

## 1333 (SERIES B & C) CONNECT GUIDE

### General Wiring Procedures

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**CAUTION:** Do not proceed without reading the information on this page.

Failure to understand procedures and hazards may result in personal injury or equipment damage.

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1. The National Electrical Code requires that a circuit breaker or fusible disconnect switch be provided in the drive branch circuit. Providing drive input fusing alone is not sufficient to meet NEC guidelines. The 1333 does not provide this requirement. Selection of a branch circuit or fusible disconnect should be based on the drive input current rating. Refer to Publication 1333.5.1 Chapter 3 for mandatory AC input fusing recommendations for drive short circuit protection
2. The National Electrical Code (NEC) requires that motor overload protection be provided in the motor branch circuit. The standard Bulletin 1333 Drive does not provide this requirement. Eutectic Alloy or bi-metal overload relays can be utilized to provide running overcurrent protection. Due to the reduced cooling capacity of motors running at low speed (full load), overload relays typically can not provide accurate protection against overheating below 50% of base speed.
3. The National Electrical Code and local regulations govern the installation and wiring of the Bulletin 1333 Adjustable Frequency AC drive. All Input and output power wire, control wire, and conduit should be brought through the drive conduit entry holes at the bottom of the enclosure. Connections to the drive should be made as shown in the following sections and in accordance with the drive nameplate data, NEC requirements, and any additional interconnection diagrams packed with the drive.
4. All signal wiring must be run separate from power wiring. Verify that shielded cable and/or conduit is used if indicated on any interconnection diagrams. If multiple drives are used, do not use common cabling for AC input or output leads. If shielded cable is required, shields must be grounded at the drive end only at the drive ground lug. The other end must be insulated and left floating. Nearby relays, solenoids, or brake coils can produce electrical noise transients and cause erratic drive behavior. Transient suppression networks must be added across the coils of these devices. Since most start-up difficulties result from incorrect wiring, every precaution should be taken to assure that the wiring is as shown on the diagrams.
- 4.3. The power circuit terminals are located at an (8) position terminal block situated on the lower front portion of the drive under the enclosure Input Fusing cover. The following explanation indicates the function of each terminal. The plastic guard over the terminal block should be replaced once field installed control wiring is complete.

The Bulletin 1333 does not provide input power short circuit protection. Refer to Publication 1333.5.1 Chapter 3 - Specifications, for the recommended fuse size to provide drive input power protection against short circuits.

## POWER CIRCUIT TERMINALS & INPUT FUSING

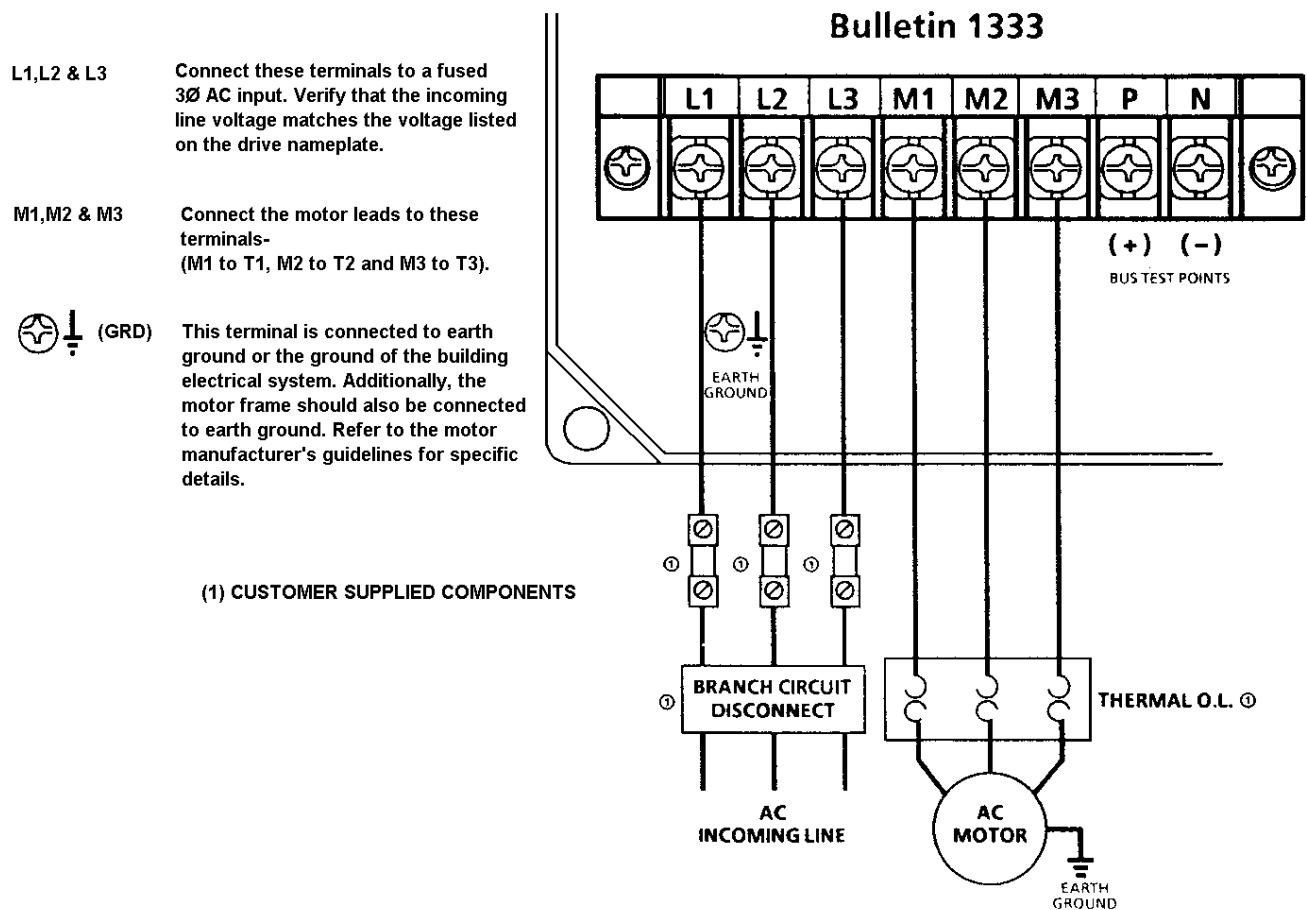
### CAUTION

- 1) Power factor correction capacitors connected to the drive output cannot be used. The switching of power factor correction capacitors on the input AC line of the drive may cause damage to the drive.
- 2) The use of contactors between the output of the Bulletin 1333 and the motor may cause damage to the drive and is not recommended.

If your application requires the use of power factor correction capacitors or output contactors, consult your nearest Allen-Bradley Area Sales/Support Center.

### IMPORTANT

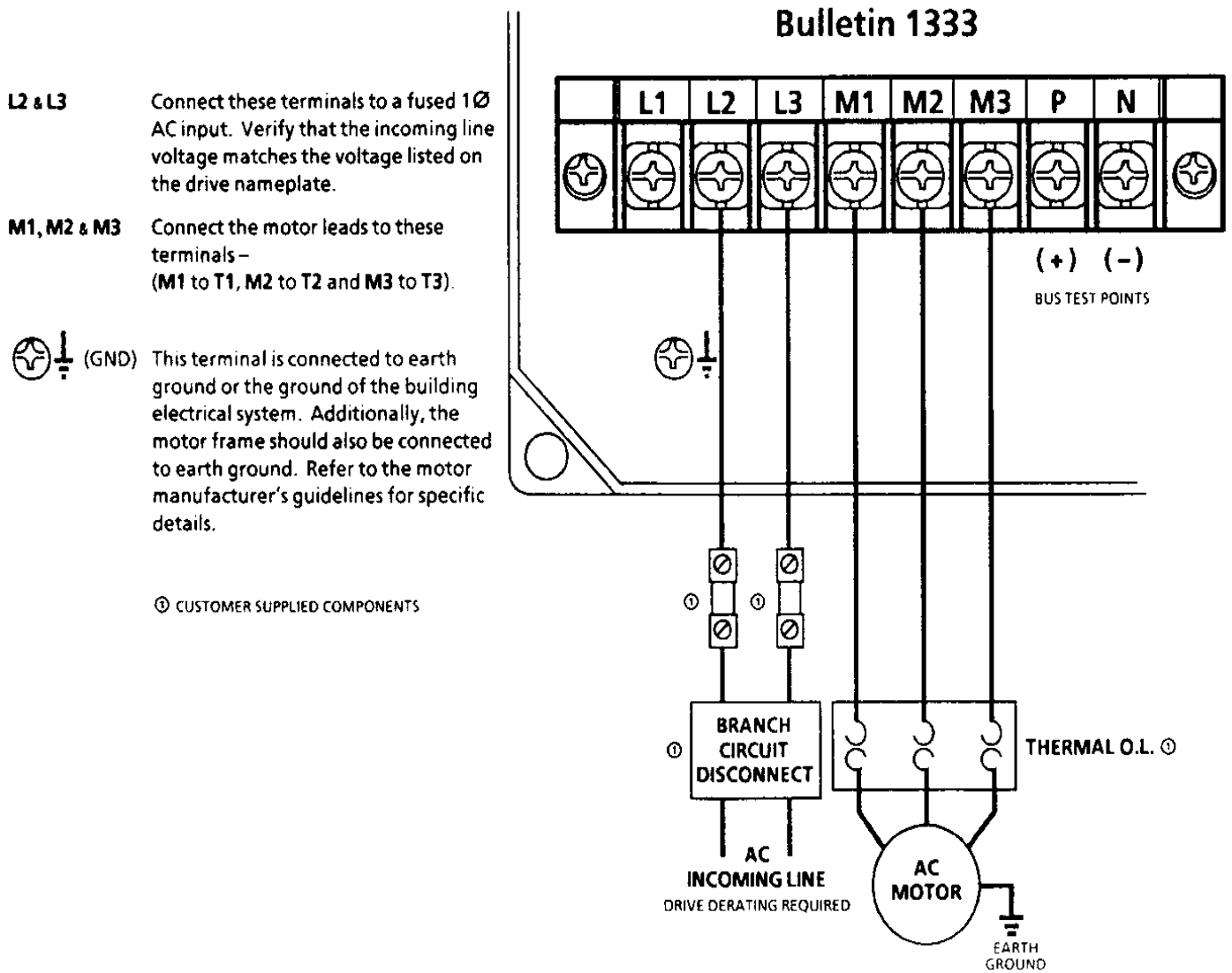
- 1) Verify that the induction motor windings are properly connected to match the drive output rating.
- 2) For multimotor operation the combined total of motor kVA cannot exceed the kVA output of the drive.



**3Ø Connections for 230/460/575V Drives-Plastic Guard on Terminal Block Removed**

**WARNING:**

- 1) Any disconnecting means wired to the output of the drive must be capable of shutting down the drive if opened during drive operation. The drive will continue to run into an open motor circuit causing a potential shock hazard. Opening the motor circuit while the drive is running will also cause equipment damage. A hard wired, normally closed, stop interlock contact must be wired between terminals 16 & 17.
- 2) The start/stop control circuitry in the Bulletin 1333 drive includes solid state components. If hazards due to accidental contact with moving machinery or unintentional flow of liquid, gas, or solids exist, an additional hard wired emergency stop circuit may be required. Refer to codes and standards applicable to your particular system for specific requirements and additional information. A device that removes AC input power when an emergency stop is initiated can be used. When AC input power is removed however, there will be a loss of inherent regenerative braking effect and the motor will coast to a stop. An auxiliary braking method may be required.



Single Phase Connections for 230V Drives - Plastic Guard Terminal Block Removed

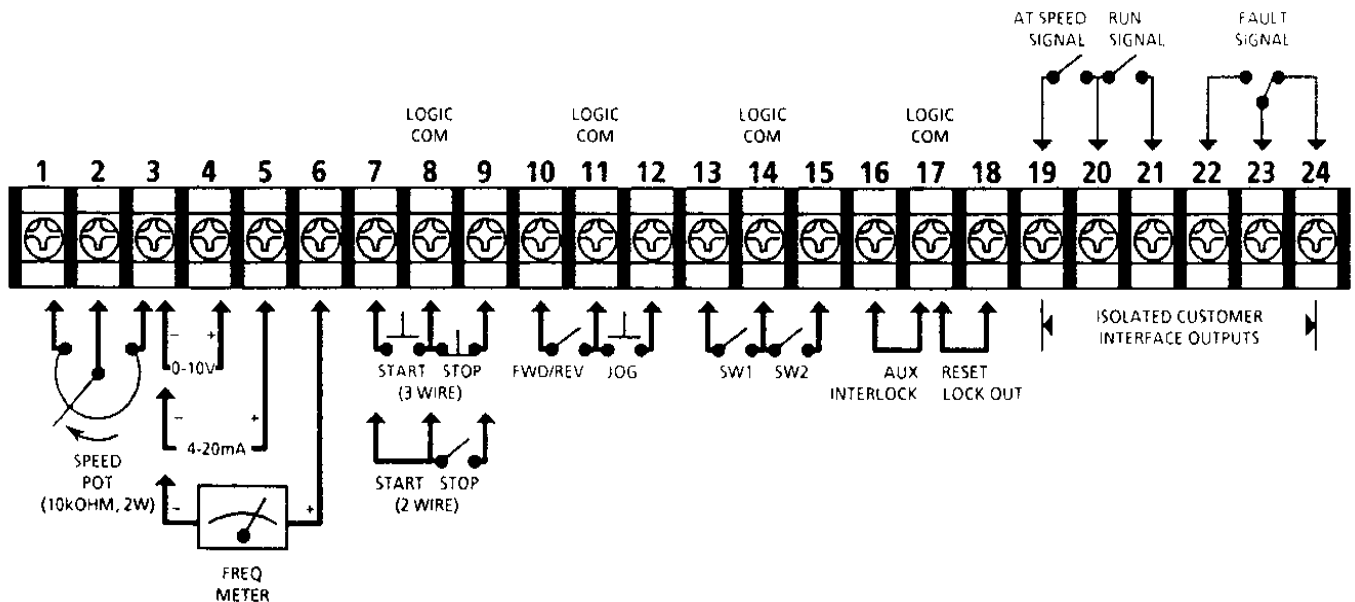
The drive is capable of operating from the built-in control panel without any connections to the customer terminal block. When required, external (remote) operator elements may be connected to the control terminal block to provide remote control of the drive. There are also several additional drive control functions and status outputs available for customer use at the control terminal block.

The control terminal block is a (24) position terminal block located on the lower front portion of the drive under the enclosure cover. The following is an explanation of the function of each of the terminals.

All signal wiring must be run separate from power wiring. Verify that shielded cable and/or conduit is used if indicated on any interconnection diagrams. If shielded cable is required, shields must be grounded at the drive end only at the drive ground lug. The other end must be insulated and left floating. Nearby relays, solenoids, or brake coils can produce electrical noise transients and cause erratic drive behavior. Transient suppression networks must be added across the coils of these devices. Since most start-up difficulties result from incorrect wiring, every precaution should be taken to assure that the wiring is as shown on the diagrams.

**IMPORTANT:**

Many of the control functions located on the control terminal block are affected by drive MODE programming and selection. Refer to sections 5.3, 5.3.1, & 5.3.2 in Publication 1333.5.1 Chapter 5 - Operation & Programming to verify that the drive is programmed for the desired operation.



Control Terminal Block with Optional Customer Connections

**1, 2 & 3**

These terminals are available for connection to a 10k OHM, 2W remote potentiometer. When a pot is connected to these terminals, no connections should be made to terminals 4 or 5. The status of MODE 10 affects the drive response to this signal.

**CAUTION:**

Unexpected machine acceleration can cause injury or death. If Mode 10 is set to a value other than 0, a loss of the potentiometer low reference signal at terminal 3 of the control terminal block will allow the drive to immediately accelerate to maximum frequency if the drive is running or a start command has been received. Ensure that remote potentiometer connection integrity is maintained and inspected in accordance with NFPA 70B standards for maintenance of electrical equipment.

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## CAUTION

Terminals 4, 5 and 6 are internally protected from reverse polarity signals or input signals rising above 120% of the maximum input signal. If reverse polarity or levels are maintained above 120%, signals may be degraded and component damage may result.

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### 3 & 4

These terminals are used when a 0 to + 10V DC signal is the external source for speed control. When these terminals are used, normally no connections are made to terminals 1, 2, or 5. The status of both MODES 10 & 11 will affect the drive response to this signal. These terminals present a load impedance of 40k OHM to external circuits.

### 3 & 5

These terminals are used when a 4 to 20mA signal is the external source for speed control. When these terminals are used, normally no connections should be made to terminals 1, 2, or 4. The status of both MODES 10 & 11 will affect the drive response to this signal. These terminals present a load impedance of 340 OHM to external circuits.

## IMPORTANT

Speed input wiring must be twisted (2) or (3) conductor shielded wired having (2) to (3) twists per inch. The shield must be grounded at the drive end only at the drive ground lug. The other end must be insulated and left floating. For distances less than 150 ft., use a minimum wire size of 22AWG. For distances between 150 and 300 ft., use a minimum wire size of 16AWG.

### 3 & 6

These terminals may be used to connect an external analog speed (frequency) meter. The output from these terminals is a 0 to 1mA signal proportional to drive output frequency. Full scale (1mA at terminal 6), is reached when the drive reaches its maximum frequency, selected by MODE 6. The connected load to these terminals must be less than 300 OHM.

### 7, 8 & 9

These terminals may be used to connect external start/stop push buttons or switches as shown in Figure 4.4. Controls connected to these terminals are affected by the programming of MODES 9 & 12.

If push buttons are used, connect a N.O. start push-button between terminals 7 & 8 and a N.C. stop push-button between terminals 8 & 9.

If a two position selector switch or isolated relay contact is used, connect the contact between terminals 8 & 9 and place a jumper between terminals 7 & 8.

## IMPORTANT

If MODE 16 Decel Stall Prevention is set to 1 (on), an overhauling load may cause the decel ramp to hold at one frequency for an extended period, causing ramp-to-stop commands to appear to be non-functional.

### 10 & 11

These terminals may be used to connect an external single pole forward/reverse switch. Controls connected to these terminals are affected by MODE 12 programming.

## 11 & 12

These terminals are used to connect a jog push-button. For the Bulletin 1333, jog is a mode of operation that allows the drive to start and run at a speed programmed by MODE 19 only as long as the push-button is held in. Once the push-button is released, the drive will stop.

### IMPORTANT

The jog command can operate the drive independent of either the local or external start/stop controls.

## 13, 14 & 15

These terminals are used to connect external switches to perform functions in one of two ways.

### 1) To Provide One of Four Preset Speeds

MODE	SPEED	SW1	SW2
NONE	MANUAL	OPEN	OPEN
20	2nd PRESET SPEED	CLOSED	OPEN
21	3rd PRESET SPEED	OPEN	CLOSED
22	4th PRESET SPEED	CLOSED	CLOSED

### 2) To Alternate Accel or Decel Rates as Programmed by MODES 28 & 29

ACCEL RATE	DECEL RATE	SW1	SW2
1st	1st	OPEN	OPEN
2nd	1st	CLOSED	OPEN
1st	2nd	OPEN	CLOSED
2nd	2nd	CLOSED	CLOSED

MODE 27 is then programmed to perform the functions in either 1) or 2) above, but not both.

## 16 & 17

These factory jumpered terminals are used to connect a customer supplied motor overload trip interlock. Typically, the N.C. pilot contacts would be wired to these terminals by the customer. An open contact indicates an AU (auxiliary fault) condition at the main display and stops the drive on a fault trip. Additional N.C. fault interlocks can be wired in series with the overload contact.

### IMPORTANT

1) If the factory installed jumper is removed from terminals 16 & 17 the drive will not run.

2) The Bulletin 1333 requires that contacts installed between terminals 16 & 17 to be open for 100mS or longer to sense the auxiliary fault.

17 & 18

These terminals are jumpered or not jumpered to determine how the Bulletin 1333 is reset after a fault condition.

When the terminals are jumpered, a drive fault trip may only be reset by removing and reapplying incoming line voltage to the drive.

When the terminals are not jumpered, a drive fault trip can be reset by either a local or remote stop command or by removing AC line voltage to the drive.

19 & 20

These terminals allow a drive supplied "at speed" contact to be used in external circuits. The N.O. drive contact closes when the drive output frequency is within 2 Hz of the commanded speed reference after Accel or Decel is complete. The contact is rated for 120V AC, 1A resistive & 30V DC, 2A resistive.

20 & 21

These terminals allow a drive supplied run contact to be used in external circuits. The N.O. drive contact closes when the drive is running. The contact is rated for 120V AC, 1A resistive & 30V DC, 2A resistive.

22, 23 & 24

These terminals allow a set of drive supplied fault contacts to be used in external circuits. The contacts are rated for 120V AC, 1A resistive & 30V DC, 2A resistive.

CONTROLLER STATE	TERMINALS 22 & 23	TERMINALS 23 & 24
NO POWER	OPEN	CLOSED
POWER ON, NO FAULT	CLOSED	OPEN
POWER ON, DRIVE FAULT	OPEN	CLOSED