TYPE RTS03ABLA
COMBINATION AUTOMATIC TRANSFER
WITH BYPASS ISOLATION SWITCH
RPTCS CONTROL
EFFECTIVE 1/19/2011

SUGGESTED SPECIFICATION
SINGLE OPERATOR
AUTOMATIC TRANSFER SWITCH
WITH LOAD BREAK BYPASS/ISOLATION OPERATION
WITH RPTCS MICROPROCESSOR CONTROL

PART 1 - GENERAL

1.01 SCOPE

A. Furnish and install Automatic Transfer Switches (ATS) with number of poles, amperage and voltage as shown on drawings. Withstand and Close-on ratings as listed in this specification are provided as a minimum requirement. Transfer Switches provided on this project without UL 3 cycle ratings as detailed in this specification will not be reviewed or approved.

1.02 CODES and STANDARDS

The Automatic Transfer Switches and controls shall conform to the requirements of the following :

A. UL 1008: Underwriters Laboratories Standard for Transfer Switch Equipment
B. NFPA 70 National Electrical Code
C. NFPA 99 Essential Electrical Systems for Health Care Facilities
D. NFPA 110 Standard for emergency and standby power systems
E. ANSI/IEEE 446 Recommended Practice for Emergency and Standby Power Systems for Commercial Applications
F. NEMA ICS 10 P1 Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment
G. IBC-2006 International Building Code-Seismic Certified
H. UL 508 Standard for Industrial Control

1.03 SUBMITTALS

A. Manufacturer shall submit shop drawings for review, which shall include the following, as a minimum:

1. Descriptive Literature
2. Plan, elevation, side and front view arrangement drawings, including overall dimension, weights and clearances, as well as mounting or anchoring requirements and conduit entrance locations.
3. Schematic diagrams
4. Wiring Diagrams
5. Accessory list

PART 2 - PRODUCTS

2.01 ACEPTABLE MANUFACTURERS

A. Automatic Transfer Switches and Bypass Isolation shall be Russelectric type RTS03ABLA. Any alternate must be submitted to the consulting engineer for approval at least 20 days prior to bid. Alternate bids must list any deviations from this specification.

2.02 CONSTRUCTION

A. General

1. The Automatic Transfer Switches and associated Bypass/Isolation Switch shall be furnished as shown on the drawings. Voltage and continuous current ratings shall be as shown.

2. On 3 phase, 4 wire systems, utilizing ground fault protection, a true 4-pole switch shall be supplied with all four poles mounted on a common shaft. The continuous current rating and the closing and withstand rating of the fourth pole shall be identical to the rating of the main poles.

3. The combination automatic transfer bypass/isolation switch shall be mounted in a NEMA 1 enclosure, unless otherwise indicated. Enclosures shall be fabricated from 12-gauge steel. The enclosure shall be sized to exceed minimum wire bending space required by UL 1008.

4. Both units shall be bussed together with silver plated copper bus to provide a complete pre-tested assembly. Construction shall be such that the contractor needs to install only power and control connections

5. Bypass/isolation switches shall provide a safe and convenient means for manually bypassing and isolating the automatic transfer switch, regardless of the condition or position of the ATS, with the ability to be used as an emergency back-up system in the event the transfer switch should fail. In addition, the bypass/isolation switch shall be utilized to facilitate maintenance and repair of the automatic transfer switch.

6. The automatic transfer switch shall be completely isolated from the bypass/isolation switch by means of insulating barriers and separate access doors.

7. The transfer switch shall be equipped with an internal welded steel pocket for housing an operations and maintenance manual.

8. The combination automatic transfer and bypass/isolation switch shall be top and bottom accessible.

9. The main contacts shall be capable of being replaced without removing the main power cable.

10. The main contacts shall be visible for inspection without any major disassembly of the transfer switch.

11. All bolted bus connections shall have Belleville compression washers.

12. When a solid neutral is required, a fully rated bus bar with required AL/CU neutral lugs shall be provided.

13. Control components and wiring shall be front accessible. All control wires shall be multiconductor, 18 gauge, 600 volt, SIS switchboard type in a point to point harness. All control wire terminations shall be identified with tubular sleeve type markers.

14. The complete combination automatic transfer bypass/isolation switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements.

B. Bypass/Isolation Construction

1. All main contacts and operating linkages of the bypass/isolation section shall be the same as the ATS, except that the operation shall be manual.

2. The bypass/isolation switch shall have the same electrical ratings as the associated ATS. The bypass/isolation shall be the load break type. The main contacts of the bypass switch shall be mechanically locked in both the normal bypass and the emergency bypass positions without the use of hooks, latches, magnets or springs and shall be silver-tungsten alloy, protected by arcing contacts. The switching mechanism shall provide "Quick-Break," "Quick-Make" operation of the contacts.

3. The primary bus work of the draw-out automatic transfer switch shall be connected to the stationary bus stabs in the freestanding cubicle by silver plated segmented, self aligning, primary disconnect fingers to facilitate proper alignment between the removable draw-out when the ATS is withdrawn and shall be available for inspection without disturbing or de-energizing the main bus.

4. The secondary control disconnect contacts mounted on the ATS shall be self-aligning and shall plug into stationary elements mounted on the freestanding cubicle.

5. The isolating portion of the bypass/isolation shall allow the ATS to be disconnected from all sources of power and control without opening the enclosure door. The transfer switch shall have a true draw-out configuration that does not require disconnection of any electrical or mechanical device by maintaining personnel. The ATS shall be provided with rollers or casters to allow it to be removed from the enclosure simply by rolling it out. The automatic transfer and bypass/isolation switch shall have two modes of operation. Automatic, the ATS connected and in automatic operating mode. Isolation, the ATS is completely disconnected for the bypass/isolation switch and free to be removed from the enclosure. The transfer switch can be tested while in bypassed mode without impact on the load.

6. Positive mechanical interlocks shall be provided to insure that the bypass/isolation functions can be accomplished without the danger of a short circuit. Overlapping contact bypass/isolation switches, that are dependent upon the position of the ATS for proper operation, are not acceptable.

7. A fourth pole, switched neutral shall be provided if the associated ATS is designed as a 4-pole. Basic 4-pole bypass/isolation switch construction shall be identical to the associated ATS construction.

8. Necessary controls shall be provided to ensure that the engine run circuit remains closed when the switch is in the bypassed to emergency position, even if the associated ATS is in the normal position or completely removed from the enclosure.

C. Automatic Transfer Switch

1. The transfer switch shall be double throw, actuated by a single electric operator momentarily energized, and connected to the transfer mechanism by a simple over center type linkage.

2. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-tungsten alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches. Interlocked, molded case circuit breakers or contactors are not acceptable.

3. The transfer switch shall be capable of being equipped with a safe external manual operator designed to prevent injury to operating personnel. The manual operation shall provide the same contact to contact transfer speed as the electrical operation to prevent flash over from switching main contacts slowly. The external manual operator shall be safely operated from outside the transfer switch enclosure while the enclosure door is closed.

D. Transfer Switch Controller

1. The transfer switch shall be equipped with a Microprocessor Controller with a Power Supply Module, CPU and I/O Modules for all voltage and ampere ratings. The controller shall be capable of both Serial and Ethernet communications.

2. The controller shall contain voltage sensing modules capable of direct single phase or three phase sensing of each source from 120 VAC to 600 VAC. The

Power Supply Module shall accept a 24 VDC external power source allowing controller communications in the event of a power outage.

3. Voltage sensing shall be true RMS type and accurate to +/- 1% of nominal voltage. Frequency sensing shall be accurate to +/- 0.05Hz. The operating temperature range shall be –20 to +50 degrees C and storage from –40 to +90 C.

4. The controller shall connect to the transfer switch through an interconnecting wiring harness. Interfacing relays shall be provided to isolate the controller from abnormal voltages applied to any and all customer input and output wiring terminals.

5. All customer interface connections shall be wired to a common DIN rail Cage Clamp terminal block. Sufficient space shall be provided to allow for future modifications and upgrades.

6. The controller shall meet or exceed the requirements for Electromagnetic Compatibility as follows:

    1. EN55022 (CISPR11) Conducted and Radiated emissions, Class B

    2. EN61000-4-2 (Level 4) ESD immunity test
       ENG6100-4-3 (ENV50140) Radiated RF
       EN61000-4-4 Electrical fast transient/burst immunity test
       EN61000-4-5 IEEE C62.41 Surge immunity test
       EN61000-4-6 (ENV50141) Conducted immunity test
       EN61000-4-11 Voltage dips and interruption immunity

    3. IEEE 472 (ANSI C37.90A) Ring wave immunity

E. Controller Display and Keypad

1. A color, ¼ VGA minimum, graphical display shall be provided for viewing data and setting operational parameters. Parameters shall also be available for viewing remotely and limited control through a front accessible USB communications port.

2. The Controller shall provide high intensity LED’s for the following:

a. Source Availability - Indicates the source voltage and frequency are within preset parameters.
b. Source Connected - Indicates the source main contacts closed and the load being served from the source.
c. XFER Inhibit - Indicates that the ATS is being inhibited from Automatic operation to the unconnected source.
d. Alarm – Indicates an alarm condition is active.
e. TD Active – Indicates that a transfer switch time delay is actively timing.

3. For ease of navigation, the display shall include the following:

a. Soft Keys – Change function based on user location in the menu structure.
b. Dedicated Navigational Keys – Home, Scroll Up, End, Escape and Enter.
c. Dedicated Pushbuttons for Alarm Reset, Test, Control and Info.

Part 3 OPERATION

3.01 Voltage, Frequency and Phase Rotation Sensing

A. Programmable voltage and frequency sensing of both sources capable of detecting single or three phase losses. The Controller shall have adjustable pickup and dropout settings for each source. Set point ranges as follows:

Parameter	**Sources**	**Drop Out/Trip**	**Pickup/Reset**
Undervoltage	N+E, 3phase	72 to 100%	70 to 98%
Overvoltage	N+E, 3phase	100 to 108%	102 to 110%
Underfrequency	N+E, 3phase	45.1 to 60.0 HZ	45.0 to 59.9HZ
Overfrequency	N+E, 3 phase	50.0 to 69.7 HZ	50.1 to 69.8 HZ

B. The controller shall monitor phase rotation of both sources and inhibit transfer if both sources are not the same phase rotation. (ABC or CBA)

C. Settings shall be adjustable in 1% increments either through the keypad, USB port or remotely via communications.

D. A single source status screen shall be provided to allow for viewing of the status of both sources including three phase voltage, power and frequency.

3.02 Time Delays

A. The controller shall include an adjustable time delay of 0 to 10 seconds to momentarily override normal source power outages and to delay engine starting. The time delay shall be expandable up to 60 minutes if an external 24 VDC power supply is provided for ATS control.

B. The controller shall include an adjustable 0 to 60 minute time delay on transfer to emergency, factory set at 3 seconds.

C. The controller shall include a time delay on retransfer to the preferred source adjustable 0 to 259 minutes, factory set at 5 minutes.

D. The controller shall include a time delay on engine cool down adjustable 0 to 60 minutes, factory set at 5 minutes.

E. All time delays shall be adjustable in 1second increments. All time delays shall be adjustable via the graphical display, the front USB port or configuration software using the USB, serial or Ethernet communications port.

3.03 Additional Features

A. Test Switch – The controller shall be provided with a two position, password protected, test switch to simulate a normal source failure. The test mode shall be configurable for Test Without Load or Test With Load functionality. The Test function shall be activated via the pushbutton on the display or remotely via a dry contact, voltage signal or a network signal.

B. Engine Start Signal – A SPDT contact, rated 10 amps at 30 VDC, shall be provided to start the engine generator in the event of a normal source outage.

C. Source connected contacts rated 10 amps at 120 VAC shall be provided to signal when the ATS is connected to each source.

D. Source Connected LED's – The controller shall include LED's to indicate when the ATS is connected to each source.

E. Source Availability LED's – The controller shall include LED's to indicate the availability of each source.

F. Commit/No-Commit Transfer Selector – The controller shall include a programmable selector to configure the controller to commit to transferring the load to emergency (or not) in the event the normal source returns prior to the generator being ready to accept load.

G. Inhibit Transfer Signals – The controller shall be capable of accepting transfer control inputs that inhibit transfer of the ATS to either source.

H. Auto/Manual Selector – The controller shall include a programmable function to select either Automatic or Manual operation.

I. ATS/Engine Exerciser – The controller shall include a user configurable exerciser. Exerciser shall be configurable for daily, 7 day, 14 day or 28 day exercise periods, each with (7) programmable events. The exerciser shall also be configurable as a full, 365 day exerciser with up to 24 independent exercise events. Each event shall be configurable for Test with Load and Test Without Load. Each event shall include user adjustable start time, date and test duration. All time and date settings shall be stored in non- volatile EEPROM memory. The controller shall include full programmability for daylight savings time.

J. Diagnostics – The controller shall contain self and system diagnostic screens for the purpose of detecting and troubleshooting abnormal system events.

K. Communications Interface – The controller shall be capable of interfacing via serial/RS485 or optional Ethernet TCP/IP communications ports integral to the controller. All communications parameters (baud rate, parity, IP Address, etc.) shall be accessible and programmable via the front keypad. Both serial and Ethernet communication shall be Modbus open protocol.

L. Event Logger – The controller shall have the ability to log data and to maintain the last 256 events, even in the event of a power failure. Time and date stamping of events will be accurate to 1 ms. Controller shall be capable of synchronizing it's date/time setting with a main PC via Network Time Protocol over an Ethernet TCP/IP network connection.

The following events shall be time and date stamped:

1.) Last Primary Source Failure
2.) Last reason for transfer.

3.) Last transfer to alternate source
4.) Last retransfer to primary source
5.) Time load is without power
6.) Time ATS powered up
7.) Total time on source 1
8.) Total time on source 2
9.) Total number of primary source failures
10.) Total number of transfers

M. Communications Modules

a. Serial Communications: Controller shall support RS485 communications port to enable serial communications at baud rates up to and including 115.2Kbps and be user configurable. The serial communications shall be capable of a direct connect or multi-drop configured network.

b. Ethernet Communications: Controller shall be capable of supporting Ethernet TCP/IP communications via an internally mounted and self powered communications card. Ethernet shall be 10/100 Mbit, auto sensing and include a RJ45 network connector.

c. Open Protocol: Both serial and Ethernet communications shall be Modbus protocol. Proprietary communications protocols shall not be acceptable.

N. External Power Supply: The controller shall be capable of being connected to an external 24 VDC power supply to permit full operation and communications of the controller when both sources are de-energized.

O. Auto Load Shed: The controller shall be capable of being programmed to automatically shed the connected load in the event of a user configurable under frequency condition.

P. Customer Configurable Alarms – The controller shall be capable of being configured to display customer configured alarm points. Alarms shall be capable of being reset via a remote contact.

3.04 Power Quality Metering

A. The ATS shall be able to supply optional metering for current, voltage, real power, reactive power, energy use, power factor and frequency. Metering shall be true RMS type, 1% accuracy for voltage and 0.5% for currents with a 5 amp secondary current transformer.

B. The following parameters shall be provided:
   1.) Phase current: Ia, Ib, Ic, In and average current (Iavg)
   2.) Phase voltage: Va, Vb, Vc, Vab, Vac, Vbc
   3.) Voltage and Current unbalance
   4.) Hz, PF, W, Var, VA
   5.) Wh, VAh, VARh
   6.) Voltage and Current Harmonics (% THD up to 8^{th} order)
   7.) Phase Rotation Sensing
   8.) Synchroscope (lead/lag)

C. The ATS shall be capable of monitoring and capturing waveform data in the event of a utility power outage or other user specified event.

   1.) A total of 10 active channels of waveform capture may be user configured.
   2.) Each channel shall be capable of capturing up to 256 cycles of waveform information.
   3.) Analog channels may be configured for 4, 8, 16 or 32 samples/cycle.
   4.) Digital channels shall be configured for 1 sample/cycle.
   5.) Waveform data shall be stored in industry standard COMTRADE format for broadest compatibility and ease of downloading to a PC.

D. The controller shall be capable of logging digital and analog measured parameters and storing the data in non-volatile memory.

   1.) The controller shall contain a 10 channel Data Logger. Each channel shall be capable of being configured to monitor a digital on/off or analog measured parameter.
   2.) The sampling rate of each channel shall be configurable form 1 cycle to 60 minutes per sample. The data shall be stored in non-volatile memory in a first in, first out method.

PART 4 ADDITIONAL REQUIREMENTS

4.01 Withstand and Close Ratings

A. The ATS shall be UL listed in accordance with UL 1008 for 3 cycle close and withstand ratings. ATSs that are not tested and labeled for 3 cycle, ratings are not acceptable. The automatic transfer and bypass/isolation switch shall be tested as a complete connected unit. Minimum UL listed close and withstand ratings at 480 VAC shall be as follows:

Size Amps	3 Cycle	Current Limiting Fuses
100 – 400	42 Ka	200,000 Ka
600- 800	65 Ka	200,000 Ka
1000-1200	85 Ka	200,000 Ka
1600-4000	100 Ka	200,000 Ka

B. During 3 cycle closing and withstand tests, there shall be no contact welding or damage. The 3 cycle test shall be performed without the use of current limiting fuses. The tests shall verify that contact separation has not occurred, and there is contact continuity across all phases. Test procedures shall be done in accordance with UL-1008, and testing shall be certified by Underwriters Laboratories, Inc.

C. When conducting temperature rise tests to UL-1008, the manufacturer shall include post-endurance temperature rise tests to verify the ability of the ATS to carry full rated current after completing the overload and endurance tests.

4.02 Manufacturer

A. The Transfer Switch manufacturer shall employ a nationwide factory-direct, field service organization, available on a 24 hours a day, 365 days a year call basis.

B. The manufacturer shall include an 800-telephone number, for field service contact, affixed to the outside of each enclosure.

C. The manufacturer shall maintain records of each transfer switch, by serial number, for a minimum of 20 years.

4.03 Installation

A. Automatic Transfer Switches shall be provided with adequate lifting means for ease of installation of wall or floor mounted enclosures.

B. Provide access and working space as indicated or required.