SIEMENS

Series 81000™ Controller
with Drawout Vacuum Contactors
For more than 20 years, Siemens has been at the leading edge of vacuum contactor technology for motor control applications. Today, as a result of its inherent reliability and outstanding performance, the entire line of Siemens Series 81000™ Controllers, from 5 through 7.2kV, exclusively features vacuum contactor technology.

The efficient design of the Series 81000 Controllers is used to maximum advantage by accommodating up to three separate contactors in one vertical section. The value of this design pays off with substantial weight savings, speedy installation and plenty of cabling room.

Every Series 81000 Controller we manufacture represents our commitment to total quality. Simply stated, we at Siemens believe that quality cannot be inspected into a product, it must be designed in from the start.

**The Vacuum Contactor Advantage**

Available with enclosed ratings of 360A and 720A at 5kV, plus 360A at 7.2kV, the Siemens family of UL listed vacuum contactors forms the very heart of our medium voltage controllers. And to enable you to take maximum advantage of this technology, every Series 81000 Controller features drawout construction design.

Why drawout construction? Because drawout construction speeds installation and maintenance. Plus it allows for safe access to the vacuum interrupter, coil and fuses. Siemens’ 60 years of drawout experience in metalclad switchgear has proven the value of drawout construction for protecting equipment and personnel.
enhancing safety and increasing serviceability for medium voltage equipment.

The latched contactor is an optional feature available on all 81000 Controllers. The latched contactor keeps the vacuum contactor closed even when power to the coil has been removed. A typical installation for a latched contactor is as a transformer feeder where you don't want the controller to open during a momentary loss of power.

For an extra measure of protection, the contactor can be provided with a blown fuse trip option to cause the contactor to open in the event of a blown fuse and prevent single phase operation of the motor.

Siemens offers the 5kV and the 7.2kV contactors in both fused and unfused models. When those models with primary fuses are subjected to high values of short circuit current, the total fault clearing time will be within one-quarter cycle — minimizing damage to your electrical equipment and loads.

In terms of maintenance, Siemens Vacuum Contactors require only minimal periodic upkeep during their life span of 1,000,000 electrical operations. When you compare that figure with the higher maintenance and the 100,000 operation life span common to air magnetic contactors, it's easy to see how Siemens' vacuum contactors have earned a reputation for outstanding reliability and durability.

The 81000 Controllers can be made a key part of the ACCESS Electrical Distribution Communication System.
Built for Versatility and Ease of Operation
The construction of Siemens Series 81000 Controllers allows you to mount one, two or three controllers in a standard vertical section and gives you maximum control over where and how they are to be used.
Available structure types include:
- NEMA 1 - General purpose, indoor
- NEMA 2 - Gasketed
- NEMA 2 - Drip proof
- NEMA 3R - Outdoor, rain, sleet and snow proof
- NEMA 12 - Industrial type, dust and drip proof

The Siemens door-in-door construction creates sufficient space for most of your low voltage control equipment. This space saving feature puts the controls right at the medium voltage controller.

Within the medium voltage compartments, the contactors themselves are offset to the right to give the user more wiring access to the load terminals of the contactor. There are no barriers in the contactor cell that interfere with access to power cable terminations.

For easy access to low voltage controls, 81000 Controllers feature Door-In-Door Construction.

For motor protection, the Siemens 3UA thermal overload relay with NEMA class 10 tripping characteristics is standard. This front adjustable relay has a wide range of trip settings and is ambient temperature compensated. The 3UA has directly heated bi-metallic elements that, after tripping, can be reset either by hand or automatically, as desired.

The 3UA relay's internal trip mechanism provides motor single phase protection and phase unbalance protection. In addition to a normally open alarm contact, the relay also has a normally closed contact for control circuit de-energization in case of a thermal trip. This highly accurate and reliable thermal overload relay has a trip indicator, manual test button and removable protective cover. And, in line with Siemens' commitment to quality, the 3UA is completely factory tested, calibrated and sealed.

For those applications which require longer acceleration times, Siemens offers the type 3UB solid-state overload relay. This relay is adjustable from NEMA class 5 up to NEMA class 30 characteristics.

Siemens Series 81000 Controllers have been designed to utilize a wide variety of bus ratings and materials for maximum specification flexibility. Horizontal main bus is available for 600, 1000 and 1200 amperes in tin
plated aluminum. With copper bus, ratings of 1000, 1200 and 2000 amperes are available, with tin plated or silver plated connections. Vertical bus is available with a 600 ampere rating using copper conductors.

For application flexibility, Siemens offers load interrupter switches in 600 and 1200 ampere ratings, fused or unfused. These switches are often specified for incoming line disconnect purposes or for bus tie applications.

And, if your specifications call for the added flexibility and protection of a main circuit breaker for the controller lineup, Siemens has a bus transition frame that allows you to connect your Series 81000 Controller directly to Siemens GM Switchgear.

With the addition of a Siemens 4700 Power Meter, your Series 81000 Vacuum Controller becomes an integral part of the Siemens ACCESS™ Electrical Distribution Communication System. Contact your local Siemens Sales Office for more information about this exciting new technology.

Siemens also offers the 85000 Synchronous Control system for synchronous motor applications. This microprocessor based protection system gives you everything you need for controlled starting and protection of brush-type synchronous machines. The 85000 Control package allows for convenient mounting of all components in one vertical section.
Safe And Easy Racking
Every Series 81000 Controller features a convenient racking mechanism as well as a host of other features that enhance safety and ease maintenance.

To start, a combination of electrical and mechanical interlocks is utilized to prevent a closed contactor from being racked in or out. The interlocking mechanism also prevents the opening of a medium voltage compartment door unless the contactor is racked out. The enhanced safety for your maintenance personnel created by these features is obvious.

Ease of operation is an important benefit of the 81000 drawout design. In fact, drawout operation is the height of simplicity: merely open the 81000 Contactor, move the racking handle to the OFF position, open the door, and the contactor is ready to be rolled out of the compartment. As the contactor is moved to the OFF position, insulated safety shutters automatically drop down to cover the line stabs.

A compound four-bar mechanism makes the racking of the drawout element a simple one-handed operation. With the drawout element racked out, inspection of vital elements is a snap. All items that may require inspection are either on the drawout element itself or are in plain view when it is racked out.

A test switch is provided in the low voltage compartment that enables you to verify the electrical operation of the contactor while in the racked out position. Use this switch to select either the RUN or TEST mode.

The control circuit disconnect plug, conveniently located on the left side of the contactor, is extremely helpful for maintenance personnel when the contactor is away from the Series 81000 Controller lineup. During bench testing, the control circuit disconnect plug provides complete access to the operating solenoid and the auxiliary contacts.
Drawout Construction Speeds Maintenance and Improves Safety

When comparing drawout construction to fixed mounted construction, take into consideration the safety aspects of drawout's positive disconnect and the fact that drawout construction has been the safety standard in metal-clad switchgear for over sixty years.

Positive One-Step Drawout Handle

Drawout construction also allows you to quickly insert a spare contactor as a replacement for any unit undergoing routine inspection, maintenance or repair. This minimized downtime is not possible with outdated fixed contactor construction, which could require you to shut down the entire lineup of controllers and physically unbolt the contactors and other equipment from the bus.

When you consider the long list of features (and benefits) that Siemens Series 81000 Controllers possess—drawout construction design, racking interlocks, safety shutters, one-handed racking, vacuum contactors, safer maintenance and inspection, as well as weight savings compared to air contactors—it's easy to see why the Series 81000 is the logical choice for state-of-the-art medium voltage controllers.

The Test Switch allows electrical operation of the contactor in the racked out position.
Typical Layouts For Series 81000

Key:
- AT - Auto-transformer
- C - Medium Voltage Contactor
- CT - Cable Terminations
- EX - Space for Field Excitation Equipment
- FU - Fuses
- INL - Incoming Line
- LBS - Load Break Switch
- LV - Low Voltage (Control)
- R - Reactor

Notes:
1. When upper cell is used for a drawout contactor, horizontal main bus (if required) is mounted on top of unit. This adds 10" to height of indoor structure.
2. Weights and dimensions for auto-transformer and reactor controllers vary as motor size varies.
3. For static exciter with any brush-type synchronous controller, using Series 85000 Synchronizing and Protection Module, add one 24" wide auxiliary structure.
4. Metering and protective device space requirements may warrant addition of a 24" wide auxiliary structure.
5. Power Factor Correction capacitors, when required with a FVNR controller, take the same space as an additional controller (1/3 of a vertical structure).
6. Surge Protection, consisting of 3-phase station class surge arrestors and surge capacitors, requires a 24" wide auxiliary section.
7. Type 3EF1 surge limiters can be provided with any controller with no effect on layout or dimensions.
8. Special metering and relaying can be provided. A wide variety of current and voltage sensing relays, metering devices, ACCESS™ system components, and similar equipment is available. Normally, the top 1/3 of the structure will be devoted to a low voltage section, and the middle and lower cells will each house a FVNR starter.
### NEMA 3R Walk-in Enclosures

<table>
<thead>
<tr>
<th>Controller Group</th>
<th>Number of Contacts</th>
<th>NEMA 1 or 12 Enclosure</th>
<th>NEMA 3R Enclosure</th>
<th>NEMA 1, 1A or 12 Enclosure</th>
<th>NEMA 3R Enclosure</th>
<th>1200#/ Contact</th>
<th>360#/ Reactor</th>
<th>310A</th>
<th>Rough Approximation for weights:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induction</td>
<td>5kV/360A</td>
<td>1</td>
<td>1400</td>
<td>1600</td>
<td></td>
<td>30</td>
<td>36</td>
<td>36</td>
<td>42/42</td>
</tr>
<tr>
<td>Full Voltage</td>
<td>5kV/720A</td>
<td>1</td>
<td>1600</td>
<td>1800</td>
<td></td>
<td>90</td>
<td>36</td>
<td>36</td>
<td>42/42</td>
</tr>
<tr>
<td>Non-Reversing</td>
<td>7kV/310A</td>
<td>1</td>
<td>1500</td>
<td>1700</td>
<td></td>
<td>90</td>
<td>36</td>
<td>36</td>
<td>42/42</td>
</tr>
<tr>
<td>Reduced Voltage-Transformer</td>
<td>5kV/360A</td>
<td>2</td>
<td>4000/6800</td>
<td>4400/7200</td>
<td></td>
<td>90</td>
<td>60/72</td>
<td>36</td>
<td>78/78</td>
</tr>
<tr>
<td>Full Voltage</td>
<td>5kV/720A</td>
<td>2</td>
<td>7400/8800</td>
<td>7800/9200</td>
<td></td>
<td>90</td>
<td>66/108</td>
<td>36</td>
<td>114/120</td>
</tr>
<tr>
<td>Non-Reversing</td>
<td>7kV/310A</td>
<td>2</td>
<td>4600/7400</td>
<td>5000/7800</td>
<td></td>
<td>90</td>
<td>96/168</td>
<td>36</td>
<td>114/120</td>
</tr>
<tr>
<td>Induction</td>
<td>5kV/360A</td>
<td>3</td>
<td>4200/7000</td>
<td>4600/7400</td>
<td></td>
<td>90</td>
<td>60/72</td>
<td>36</td>
<td>78/78</td>
</tr>
<tr>
<td>Reduced Voltage-Transformer</td>
<td>5kV/720A</td>
<td>3</td>
<td>7600/9000</td>
<td>8200/9600</td>
<td></td>
<td>90</td>
<td>96/108</td>
<td>36</td>
<td>114/120</td>
</tr>
<tr>
<td>Non-Reversing</td>
<td>7kV/310A</td>
<td>3</td>
<td>4800/7600</td>
<td>5400/8200</td>
<td></td>
<td>90</td>
<td>96/108</td>
<td>36</td>
<td>114/120</td>
</tr>
<tr>
<td>Induction</td>
<td>5kV/360A</td>
<td>3</td>
<td>2000/2000</td>
<td>4000/4000</td>
<td></td>
<td>90</td>
<td>60/72</td>
<td>36</td>
<td>78/78</td>
</tr>
<tr>
<td>Full Voltage</td>
<td>5kV/720A</td>
<td>3</td>
<td>3200/3200</td>
<td>4000/4000</td>
<td></td>
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<td>96/108</td>
<td>36</td>
<td>114/120</td>
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<tr>
<td>Non-Reversing</td>
<td>7kV/310A</td>
<td>3</td>
<td>2000/2000</td>
<td>4000/4000</td>
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<td>96/108</td>
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<td>114/120</td>
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<tr>
<td>Synchro-Transformer</td>
<td>5kV/360A</td>
<td>3</td>
<td>5100/5100</td>
<td>5700/5700</td>
<td></td>
<td>90</td>
<td>84/108</td>
<td>36</td>
<td>114/120</td>
</tr>
<tr>
<td>Reduced Voltage-Transformer</td>
<td>5kV/720A</td>
<td>3</td>
<td>8500/8500</td>
<td>9300/10700</td>
<td></td>
<td>90</td>
<td>132/144</td>
<td>36</td>
<td>150/156</td>
</tr>
<tr>
<td>Non-Reversing</td>
<td>7kV/310A</td>
<td>3</td>
<td>5700/6500</td>
<td>6500/9300</td>
<td></td>
<td>90</td>
<td>132/144</td>
<td>36</td>
<td>150/156</td>
</tr>
<tr>
<td>Induction</td>
<td>5kV/360A</td>
<td>3</td>
<td>2000</td>
<td>2200</td>
<td></td>
<td>90</td>
<td>72/84</td>
<td>36</td>
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<td>Full Voltage</td>
<td>5kV/720A</td>
<td>3</td>
<td>Note1</td>
<td>Note1</td>
<td></td>
<td>90</td>
<td>72/84</td>
<td>36</td>
<td>78/84/108</td>
</tr>
<tr>
<td>2-Speed, 2-Winding</td>
<td>7kV/310A</td>
<td>3</td>
<td>Note1</td>
<td>Note1</td>
<td></td>
<td>90</td>
<td>72/84</td>
<td>36</td>
<td>78/84/108</td>
</tr>
<tr>
<td>Switched Contact</td>
<td>5kV/360A</td>
<td>3</td>
<td>3300</td>
<td>3700</td>
<td></td>
<td>90</td>
<td>72</td>
<td>36</td>
<td>78/84/108</td>
</tr>
<tr>
<td>2-Speed, 2-Winding</td>
<td>7kV/310A</td>
<td>3</td>
<td>Note1</td>
<td>Note1</td>
<td></td>
<td>90</td>
<td>72</td>
<td>36</td>
<td>78/84/108</td>
</tr>
<tr>
<td>Linear Contact</td>
<td>5kV/360A</td>
<td>3</td>
<td>1400</td>
<td>1600</td>
<td></td>
<td>90</td>
<td>36</td>
<td>36</td>
<td>42/42</td>
</tr>
<tr>
<td>2-Speed, 2-Winding</td>
<td>7kV/310A</td>
<td>3</td>
<td>1400</td>
<td>1600</td>
<td></td>
<td>90</td>
<td>36</td>
<td>36</td>
<td>42/42</td>
</tr>
<tr>
<td>LBS-500A or 1000A</td>
<td>7kV</td>
<td>3</td>
<td>1400</td>
<td>1600</td>
<td></td>
<td>90</td>
<td>36</td>
<td>36</td>
<td>42/42</td>
</tr>
<tr>
<td>LBS-500A/1000A</td>
<td>5kV</td>
<td>3</td>
<td>2200</td>
<td>2500</td>
<td></td>
<td>90</td>
<td>72</td>
<td>36</td>
<td>78/78/108</td>
</tr>
<tr>
<td>LBS-1200A (LS-1000)</td>
<td>5kV</td>
<td>3</td>
<td>2200</td>
<td>2500</td>
<td></td>
<td>90</td>
<td>72</td>
<td>36</td>
<td>78/78/108</td>
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<tr>
<td>Incoming Line</td>
<td>7kV</td>
<td>3</td>
<td>600</td>
<td>800</td>
<td>19/24/36</td>
<td>90</td>
<td>19/24/36</td>
<td>36</td>
<td>42/42</td>
</tr>
<tr>
<td>Main Lug Only</td>
<td>7kV</td>
<td>3</td>
<td>600</td>
<td>800</td>
<td>19/24/36</td>
<td>90</td>
<td>19/24/36</td>
<td>36</td>
<td>42/42</td>
</tr>
</tbody>
</table>

**Note 1:** Consult Factory

All dimensions and weights are for estimating purposes only—not for construction!

NEMA 3R Walk-in Enclosures are 107" H x 101" D

NEMA 3R Non Walk-in Enclosures are 100" H x 47" D

Rough approximation for weights:

- 1200#/ per vertical structure, indoor
- 600#/ per incoming line structure, indoor
- 1200 - 4100#/ per reactor, up to 360A
- 360#/ per converter, 7kV/310A
- 400#/ per contactor, 5kV/720A
- 300#/ per contactor, 7kV/310A
- add 200#/ per structure, outdoor
Overvoltage Protection

Proven Vacuum Interrupter Technology
Over the years, vacuum interrupters have proven to be the best circuit protection and disconnect devices available. With very little arcing and no arc products emitted to foul either the contacts or the controller, the Series 81000 Contactor has a life span of up to 1,000,000 electrical operations.

Series 81000 Controllers feature modern contact materials that minimize current chopping and the associated overvoltage produced. For those applications where surges may be of concern, Siemens Type 3EF1 surge limiters are available as optional equipment.

When surge limiters are specified, they are connected to the load terminals of the controller. As a result of the controller compartment’s efficient design, no special space allowance is required for the 3EF1. Voltage ratings of the Type 3EF1 Surge Limiters are shown in the table below.

<table>
<thead>
<tr>
<th>System Voltage</th>
<th>Limit Voltage</th>
<th>Delta</th>
<th>Effectively Grounded Wire</th>
<th>Resonant Grounded Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3kV</td>
<td>3.6kV</td>
<td>2.4kV</td>
<td>4.16kV</td>
<td>4.16kV</td>
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<tr>
<td>4.0kV</td>
<td>6.0kV</td>
<td>4.16kV</td>
<td>6.9kV</td>
<td>6.9kV</td>
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<tr>
<td>4.6kV</td>
<td>6.0kV</td>
<td>4.8kV</td>
<td>6.9kV</td>
<td>6.9kV</td>
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<tr>
<td>6.6kV</td>
<td>7.5kV</td>
<td>6.9kV</td>
<td>6.9kV</td>
<td>6.9kV</td>
</tr>
</tbody>
</table>

For more information on overvoltage protection, contact your local Siemens Sales Office.

Siemens Energy and Automation Technology that serves the customer.
2.11 Enclosures shall be provided as one of the
2.8 All units shall be dead front construction and will line section shall be provided for the following automatically open the CPT secondary whenever
2.12 Outdoor enclosure construction shall be
2.2 Individual vertical sections shall be capable of
3.1.2. should be ANSI class "R" for motor starting duty,
1.1 This specification covers the design, manufacture, assembly and testing of 5kV and
1.4 The controllers will comply with the requirements
1.3 This equipment will be designed and constructed in accordance with applicable sections of NEMA, ANSI and the National Electrical Code.
1.2 Controllers shall be Siemens 81000 or Engineer approved equal.
1.0 General Conditions

1.0 General Conditions

2.7 Interior sheet steel shall be provided with an electrostatically applied ANSI-61 light gray thermosetting polyester finish.

2.6 All external controller parts shall be provided with an electrostatically applied ANSI-61 light gray thermosetting polyester finish, or be galvanized as heavy galvanized construction for corrosion protection.

2.5 Typical dimensions of the vertical sections shall be 90° high, 36° wide and 36° deep.

2.4 Doors shall be fabricated from 12 gauge steel minimum.

2.3 The frames shall be fabricated from 11 gauge steel.

2.2 Individual vertical sections shall be capable of mounting up to three (3) drawout controller assemblies.

2.1 The controller line-up shall consist of free standing vertical sections which are designed to allow additional sections, or individual starters, to be added in the field.

1.5 See attached drawings for equipment one line diagram.

2.0 Structural, Construction, and Finish Requirements

5.0 Drawout Controller Assembly Requirements

5.1 Each 360A drawout controller shall consist of a magnetically held controller, primary fuses for short circuit protection and an overload relay for motor overload protection.

5.2 Each 720A controller shall consist of a drawout primary fuse assembly for short circuit protection, an overload relay for motor overload protection and fixed contactor.

5.3 Overload relays shall provide running single-phase protection and an isolated N.O. alarm contact and shall be Siemens Type SJA.

5.4 The drawout assembly shall include both line and load side stab fingers allowing for complete removal of the drawout unit without disconnecting any power cabling.

5.5 All contactors shall utilize a vacuum interrupter main contact design to ensure extended operating life. Minimum electrical life of main contacts shall be 1,000,000 operations for 360A contactors.

5.6 The racking mechanism for each controller shall be designed such that it is impossible to rack the controller or fuse assembly on or off the bus without first opening the contactor. Likewise, the mechanism must prevent opening of the compartment door unless the carriage is racked out.

5.7 The racking handle must clearly indicate the "ON" and "OFF" positions of the controller, and must be capable of being padlocked in the "OFF" position.

5.8 As an added safety feature, each controller will be provided with an externally visible red indicator light which is illuminated whenever the contactor is racked onto the bus.

5.9 The minimum short circuit rating of the fused assembly will be 350 MVA at 4kV, or 570 MVA at 6.6kV. The primary protective fuses should be ANSI class "R" for motor starting duty, and class "E" for transformer or capacitor feeder duty. All fuses shall be rated a minimum of 4800 volts and should have an interrupting rating of at least 80,000 amps asymmetrical. Fuses should be Siemens Type FM (2400-4800 volts), or Type AF (2000 volts).

5.8 As an added safety feature, each controller will be provided with an externally visible red indicator light which is illuminated whenever the contactor is racked onto the bus.

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5.4 The drawout assembly shall include both line and load side stab fingers allowing for complete removal of the drawout unit without disconnecting any power cabling.

4.6 Load Interrupter Switchgear (optional) - Load Interrupter Switchgear used for incoming line equipment, shall be Siemens Type QM (see CSI specification section 16320).

4.5 All power buses will be readily accessible from the top, sides or rear of the structure by simple removal of the external cover plates.

4.4Incoming Power Requirements

4.3Incoming Line Section (optional) - An incoming line section shall be provided for the following conditions: Q Top entry cables, Q Bottom entry cables, Q Top entry bus duct (see attached drawings), Q Bus transition to switchgear (see attached drawings).

4.2 Load Interrupter Switchgear (optional) - Load Interrupter Switchgear used for incoming line, feeder or bus tie equipment shall be Siemens Type QM Fused, Q Non Fused, Q 600A, or Q 1200A.

4.1 Metalclad Switchgear (optional) - Metalclad Switchgear, used for incoming line equipment, shall be Siemens Type GM (see CSI specification section 16320).

4.0Incoming Power Requirements

3.8 As an added safety feature, each controller will be provided with an externally visible red indicator light which is illuminated whenever the contactor is racked onto the bus.

3.7 The racking handle must clearly indicate the "ON" and "OFF" positions of the controller, and must be capable of being padlocked in the "OFF" position.

3.6 The racking mechanism for each controller shall be designed such that it is impossible to rack the controller or fuse assembly on or off the bus without first opening the contactor. Likewise, the mechanism must prevent opening of the compartment door unless the carriage is racked out.

3.5 All contactors shall utilize a vacuum interrupter main contact design to ensure extended operating life. Minimum electrical life of main contacts shall be 1,000,000 operations for 360A contactors.

3.4 All power buses will be readily accessible from the top, sides or rear of the structure by simple removal of the external cover plates.

3.3 An optional continuous horizontal ground bus shall be provided with a 600A rating.

3.2 Each vertical section housing drawout controllers shall be provided with a 600A rated copper vertical bus with the same plating as specified in 3.1.2.

3.1.2 Horizontal bus material shall be tin plated aluminum, tin plated copper, or silver plated copper.

3.1 A continuous 3 phase horizontal bus shall extend the length of the line-up.

3.0 Power Bus Requirements

2.14 The low voltage section shall contain terminal blocks for termination of purchaser's low voltage control circuits, as well as the overload relay and any other low voltage devices.

2.15 Provision shall be made for Q top, or Q bottom entry of power cables.

2.13 Within the door of each controller compartment, a low voltage section will be provided. This low voltage compartment must have a separate door, and must totally isolate all low voltage control circuitry from the high voltage cubicle. The low voltage compartment door shall be provided with an externally operable overload reset button.

2.12 Outdoor enclosure construction shall be

2.11 Enclosures shall be provided as one of the following NEMA types: Q 1 (general purpose indoor), Q 1f (skidded), Q 2 (pip proof), Q 3HR (outdoor), or Q 12 (dust proof).

2.10 The back of each section shall be provided with a two piece removable barrier for ease of access.

2.08 The controller line-up shall consist of free standing vertical sections which are designed to allow additional sections, or individual starters, to be added in the field.

2.07 Interior sheet steel shall be provided with an electrostatically applied ANSI-61 light gray thermosetting polyester finish.

2.06 All external controller parts shall be provided with an electrostatically applied ANSI-61 light gray thermosetting polyester finish, or be galvanized as heavy galvanized construction for corrosion protection.

2.05 Typical dimensions of the vertical sections shall be 90° high, 36" wide and 36° deep.

2.04 Doors shall be fabricated from 12 gauge steel minimum.

2.03 The frames shall be fabricated from 11 gauge steel.

2.02 Individual vertical sections shall be capable of mounting up to three (3) drawout controller assemblies.

2.01 The controller line-up shall consist of free standing vertical sections which are designed to allow additional sections, or individual starters, to be added in the field.

1.9 An insulating shunter mechanism shall act automatically to close the line side stab connections when the controller is racked off the bus.

1.8 All units shall be deadfront construction and will utilize sheet steel barriers for isolation of the power bus compartments from the drawout controller area.

1.7 Interior sheet steel shall be provided with an electrostatically applied ANSI-61 light gray thermosetting polyester finish, or be galvanized as heavy galvanized construction for corrosion protection.

1.6 All external controller parts shall be provided with an electrostatically applied ANSI-61 light gray thermosetting polyester finish, or be galvanized as heavy galvanized construction for corrosion protection.

1.5 See attached drawings for equipment one line diagram.

1.4 The controllers will comply with the requirements of UL 347 and shall bear the UL label whenever possible.

1.3 This equipment will be designed and constructed in accordance with applicable sections of NEMA, ANSI and the National Electrical Code.

1.2 Controllers shall be Siemens 81000 or Engineer approved equal.

1.1 This specification covers the design, manufacture, assembly and testing of 5kV and 7.2kV Medium Voltage Controllers, Class E2.

1.0 General Conditions
### Ratings Table

| Nominal Motor Voltage 6600V |

### Operating Table

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<thead>
<tr>
<th>Operating Data</th>
<th>90H35 or 90H37 Contactor</th>
<th>90H6 Contactor</th>
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