Procedure

1. Disconnect all power from controller.
2. Wait 1 minute to allow the DC bus to discharge.
3. Remove all covers.
4. Set the voltmeter to the 1000 VDC scale. Measure the bus capacitor voltage between the J9+ and J8- terminals to verify the DC voltage is zero. **Do not short across capacitor terminals with voltage present!**
5. If the bus capacitors are not fully discharged, contact your local Furnas Electric Company representative – **do not operate the controller.**
6. Replace all covers.

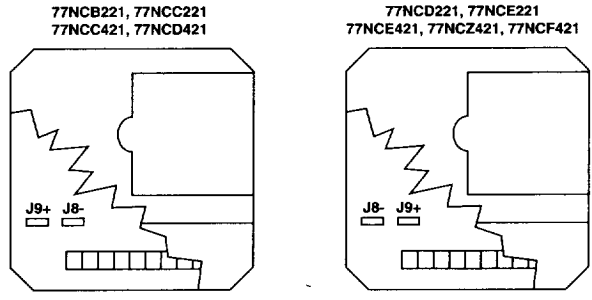


Figure 5 Measuring Bus Capacitor Voltage

WIRING

Figure 6 shows the location of the drive controller wiring terminals.

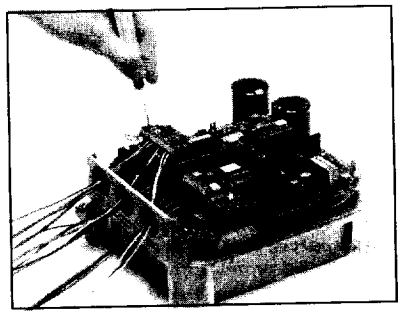


Figure 6 Wiring Terminals

General Wiring Practices

Good wiring practice requires the separation of control circuit wiring from all power (line) wiring. Power wiring to the motor must have the maximum possible separation from all other power wiring, whether from the same drive controller or other drive controllers; **do not run in the same conduit**. This separation reduces the possibility of coupling electrical transients from power circuits into control circuits or from motor power wiring into other power circuits.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD.

Follow wiring practices described in this document in addition to those already required by the National Electrical Code and local electrical codes.

Failure to observe this precaution can result in equipment damage or personal injury.

Follow the practices below when wiring Micro5000 drive controllers:

- ❑ Use metallic conduit for all controller wiring. Do not run control and power wiring in the same conduit.
- ❑ Metallic conduits carrying power wiring or low-level control wiring must be separated by at least 4 in (10 cm).
- ❑ Non-metallic conduits or cable trays used to carry power wiring must be separated from metallic conduit carrying low-level control wiring by at least 12 in (30.5 cm).
- ❑ Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays must cross at right angles.

Branch Circuit Connections

All branch circuit components and equipment (such as transformers, feeder cables, disconnect devices and protective devices) must be rated for the maximum input current of the Micro5000 drive controller, not the motor full load current. The drive controller input current is stamped on the nameplate.

⚠ WARNING

IMPROPERLY COORDINATED DEVICES WILL MISOPERATE.

- **Branch circuit components and equipment must be rated for the maximum drive controller rated current.**
- **If the system short circuit capacity (current) available at the input line terminals is larger than the nameplate rating, higher-than-rated line currents will be drawn from the input line and equipment misoperation may occur.**

Failure to observe these precautions can result in equipment damage, severe personal injury or death.

In some installations, conducted emissions to the line from the controller must be attenuated to prevent interference with telecommunication, radio and sensitive electronic equipment. In these instances, attenuating filters may be required. Consult factory for selection and application of these filters.

Output Wiring Precautions

⚠ WARNING

DRIVE CONTROLLER DAMAGE.

Controller will be damaged if input line voltage is applied to output terminals (U/T1, V/T2, W/T3). Check power connections before energizing controller.

Failure to observe this precaution can result in equipment damage, severe personal injury or death.

The drive controller is sensitive to the amount of capacitance (either phase-to-phase or phase-to-ground) present on the output power conductors. If excessive capacitance is present, the controller may trip on overcurrent. Follow the guidelines below when selecting output cable:

- ❑ Cable type: the cable selected must have a low capacitance phase-to-phase and to ground. Do not use mineral-impregnated cable because it has a very high capacitance. Immersion of cables in water increases capacitance.
- ❑ Cable length: the longer the cable, the greater the capacitance. Cable lengths greater than 320 ft (100 m) may cause problems.
- ❑ Proximity to other output cables: because of the high frequency switching and increased capacitance, the drive controller may fault under some conditions.
- ❑ Do not use lightning arrestors on output of drive controller.

For installations where cable capacitances may be a problem, install an inductor between the controller and the motor.

A minimum inductance is needed to protect the drive controller output from short circuits. Provide at least 19.7 in (50 cm) of cable at drive controller output (U/T1, V/T2, W/T3).

⚠ CAUTION

DRIVE CONTROLLER SWITCH FAILURE.

For proper controller electronic short circuit protection, certain values of inductance may be required in the output power wiring. Inductance can be supplied by the power wiring or auxiliary inductors.

Failure to observe this precaution can result in equipment damage.

Grounding

For safe, dependable operation, drive controllers must be grounded according to National Electrical Code and all local codes. To ground the drive controller:

- ❑ Connect a copper wire from the grounding terminal to the power system ground conductor. Wire size is determined by the drive controller size (see page 9), the National Electrical Code and local electrical codes.
- ❑ Verify that resistance to ground is one ohm or less. Improper grounding causes intermittent and unreliable operation.

⚠ DANGER

HAZARDOUS VOLTAGE.

- **Ground equipment using connection provided. Drive controller panel must be properly grounded before applying power.**
- **Do not use metallic conduits as a ground conductor.**

Failure to observe these precautions will cause shock or burn, resulting in severe personal injury or death.

Multiple drive controllers must be grounded as shown in Figure 7. Do not loop or series the ground cables.

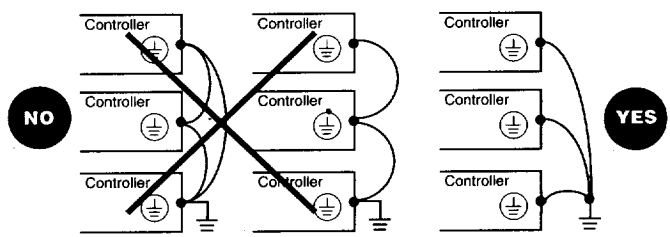


Figure 7 Grounding Multiple Controllers

Terminal Strip Characteristics

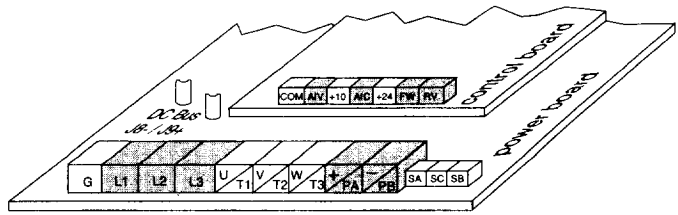


Figure 8 Micro5000 Terminal Strips

Table 3 Terminal Strip Characteristics

Terminal Reference 77NCB221 77NCC221	Terminal Reference 77NCD221 77NCE221 77NC•421	Function		Characteristics		Max. Wire Size AWG (mm^2)	Torque lb-in (N-m)
G	G	Ground				12 (2.5)	12 (1.4)
L1 L2	L1 L2 L3	Input power		208/240 V, ±10%, 1 or 3ø 400/460 V, ±15%, 3ø		12 (2.5)	12 (1.4)
U/T1 V/T2 W/T3	U/T1 V/T2 W/T3	Output connections to motor		M2: 230 V / 50 Hz 230 V / 60 Hz	N4: 400 V / 50 Hz 460 V / 60 Hz	12 (2.5)	12 (1.4)
+ –	PA PB	77NCB221 77NCC221 Connection for dynamic braking module	77NCD221 77NCE221 77NC•421 Connection for dynamic braking resistance	See dynamic braking manuals For 77•••221: R ≥ 47 Ω For 77•••421: R ≥ 68 Ω		12 (2.5)	12 (1.4)
SA SC SB	SA SC SB	N.C. Contact [1] Common N.O. Contact	Fault relay outputs	Minimum: 10 mA, 24 VDC [2] Maximum: inductive charge of 1.5 A, 250 V 2.5 A, 30 VDC		14 (1.5)	3.5 (0.4)
J9+ J8–	J9+ J8–	Filtered DC voltage [3]		265 V > V > 370 V 480 V > V > 745 V		—	—
COM	COM	Common for speed reference inputs and control inputs		0 V		14 (1.5)	3.5 (0.4)
AIV	AIV	Speed reference voltage input		0-10 V, Impedance = 30 kΩ		14 (1.5)	3.5 (0.4)
+10	+10	Reference input supply		10 VDC, 10 mA maximum 1 kΩ < R < 10 kΩ		14 (1.5)	3.5 (0.4)
AIC	AIC	Speed reference current input		0-20 mA, 4-20 mA, Impedance = 250 Ω		14 (1.5)	3.5 (0.4)
+24	+24	Control inputs supply		24 VDC (from 20 VDC to 30 VDC)		14 (1.5)	3.5 (0.4)
FW RV	FW RV	Forward control input Reverse control input		Minimum: 10 mA, 24 VDC State 0: V < 5 V, I < 2.5 mA State 1: V > 11 V, I > 6 mA Impedance = 1.5 kΩ		14 (1.5)	3.5 (0.4)

[1] Contact state shown with controller deenergized.

[2] Relay coil deenergizes on fault.

[3] Figure 8 is a general representation. Refer to the actual drive controller power board for location of J8- and J9+.

Note: The reference and control inputs are isolated from the mains voltage.

Wiring Diagram

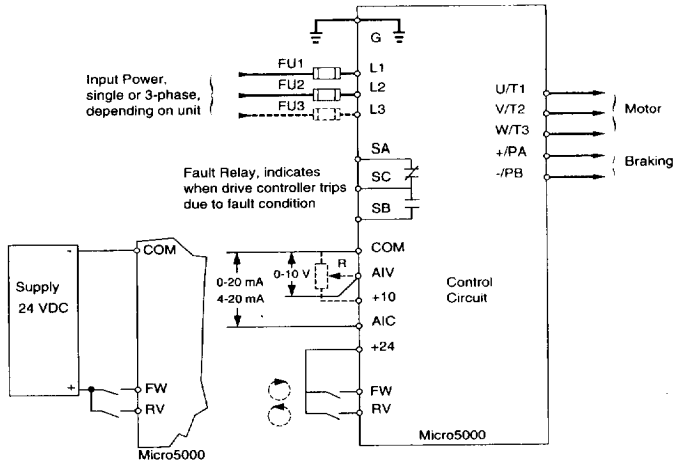


Figure 9 Micro5000 Wiring Diagram

DRIVE CONTROLLER SET UP

Factory Settings

Table 4 Micro5000 Factory Settings

Parameter	Setting	Description
Nominal motor voltage	77•••221: 230 V 77•••421: 400 V [1,2]	Rated nameplate voltage of motor. See page 12.
Nominal motor frequency	60 Hz [1,2]	Output frequency selection at rated motor voltage. See page 12.
Maximum frequency	60 Hz [1,2]	Maximum output frequency (Hz). See page 12.
Selection of type of V/f ratio	n [1,2]	Selection of V/f ratio: n: Standard applications at constant torque. P: Variable torque applications (pumps, fans). L: Machines requiring high torque at low speed, machines with fast cycles, special motors.
Switching frequency	5 kHz [2]	Carrier frequency of the output pulses. Normal setting 5 kHz. For reduced audible motor noise, setting is 10 kHz.
Deceleration ramp adaptation	Yes [1,2]	If set to Yes and initial deceleration ramp time is too low, automatically extends deceleration ramp time, accounting for load inertia.
Slip compensation	Yes [1,2]	If set to Yes, drive controller maintains a constant speed to the motor for a given reference as the load changes, automatically adjusting the output frequency.
Automatic DC injection	f < 0.1 Hz [2]	DC injection braking at the end of the deceleration ramp. If enabled, will be injected when f < 0.1 Hz or when f < LSP, depending on setting.
DC current level	0.7 Ith [2]	Amount of DC injected at the end of the deceleration ramp. Ith = Motor thermal overload protection setting.
DC current time	0.5 s [2]	Length of time DC is injected at the end of the deceleration ramp.

[1] Modifiable with display/adjustment option.
[2] Modifiable with PC connection option.

Table 4 Micro5000 Factory Settings (Continued)

Parameter	Setting	Description
Automatic restart	No [2]	If set to Yes, enables drive controller to automatically restart following an overvoltage (OSF), overload (OLF) or overbraking (ObF) fault. For OSF and ObF faults, drive controller remains disabled for 1 minute after fault appears, causing fault relay of drive controller to engage, then restarts automatically if fault has disappeared. If fault is present at end of 1 minute, drive controller faults and must be reset. If there are 5 faults within 6 minutes of first fault, drive controller faults and must be reset. For OLF fault, the restart is effective as soon as the thermal state drops below 100% without any delay.

⚠ WARNING

UNINTENDED EQUIPMENT ACTION.

- **Automatic restart and catching a spinning load can only be used for machines or installations that present no danger in the event of automatic restarting, either for personnel or equipment.**
- **Equipment operation must conform with national and local safety regulations.**

Failure to observe these precautions can result in equipment damage or severe personal injury.

Catching a spinning load	No [2]	When set to Yes, allows smooth restarting of motor after a brief input line undervoltage. If the reference signal and a direction command are maintained, motor accelerates back up to speed without starting at zero.
Controlled stop on loss of AC supply	No [2]	When set to Yes, at loss of input power, deceleration follows a self-adjusting ramp, which is a function of the regenerated energy. When set to No, motor coasts to a stop.
Ramp type	Linear [2]	Determines type of acceleration and deceleration ramps (linear or S). See diagrams below.
Current limit	1.5 In	Current limit value. In = nominal motor current.
Acceleration	3 s [1,2]	Length of time to accelerate to nominal motor frequency from zero speed.
Deceleration	3 s [1,2]	Length of time to decelerate from nominal motor frequency to zero speed.
Low speed	0 Hz [1,2]	Low speed setting.
High speed	60 Hz [1,2]	High speed setting. See page 12.
V/f ratio	20 [1,2]	Adjustment of amount of motor torque supplied by the motor at low speed.
Motor thermal overload protection	0.9 drive controller In [1,2]	See page 12. In = nominal motor current.
Frequency loop gain	33% [1,2]	Amount of frequency loop gain for maximizing motor torque.

[1] Modifiable with display/adjustment option.
[2] Modifiable with PC connection option.

Without Voltage Present

Figure 10 shows the location of the drive controller configuration switches.

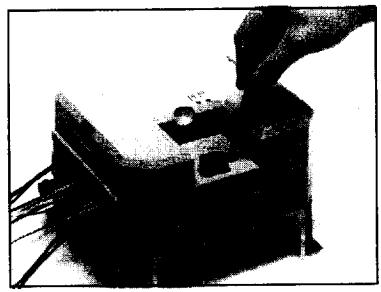


Figure 10 Drive Controller Configuration Switches

Volts/Frequency Ratio Configuration

Figure 11 shows selections available by changing switch 1 on front of the drive controller. Switch 1 configures the volts/frequency ratio.

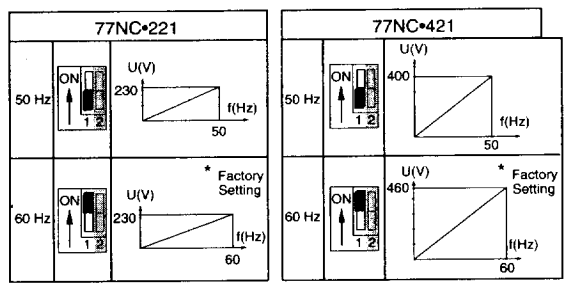


Figure 11 Configuring Switch 1

Current Speed Reference Input Configuration

Figure 12 shows selections available by changing switch 2 on front of the drive controller. Switch 2 configures the speed reference input. When it is set to 4-20 mA (switch 2 ON), the reference voltage (AIV) is from 2 to 10 V.

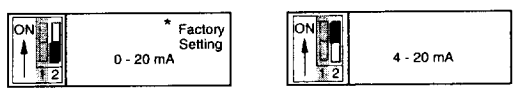
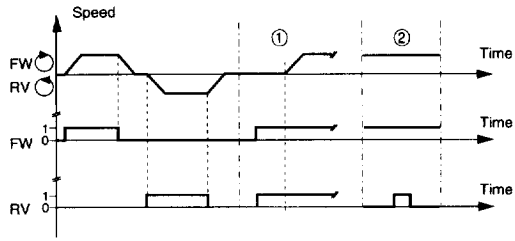


Figure 12 Configuring Switch 2

DIRECTION OF ROTATION

Figure 13 shows how the FW and RV inputs control the rotation direction of the drive controller shaft.



① When both FW and RV are selected, the forward direction has priority.
② Direction control input selected first takes priority over the other.

Figure 13 Direction of Rotation

THERMAL OVERLOAD PROTECTION OF THE MOTOR

Thermal overload protection to the motor is accomplished by:

- The I^2t thermal protection of the drive controller if the nominal motor current is equal to 0.9 times the nominal drive controller current. For use in the 25/30 to 50/60 Hz frequency range. The value of the motor thermal protection can be changed with display/adjustment option.
- A thermal sensor integral to the motor when high torque at base speed is required.
- An external thermal overload relay.

⚠ CAUTION

LOSS OF MOTOR OVERLOAD PROTECTION.

When using external overload relays connected to the drive controller output, the overload relay must be capable of operation over the expected range of controller output frequencies (including direct current).

When DC injection braking is used:

- **The overload relay must be suitable for operation with direct current flowing in the motor.**
- **Do not use overload relays equipped with current transformers for sensing the motor current.**

Failure to observe these precautions can result in equipment damage.

> **⚠ CAUTION**
>
> **MOTOR OVERHEATING.**
>
> **This drive controller does not provide direct thermal protection for the motor. Use of a thermal sensor in the motor may be required for protection at all speeds and loading conditions. Consult motor manufacturer for thermal capability of motor when operated over desired speed range.**
>
> Failure to observe this precaution can result in equipment damage or personal injury.

AVAILABLE TORQUE

Continuous duty:

- For self-ventilated motors, motor cooling depends on the speed.
- This results in derating for speeds less than 50% of the nameplate motor speed. For fractional powers ≤ 1/3 hp (250 W), the derating is less (e.g. 20% instead of 50% at the lowest frequency).

Transient duty:

- The possibility of overtorque depends on the maximum amount of transient current that the drive controller is capable of delivering.

Figure 14 shows the typical torque characteristics of the Micro5000 drive controller.

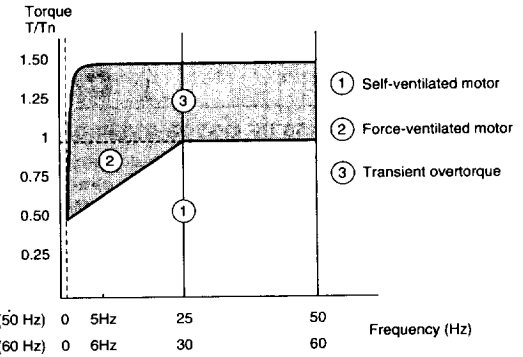


Figure 14 Typical Micro5000 Torque Characteristics

PREVENTIVE MAINTENANCE

Read the safety statements below before proceeding with any maintenance or troubleshooting procedures.

⚠ DANGER

HAZARDOUS VOLTAGE.

- **Read and understand this manual in its entirety before installing or operating AC drive controllers. Installation, adjustment, repair and maintenance of these controllers must be performed by qualified personnel.**
- **Disconnect all power before servicing drive controller. WAIT ONE MINUTE until bus capacitors discharge, then measure bus capacitor voltage between J9+ and J8- terminals to verify DC voltage is zero. See page 5.**
- **DO NOT short across capacitors or touch unshielded components or terminal strip screw connections with voltage present.**
- **Install all covers and close door before applying power or starting and stopping the controller.**
- **User is responsible for conforming to all applicable code requirements with respect to grounding all equipment. For more information on grounding, see page 8.**
- **Many parts, including printed wiring boards, in this drive controller operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools while making adjustments.**

Before servicing controller:

- **Disconnect all power.**
- **Place a "DO NOT TURN ON" label on controller disconnect.**
- **Lock disconnect in open position.**

Failure to observe these precautions will cause shock or burn, resulting in severe personal injury or death.

The following preventive maintenance procedures are recommended at regular intervals:

- ❑ Check the condition and tightness of the connections.
- ❑ Make sure ventilation is effective and temperature around the drive controller remains at an acceptable level.
- ❑ Remove dust and debris from the drive controller, if necessary.

If anything unusual occurs when putting the controller into service or during operation, be sure all recommendations relating to the environment, mounting and connecting the drive controller have been followed.

DIAGNOSTICS

The LEDs on front of the Micro5000 drive controller indicate several states (see Figure 15).

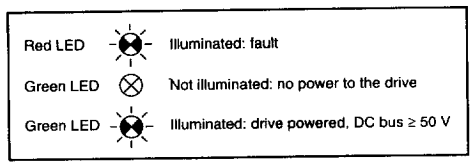


Figure 15 LED States

Fault Storage

When a fault occurs:

- ❑ The first fault detected is stored if mains voltage is maintained.
- ❑ The fault relay opens.

To reset the fault:

- ❑ Remove power from the drive controller.
- ❑ Before switching power back on, identify and correct the cause of the fault.
- ❑ Restore power. This will reset the fault if it has been corrected.

NOTE

Display/adjustment options 77NK1 and 77NK2 display the fault codes.

ADDITIONAL DOCUMENTATION

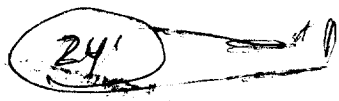
Table 5 Documentation for Micro5000 Products

Product	Product Catalog No.	Bulletin No.
Micro5000 Adjustable Speed AC Drive Controller (base product)	Micro5000	77-IMVFD1
Display/Adjustment Options:		
Display/Adjustment	77NK1	77-IMVFD2
Display/Adjustment/Local Control	77NK2	77-IMVFD2
Display/Adjustment Remote Mounting Kit	77NK4	77-HVFD1
PC Connection	77NK3	77-IMVFD3
Dynamic Braking Module	77NA1	77-HVFD2
Dynamic Braking Resistor	77NA2	77-HVFD3
Option cards:		
General Use/Material Handling	77NG1	77-IMVFD4
Variable Torque	77NG2	77-IMVFD5
High Speed Motor	77NG3	77-IMVFD6

Jim Hall

#1 Leg Variation

Servo Belt



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