Inverter Installation

Factors to be considered when selecting a location and method of installing the inverters includes the following:

- **Temperature (Location):**
  Hot air rises. The temperature at catwalk level is hotter than at floor level. Keep all inverters near floor level.
- **Temperature (Radiant Heat):**
  Check for direct radiation heating as well as the ambient air temperature in the proposed mounting area. If the inverters must be mounted near a conveyor where hot ware is only a few feet away, consider a heat shield to prevent direct radiation.
- **Temperature (Mounting Inside Another Enclosure):**
  Inverters do NOT need to be installed in an air-conditioned room. With a few common sense precautions, they can be mounted directly on the factory floor. Also, choosing the next larger HP inverter for the motor being driven allows operation on the derated end of the temperature graph (higher ambient temperature). If you decide to mount the inverter inside another enclosure, you must consider the heat dumped into that enclosure by the inverter and the subsequent ambient temperature rise inside the enclosure.
  Note: TCD Systems has chosen a design that mounts the inverter ½ inside and ½ outside an enclosure. By placing the inverter's heat sink outside the enclosure, the ambient rise inside the enclosure is minimized.
- **Environmental Rating:**
  If you intend to mount the inverter on a rack or wall in the production area, consider using a NEMA 12 (gasketed) inverter. Mounting the inverter inside another enclosure in the production area or in an air-conditioned room allows the use of a NEMA 1 or chassis style inverter.
  Note: As most air born contamination is suspended in the air, an enclosure with openings in the bottom is satisfactory. As long as the air inside the enclosure is stagnant (especially NO fan) it need not be gasketed.
- **Wiring the Inverter to the Motor:**
  It is almost impossible to purchase an inverter that does not use IGBTs as output drivers to the motor. Because of their rapid turn on/off switching characteristics, internal heating (and thus size and cooling problems) have vastly improved compared to inverters available in the 1990's. However, this rapid switching does come with a down side. The high frequencies generated can cause voltage doubling in improperly terminated wires to the motor. Keeping the motor leads 300 feet (100 meters) or less allows this problem to be ignored. It does however prevent you from installing the inverters too far from the production area.
- **Wire Selection:**
  Some of the motor lead wiring is in high temperature areas, high temperature wiring is generally used to connect the inverters to the motors. If FEP (Teflon coated) wire is used and if it is pulled through rigid conduit, microscopic cracks can develop in the Teflon insulation. Although these cracks do not show up when a sine wave meggar is used for testing, any water condensing in the conduit will find its way into these microscopic cracks and appear as a high frequency (MHz) short circuit. The inverter will "ground fault trip". A glass braided insulation wire should have the glass braid stripped an additional 1 inch (2 cm) more that the underlying insulation to prevent the same problem caused by wicking of moisture.
- **Wiring Synphase Control Card to Inverter:**
  There is only one connection between the Synphase card and the inverter, the 0-10 volt speed reference command. Use a twisted shielded 2-conductor wire and connect the shield to the negative terminal of the inverters 0-10 volt input. Wire size is not important as current is minimal. Do not

exceed the inverter manufacturer's recommendation for length of wire (usually around 10 feet or 3 meters).

- **Wiring Start/Stop Switches:**
  If you decide to use separate switches to start or stop the motor instead of the switches on the inverter's front panel, wire them according to the inverter manufacturer's instructions.
  Note: There is no connection of this function to the Synphase card. The Synphase logic determines motor run status by observing the tachometer attached to the motor.
- **Additional Devices:**
  Local codes vary. Branch circuit protection and motor disconnect devices are the responsibility of the plant.