

[PROJECT NUMBER]
[DATE]

[PROJECT NAME]
[PROJECT LOCATION]

ROCKWELL AUTOMATION

PROCUREMENT SPECIFICATION

PROCUREMENT SPECIFICATION

SMC™-3 Reduced Voltage Solid-State Smart Motor Controllers

NOTICE: The specification guidelines in this document are intended to aid in the specification of products. Specific installations have specific requirements, and Rockwell Automation does not recommend or intend any specific application based solely upon the guidelines provided here. Because of the variety of uses for this information, the user of, and those responsible for applying this information, are responsible for ensuring the acceptability of each application and appropriate use of the guidelines. In no event will Rockwell Automation be liable for misuse, misapplication or reliance on these guidelines in connection with any specific application. Rockwell Automation also disclaims indirect or consequential damages resulting from the use or application of this information.

Note: To download or view a .doc file version of this procurement specification, please visit:
www.rockwellautomation.com/industries/procurement-specifications

[PROJECT NUMBER]
[DATE]

[PROJECT NAME]
[PROJECT LOCATION]

TABLE OF CONTENTS

PART 1 GENERAL 4

 1.01 QUALIFICATIONS 4

 1.02 REFERENCES 4

 1.03 ENVIRONMENTAL REQUIREMENTS 5

 1.04 PRE-MANUFACTURE SUBMITTALS 5

 1.05 FINAL SUBMITTALS 6

 1.06 DELIVERY, STORAGE, AND HANDLING 6

 1.07 FIELD MEASUREMENTS 6

 1.08 SPARE MATERIALS 7

 1.09 WARRANTY 7

PART 2 PRODUCTS 7

 2.01 RATINGS 7

 2.02 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT DESIGN 7

 2.03 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT MODES 8

 2.04 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT FEATURES 9

 2.05 SOLID-STATE REDUCED-VOLTAGE CONTROLLER SYSTEM OPTIONS 9

PART 3 EXECUTION 11

 3.01 MANUFACTURER’S SERVICES 11

 3.02 TRAINING 11

PART 1 GENERAL

1.01 QUALIFICATIONS

A. Manufacturer

1. The manufacturer shall have a minimum of 25 years of experience in the manufacture of solid-state reduced-voltage controllers.
2. The approved manufacturers are:
 - a) Rockwell Automation Allen-Bradley
 - b) Substitutions: None permitted

B. Support

1. The manufacturer shall maintain factory trained and authorized service facilities within 100 miles of the project and shall have a demonstrated record of service for at least the previous ten years.
2. Support personnel are to be direct employees of the manufacturer and be available 24 hours per day through a toll-free number.
3. The manufacturer shall provide all required start-up and training services.
4. The approved manufacturers are:
 - a) Rockwell Automation Customer Support & Maintenance
 - b) Substitutions: None permitted

C. Certification

1. To ensure all quality and corrective action procedures are documented and implemented, all manufacturing locations shall be certified to the ISO-9001 Series of Quality Standards.
2. Third-party manufacturers and brand labeling shall not be allowed.

D. Definitions

1. The Solid-state Reduced Voltage Controller Unit shall refer to the actual controller unit that will be mounted within the specified enclosure.
2. The Solid-state Reduced Voltage Controller System shall refer to the controller unit and all items specified under Controller System Options.

1.02 REFERENCES

- A. The controller shall be designed to meet or exceed the applicable requirements of the following agencies.
 1. EN
 2. cULus
 3. VDE
 4. IEC
 5. NEMA
 6. IEEE

7. CCC

B. The following standards shall be met.

1. Creep distances and clearances 600V (UL/CSA) and 500V (IEC)
2. Power terminal markings per EN 50005 and EN 60947
3. Dielectric withstand per UL 508 and IEC 947
4. Noise and radio frequency (RF) immunity per NEMA ICSA1-109
5. Surge withstand per IEEE587 and IEC801-5

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Confirm to specified service conditions during and after installation of products.
- B. Maintain area free of dirt and dust during and after installation of products.

1.04 PRE-MANUFACTURE SUBMITTALS

- A. Refer to Section _____ for submittal procedures.
- B. Manufacturer Drawings
 1. Elevation drawings showing dimensional information
 2. Structure descriptions showing
 - a) Enclosure ratings
 - b) Fault ratings
 - c) Other information as required for approval
 3. Conduit locations
 4. Unit descriptions including amperage ratings, frame sizes, trip settings, pilot devices, etc.
 5. Nameplate Information
 6. Schematic wiring diagrams
- C. Product Data
 1. Publications on solid-state reduced-voltage controller.
 2. Data sheets and publications on all major components including but not limited to the following
 - a) Contactors
 - b) Circuit breakers and fuse information including time current characteristics
 - c) Control power transformers
 - d) Pilot devices
 - e) Relays
- D. Specification Response
 1. Detailed response to this specification showing where in the literature each requirement is satisfied.
 2. All clarifications and exceptions must be clearly identified.
- E. Installation Instructions

1. Provide a copy of the manufacturer's installation instructions which includes the following:

- a) Receiving, handling, and storage instructions

F. Testing and Test Reports

1. Testing shall be per manufacturer's standard.
2. A copy of the test reports, if available, shall be provided as part of the final documentation.

1.05 FINAL SUBMITTALS

- A. Refer to Section _____ for procedure on submittal of final documentation.
- B. The contractor shall provide certification that the solid-state reduced-voltage controller has been installed in accordance with the manufacturer's instructions.
- C. The contractor shall provide certification that the Contractor has properly adjusted any timing devices required in the starting circuitry.
- D. Final Drawings
 1. The manufacturer shall provide final drawings reflecting the "As-Shipped" state of the installed equipment.
 2. Manufacturer drawings shall be provided in DWG format.
 3. Manufacturer drawings do not need to be stamped if a drawing schedule is provided that lists the drawing numbers, revision levels, and status of drawings (Preliminary, Approval, Final, etc.)
 4. The contractor shall be responsible for making any changes to the "As-Shipped" drawings from the manufacturer to reflect any field modifications.
- E. Test reports, if available, indicating manufacturer's standard testing was performed.
- F. Maintenance Data
 1. Solid state reduced-voltage controller installation instructions and User Manual.
 2. Installation / Operation instructions for major components such as circuit
 3. Parameter listing
 4. Field service report from start-up service
 5. Solid-state reduced-voltage controller spare parts listing and pricing
 6. Include name and phone number for a local distributor for the spare parts.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. The contractor shall coordinate the shipping of equipment with the manufacturer.
- B. The contractor shall store the equipment in a clean and dry space.
- C. The contractor shall protect the units from dirt, water, construction debris and traffic.
- D. During storage the contractor shall connect internal space heaters (if specified) with temporary power.

1.07 FIELD MEASUREMENTS

- A. The contractor shall verify all field measurements prior to the fabrication of the solid-state reduced-voltage controller.

1.08 SPARE MATERIALS

- A. Provide one (1) set of three (3) of each size power fuse utilized.
- B. Provide spares equal to 10 percent of the installed quantity for primary and secondary control power fuses.
- C. Provide one (1) spare control relay for each unique relay utilized on the project.

1.09 WARRANTY

- A. The manufacturer shall provide their standard parts warranty for eighteen (18) months from the date of shipment or twelve (12) months from the date of being energized, whichever occurs first.
- B. The manufacturer shall confirm this warranty as part of the submittal.
- C. This warranty applies only to stand alone solid-state reduced-voltage controllers.

PART 2 PRODUCTS

2.01 RATINGS

- A. The solid-state reduced-voltage controller shall accept an input voltage from 200V... 480V AC or 200V AC... 600V AC three-phase plus 10 percent or minus 15 percent.
- B. The solid-state reduced-voltage controller shall have a minimum short circuit current rating of 65 kA when protected with a type CC/J/L fuses (up to 600V).
- C. Environmental Ratings
 - 1. Storage ambient temperature range: -25...+ 75°C.
 - 2. Operating ambient temperature range: 0... 50°C.
 - 3. The relative humidity range: 5% to 95% non-condensing.
 - 4. Operating elevation: up to 2000 meters.

2.02 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT DESIGN

- A. The open-type controller device shall consist of a power structure and a logic component.
- B. Power Structure
 - 1. The family of devices must be available from 1...480 A in a line connection
 - 2. The family of devices must be available from 1... 830 A when connected inside the delta
 - a) The inside-the-delta connection should be enabled with a DIP switch
 - 3. The power structure shall include an electro-mechanical SCR bypass device.
 - 4. The power structure shall include built-in 3-phase current monitoring and overload protection.
 - 5. There shall be a current transformer on each phase of the device for current measurements.
 - 6. For ratings 1...480 A, SCRs shall have the following minimum repetitive peak inverse voltage ratings
 - a) 1400V for units rated 200...480V
 - b) 1600V for units rated 200...600V
- C. Logic Component

1. The logic component shall be an integral part of the power structure so it cannot be removed and misplaced.
2. The control module shall provide digital microprocessor control and supervision of all controller operation, including pulse firing of the SCRs.
3. The control module shall consist of the following.
 - a) Self-tuning power supply accepting control power input from 100...240V AC or 24V AC/DC, 50/60 Hz.
 - b) Logic control circuitry incorporating a latch circuit for three-wire control.
 - c) Input / output circuitry
 - d) DIP switches are to be used for secure setting of the setup parameters
 - e) A POT setting is to be used for setting up the motor FLA
 - f) Integrated LED to indicate fault and running status
4. The control terminals shall have the following characteristics
 - a) The control terminal wiring connector shall be easily accessible and located on the front top of the device.
 - b) The terminals shall be UL rated for 300 Volts, 10 Amps maximum.
 - c) The terminals are UL Recognized to accept a maximum of two (2) wires rated #24...#14 AWG.

2.03 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT MODES

A. Starting Modes

1. Soft start with Selectable Kickstart
 - a) Programmable initial torque value of 15...65% of locked rotor torque.
 - b) Programmable acceleration ramp time from 0...30 seconds.
 - c) A selectable kickstart, or boost, shall be provided at the beginning of the voltage ramp. The kickstart shall provide a current pulse of 550% of the full load current. The kickstart time shall be adjustable from 0...2 seconds.
2. Current limit start
 - a) Provides means of limiting the maximum starting current
 - b) Adjustable from 150...450% of motor full load current.

B. Stopping Modes

1. Soft stop
 - a) The soft stop option shall provide a voltage ramp-down for an extended motor stopping time.
 - b) Soft stop shall be initiated by a dedicated Soft Stop input. A coast-to-rest stop shall still be possible with a separate stop input.
 - c) Programmable voltage ramp down time from 100...300% of the start time selected.
 - d) The load shall stop when the motor voltage drops to a point where the load torque is greater than the motor torque

2.04 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT FEATURES

A. Overload Protection

1. Shall meet applicable standards as a motor thermal protective device.
2. Shall utilize three-phase current sensing. The use of two current transformers shall be unacceptable.
3. Selectable trip classes of 10, 15, and 20 shall be provided as standard.
4. Electronic thermal memory shall provide enhanced motor protection.

B. Digital I/O

1. A minimum of two (2) auxiliary contacts shall be provided for customer use
2. The contacts shall be rated for 240V AC maximum.
3. Contact configurations shall be programmable and contain the following configurations:
 - a) Aux1 (N.O.) Normal/Up-to-Speed
 - b) Aux 2 (N.O./N.C.) Normal/Up-to-Speed
 - c) Fault Aux (N.O.) Fault

C. Protection and Diagnostics

1. Pre-start line fault advising of shorted SCR or missing load connection with phase indication.
2. Phase imbalance protection
3. Running line fault advising power loss, shorted SCR, or missing load connection.
4. SCR Over temperature
5. The overload is the only defeatable protection provided as standard with the controller.
6. When fault conditions are detected, the controller shall inhibit starting or shutting down SCR pulse firing.
7. An auxiliary contact that is user programmable for fault indication shall be provided for customer use.

2.05 SOLID-STATE REDUCED-VOLTAGE CONTROLLER SYSTEM OPTIONS

A. Enclosure

1. NEMA 4/12 enclosure for indoor use to provide a degree of protection against dust, falling dirt and dripping non-corrosive liquids. They shall be designed to meet drip, dust and rust resistance tests. No ventilation openings shall be allowed.
2. Paint: ANSI 49 Gray
3. Unless indicated differently, provide top entry and bottom exit for power cables.
4. Provide a 6.25 in. x 2 in. Door-mounted white lamacoid nameplate with black letters (message to be defined during submittal).
5. UL label

B. Transient Protection Modules

1. Transient protection with separately mounted protective modules.
2. Protective modules shall consist of metal oxide varistors (MOVs) in combination with capacitors to protect the power components from electrical transients and / or electrical

noise. The capacitors shall be provided to shunt noise energy away from the controllers electronics.

3. The MOVs and capacitors shall be encapsulated in a clear material for easy inspection.
4. The protective modules shall be mounted so that they will not cause damage to the power components upon absorbing an electrical transient.

C. Input Circuit Breaker

1. Provide a door interlocked thermal magnetic circuit breaker disconnect
2. Operator Handles
 - a) Provide flange mounted operator handles for free standing units
 - b) Through the door operating handles are acceptable for wall mounted units
 - c) Handles shall be padlockable
3. The system shall be rated for 5...10 kA. The rating shall be shown on the system label.

D. Input Isolation Contactor

1. An input contactor between the AC line and the controller can be provided.
2. The contactor shall have two N.O. and two N.C. auxiliary contacts.

E. Control Power Transformer

1. Provide a control power transformer mounted and wired inside of the system enclosure.
2. The transformer shall be rated for an additional 100 VA for customer use.
3. The transformer shall be provided with fused primary and secondary protection.

F. Hand-Off-Auto Selector Switch

1. Provide a "Hand/Off/Auto" selector switch for start-stop control
2. Provide pilot lights for indication of the "Hand" and "Auto" modes
3. The devices shall be Allen-Bradley Bulletin 800E pilot devices (22.5 mm, NEMA Type 4/4X/13) mounted on the enclosure door.

G. Start-Stop Push buttons

1. Provide Start-Stop and Pump Stop (if required) push buttons. Stop push buttons shall always be active.
2. The devices shall be Allen-Bradley Bulletin 800E (22.5 mm, NEMA Type 4/4X/13) pilot devices mounted on the enclosure door.

H. Pilot Lights

1. Provide pilot lights, mounted on the enclosure door, for indication of On, Off and Fault.
2. Pilot lights shall be transformer type
3. The devices shall be Allen-Bradley Bulletin 800E (22.5 mm, NEMA Type 4/4X/13) pilot devices mounted on the enclosure door.

PART 3 EXECUTION

3.01 MANUFACTURER'S SERVICES

- A. The service division of the manufacturer shall perform all start-up services.
- B. Start-up personnel shall be direct employees of the manufacturer and shall be degreed engineers.
- C. At a minimum, the start-up service shall include:
 - 1. Pre-power check
 - a) Megger motor resistance: phase-to-phase and phase-to-ground
 - b) Verify system grounding per manufacturer's specifications
 - c) Verify power and signal grounds
 - d) Check connections
 - e) Check environment
 - 2. Power-up and commissioning
 - a) Measure incoming power phase-to-phase and phase-to-ground
 - b) Measure DC bus voltage
 - c) Measure AC current unloaded and loaded
 - d) Measure output voltage phase-to-phase and phase-to-ground
 - 3. Recording of all measurements
 - 4. Tuning for system operation
 - 5. Providing a parameter list

3.02 TRAINING

- A. Manufacturer to provide a quantity of one (1) session of on-site instruction.
- B. The service engineer shall perform training.
- C. The instruction shall include the operational and maintenance requirements of the controller
- D. The basis of the training shall be the installed controller, the engineered drawings and the user manual. At a minimum, the training shall do the following:
 - 1. Review of the engineered drawings identifying the components shown on the drawings.
 - 2. Review starting / stopping options for the controller.
 - 3. Review operation of the Human Interface for programming and monitoring of the controller.
 - 4. Review the maintenance requirements of the controller.
 - 5. Review safety concerns with operating the controller.

End of section.

[PROJECT NUMBER]
[DATE]

[PROJECT NAME]
[PROJECT LOCATION]

Rockwell Automation, Rockwell Software, Allen-Bradley, CENTERLINE 2100, ArcShield, IntelliCENTER software, Powermonitor 3000, SMC-Flex, SMB, Accu-Stop, SMC-3, PowerFlex 40, PowerFlex 70, and PowerFlex 700 are trademarks of Rockwell Automation, Inc.

Trademarks not belonging to Rockwell Automation are property of their respective companies.

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 150-SR001C-EN-P March 2014
Supersedes Publication 150-SR001B-EN-P – April 2013

Copyright © 2014 Rockwell Automation, Inc All rights reserved.