1 Motor Control Equipment

1.1 All controllers shall be equipped with solid-state type overload elements, equipped with single phase protection. The overload relay must be of the manual reset type, auto-reset features are not acceptable.

1.2 Overload elements shall be sized for actual motor amperes, but shall not exceed motor nameplate rating.

1.3 Motor controllers Reference standard is Square D, Allen Bradley, Siemens, G.E. or equal.

2 General Description

2.1 Controllers shall:

2.1.1 Be complete with 120 volt fused control transformer, (dual fusing in primary, single fusing in secondary and grounded secondary) where the system voltages are 208V, 240V, 480V.

Exception: Controllers installed on 208V systems need not be furnished with a control transformer when a neutral conductor is provided.

Note: A separate fuse holder and fuse must still be provided for the control circuit and sized to protect the devices in the control circuit.

2.1.2 Motor starter compartments shall have a door mounted red LED run light. Provide other LED indicator lights as the application requires.

2.1.3 All indicator lights shall be LED with a push-to-test feature.

2.1.4 Starters shall be NEMA rated of the size required, with NEMA size 0 minimum.

2.1.5 Be complete with adjustable solid-state type overload elements per speed or step, sized for actual motor amps, but not to exceed nameplate rating.

2.2 All terminations shall be mechanical screw type suitable for 75°C copper wire.

3 Single Phase Controllers

3.1 Manual Controller/non-interlocked/without thermal protection:

- HP (horsepower) rated.
- 1 HP maximum at 120 volts.
- Toggle type.
- Enclosure as required for location.

3.2 Manual Controller/non-interlocked/with thermal protection:

- HP (horsepower) rated.
- 1 HP maximum at 120 volts.
- Toggle type.
- Reference standard is Square D, Allen Bradley, Siemens, G.E. or equal.

3.3 Automatic/Interlocked:

- Designed for switching motor loads.
- 1 HP maximum at 120 volts.
- Reference standard is Square D or equal.

4 Three Phase Controllers

4.1 Manual Controller/non-interlocked/with thermal protection:

- Designed for starting motor loads.
- 7-1/2 HP maximum at 230 volts (size 0 minimum).
- Toggle type STOP-START and "ON" pilot light in cover.
- 3 pole - 120 volt coil voltage.
- Reference standard is Square D, Allen Bradley, Siemens, G.E. or equal.
5 Control Stations

5.1 Provide heavy duty or "Hand-Off-Auto" selector switches equal to Allen Bradley Bulletin 800H on controllers for equipment.

5.2 The equipment includes, but shall not be limited to the following:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Hand-Off-Auto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilled Water Pumps</td>
<td>X</td>
</tr>
<tr>
<td>Heating Pumps</td>
<td>X</td>
</tr>
<tr>
<td>Heat Recovery System Pumps</td>
<td>X</td>
</tr>
<tr>
<td>Hydronic Pumps</td>
<td>X</td>
</tr>
<tr>
<td>A.C. Units</td>
<td>X</td>
</tr>
<tr>
<td>Return Air Fans</td>
<td>X</td>
</tr>
<tr>
<td>Exhaust Fans</td>
<td>X</td>
</tr>
<tr>
<td>Steam Condensate Pumps</td>
<td>X</td>
</tr>
<tr>
<td>Steam Vacuum Pumps</td>
<td>X</td>
</tr>
<tr>
<td>Air Compressors</td>
<td>X</td>
</tr>
<tr>
<td>Vacuum Pumps</td>
<td>X</td>
</tr>
<tr>
<td>Sump Pumps</td>
<td>X</td>
</tr>
<tr>
<td>Sewage Pumps</td>
<td>X</td>
</tr>
<tr>
<td>Dionizer Pumps</td>
<td>X</td>
</tr>
</tbody>
</table>

Note: If equipment has been determined, by the Owner/User to be automatically controlled only, do not connect the "Hand" side.

6 Control Center Reference Standard

6.1 Square D - Class 8998 - Model 6 or Equal equipment by Siemens