Chapter 6

Wiring

General Wiring Procedures

ATTENTION: Do not proceed without reading the information on this page. Failure to understand procedures and hazards may result in personal injury or equipment damage.

ATTENTION: An incorrectly applied or installed system can result in component damage or reduction in product life. The most common causes are:

- Wiring the AC line to drive output or control terminals.
- Improper bypass or output circuits not approved by Allen-Bradley.
- Output circuits which do not connect directly to the motor.
- Incorrect or inadequate AC supply.
- Excessive ambient temperature.

Contact Allen-Bradley for assistance with application or wiring.

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 1336 does not provide this requirement. Selection of a branch circuit breaker or fusible disconnect should be based on the drive input current rating. Refer to the Terminal Block TB1 Wiring sections in this chapter for mandatory AC input fusing recommendations for drive short circuit protection.
2. The National Electrical Code and local regulations govern the installation and wiring of the 1336. All input and output power wiring, control wiring and conduit must be brought through the drive conduit entry holes provided on the enclosure. Connections to the drive must be made as shown in the following sections and in accordance with the drive nameplate, National Electrical Code requirements and any additional interconnection diagrams packed with the drive.
3. The voltage on each phase of the incoming line to the drive must match the drive input rating. Verify the drive rating by referring to the input voltage listed on the drive nameplate. If the incoming line voltage is out of this tolerance, equipment may be damaged or fail to operate.
4. If multiple drives are used, do not use common cabling for AC input or output leads. If multiconductor cable is used, separate 3-conductor input and output cable for each drive must be used.
5. All signal wiring must be run separate from power or control wiring. Verify that shielded cable and/or conduit is used if indicated on any interconnection diagrams or in the following sections. If shielded cable is required, shields must be grounded at the drive end only at one of the drive ground lugs provided.
6. 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.

7. Since most startup difficulties result from incorrect wiring, every precaution should be taken to assure that the wiring is as indicated on the diagrams and information packed with the drive.

Input Power Conditioning

General

Typically the 1336 is suitable for direct connection to a correct voltage, three phase, AC power line. There are however certain power line conditions which may introduce the possibility of drive input power component malfunction. To reduce the possibility of these malfunctions, a line reactor or isolation type transformer may be required.

The basic rules for determining if a line reactor or isolation type transformer is required are as follows:

1. If the AC line supplying the drive has power factor correction capacitors connected, an AC line reactor or isolation type transformer must be connected between the capacitor bank and the input to the drive.
2. If the AC line frequently experiences transient power interruptions or significant voltage spikes, an AC line reactor or isolation type transformer should be used.

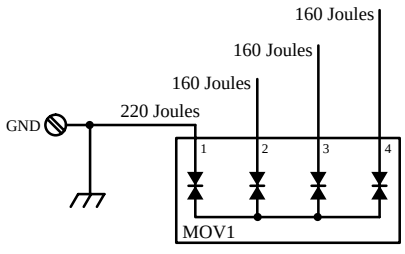
Ungrounded Distribution Systems

All 1336 drives are equipped with an MOV (metal oxide varistor) that provides voltage surge protection and phase-to-phase plus phase-to-ground protection which is designed to meet IEEE 587. The MOV circuit is designed for surge suppression only (transient line protection), not continuous operation.

With ungrounded distribution systems, the phase-to-ground connection of the MOV could become a continuous current path to ground. MOV line-to-line and line-to-ground voltages should not exceed the values listed below. Exceeding these MOV ratings may cause physical damage to the MOV.

Line-to-Line MOV Rating
Energy Rating = 320 Joules Turn On Voltage = 850-1000 volts

Line-to-Ground MOV Rating
Energy Rating = 380 Joules Turn On Voltage = 1500 volts



Wire Group Numbers

The following chart identifies general wire categories that will be encountered when installing the 1336 and other AC drives. Each category has an associated wire group number that is used in the following sections to identify the wire to be used. Application and signal examples along with the recommended type of cable for each group is provided. A matrix providing the recommended minimum spacing between different wire groups run in the same tray or separate conduit is also provided.

Wire Category	Wire Group	Application	Signal Example	Recommended Cable	For Tray: Recommended minimum spacing between different wire groups in the same tray For Conduit: Different wire groups must be run in separate conduit All Dimensions in Inches and (Millimeters)						
					Wire Group	Power 1	Power 2	Control 3	Control 4	Signal 5	Signal 6
Power	1	AC Power (> 600 V AC)	2.3 KV, 3∅ AC Lines	Per NEC Local Codes and Application Requirements	In Tray	9.00 (228.6)	9.00 (228.6)	9.00 (228.6)	9.00 (228.6)		
					Between Conduit	3.00 (76.2) Between Conduit					
	2	AC Power (to 600 V AC)	480V, 3∅ ❶ n	Per NEC Local Codes and Application Requirements	In Tray	9.00 (228.6)	9.00 (228.6)	6.00 (152.4)	6.00 (152.4)		
					Between Conduit	3.00 (76.2) Between Conduit					
Control	3	115VAC or 115V DC Logic	Relay Logic PLC I/O	Per NEC Local Codes and Application Requirements	In Tray	9.00 (228.6)	6.00 (152.4)	9.00 (228.6)	6.00 (152.4)		
		115V AC Power	Power Supplies Instruments		Between Conduit	3.00 (76.2) Between Conduit					
	4	24V AC or 24V DC Logic	PLC I/O	Per NEC Local Codes and Application Requirements	In Tray	9.00 (228.6)	6.00 (152.4)	6.00 (152.4)	9.00 (228.6)		
					Between Conduit	3.00 (76.2) Between Conduit					
Signal	5	Analog Signals DC Supplies	5-24V DC Supplies	Belden 8760 Belden 8770 Belden 9460	All signal wiring must be run in separate steel conduit. A wire tray is not suitable. The minimum spacing between conduit containing different wire groups is 3.00 inches (78.2 mm).						
		Digital (Low Speed)	Power Supplies TTL Logic Level								
	6	Digital (High Speed)	Pulse Train Input	Belden 8760 Belden 9460							

❶ Refer to precautions in General Wiring Procedures concerning multi-conductor cables.

Belden 8760 — 18 AWG, twisted pair, shielded.

Belden 8770 — 18 AWG, 3 conductor, shielded.

Belden 9460 — 18 AWG, twisted pair, shielded.

Note 1 Steel conduit is recommended for all 1336 power or control wiring and required for all 1336 signal wiring. All input and output power wiring, control wiring or conduit should be brought through the drive conduit entry holes provided. Use appropriate connectors to maintain the environmental rating of the enclosure.

Note 2 Spacing between wire groups is the recommended minimum for parallel runs of 200 feet or less.

Note 3 All shields for shielded cable must be grounded at the drive end only — Terminal 3 or 4 of TB2 — The other end must be insulated and remain floating. Shields for cables from one enclosure to another must be grounded only at the enclosure nearest the drive. If splicing of shielded cables is required, the shield must remain continuous and insulated from ground.

Note 4 AC and DC circuits must be run in separate conduit or trays.

Note 5 A voltage drop in motor leads may adversely affect motor starting and running performance. Installation and application requirements may dictate that larger wire sizes than indicated in the NEC guidelines be used.