

**North and South Shore Pump Stations
Load Bank Connection's
5560 C/S FY12 Rev 04**

PART I – GENERAL

1.01 Scope of Work – Rolling Hills and Colonial Williamsburg Pump Stations

The work to be performed under this Section shall include furnishing all labor, materials, tools and equipment necessary to install and test all load bank connections.

- A. Work includes providing labor and materials to build and install a Deep Hinged Window Kit with locking wing knobs and an aluminum inner plate for mounting the necessary panel receptacles.

The Deep Hinged Window Kit shall be sized and configured to insure proper safe distances between all energized components to grounding surfaces with the hinged cover closed and locked while the panel receptacles are energized.

- Special Notation

- The amount of panel receptacles and Deep Hinged Window Kit shall be sized to meet the minimum of 100% rating of the generator load with additional room to add 50% more panel receptacles.

- B. Work includes installing properly sized aluminum plate and Deep Hinged Window Kit to meet 150% of the capacity of the generator.

- C. Work includes providing and installing all necessary lugs in transfer switch to accept cable for panel receptacles.

- Special Notation

- Lugs shall be sized to accept conductors being used for panel receptacles and conductors from generator.

- D. Work includes making all necessary terminations in a workmanship like manor.

- E. Work includes removing a portion of the steel side door of the transfer switch and mounting an aluminum plate of adequate size to cover area removed and to accept panel receptacles to meet 150% of the capacity of the generator.

- F. Work includes mounting Aluminum Plate, Panel Receptacles, and Deep Hinged Window Kit with machine screws and nuts of adequate size.

- G. Work includes coordination with HRSD to perform an operational test to validate product quality and installation.

- H. Work must be performed onsite between hours of 7am-3pm Mon-Fri. The time schedule may be altered if approved by owner.

1.02 Scope of Work – Rodman, Quail, and Suffolk Pump Stations

The work to be performed under this Section shall include furnishing all labor, materials, tools and equipment necessary to install and test all load bank connections.

- A. Work includes providing labor and materials to install conduit, wire, and deep hinged NEMA 4X junction box with an aluminum dead front panel for mounting the necessary panel receptacles.

The junction box shall be sized and configured to insure proper safe distances between all energized components to grounding surfaces with the hinged cover closed and locked while the panel receptacles are energized.

- Special Notation

- The amount of panel receptacles and junction box shall be sized to meet the minimum of 100% rating of the generator load with additional room to add 50% more panel receptacles.

- B. Work includes installing properly sized aluminum plate and junction box to meet 150% of the capacity of the generator.

- C. Work includes providing and installing all necessary lugs in transfer switch to accept cable for panel receptacles.

- Special Notation

- Lugs shall be sized to accept conductors being used for panel receptacles and conductors from generator.

- D. Work includes making all necessary terminations in a workmanship like manor.

- E. Work includes installing properly sized conduit and fittings necessary from the existing transfer switch to the receptacle junction box.

- F. Work includes mounting aluminum dead front plate and Panel Receptacles in junction box.

- G. Work includes coordination with HRSD to perform an operational test to validate product quality and installation.

- H. Work must be performed onsite between hours of 7am-3pm Mon-Fri. The time schedule may be altered if approved by owner.

- 1.03 Submittals
- B. The contractor shall submit a minimum of four copies of all submittals in a three ring binder. Any CAD drawings or other relevant information must be submitted in electronic format on a CD (Compact Disc). The Owner will review and approve before any material is purchased or any work has commenced. The submittals shall be delivered or mailed to the North Shore Electrical Shop, 2391 G Avenue Newport News, VA 23602 Attn: Dean Lowery or the South Shore Electrical Shop, 1424 Air rail Ave, VA Beach VA 23455 Attn: Donnie Ward.
 - C. The following submittals will be provided:
 - a. Manufacture Product Specification's of cables, connectors, enclosure, and associated hardware.

Part 2 Products

- 2.01 Panel Receptacles shall be Leviton 18 series female panel receptacle, Cam type 400 amp 600v 1/0 – 4/0 AWG. (18R24-(B,O,Y,G))
- A. Panel Receptacles shall be Leviton® 18series female receptacle Cam type 400amp 600v, 1/0 – 4/0 AWG (part No.18R24).
 - B. Panel Receptacles shall be colored to match corresponding phase and grounding conductor (grounded conductor Not Applicable)
 - i.e.: 480V or 240V
 - A phase – Brown/Black
 - B phase – Orange/Red
 - C phase – Yellow/Blue
 - Ground - Green
 - Neutral – NA
- 2.02 Deep Hinged Window Kit with locking wing knobs (Rolling Hills, Colonial Williamsburg)
- A. Deep Hinged Window Kit with locking wing knobs may be Hoffman® (i.e. CAT No. AWDH2420N4) or equivalent quality.
 - B. Window Kit shall be capable of being locked.
 - C. Shall be mounted with machine screws and nuts.
- 2.03 Deep Junction Box with Aluminum dead front panel (Rodman, Quail, Suffolk)
- A. Shall be lockable, hinged, and NEMA 4X
 - B. Shall have an aluminum dead front panel
- 2.04 Lugs
- A. Shall be that of a manufacture with conductor size and temperature rating stamped into side of lug.
 - B. Shall be capable of accepting the correct number of conductors coming from the generator and panel receptacles (a minimum of 100% rating of the generator).
- 2.05 Aluminum Plate
- A. Shall be a minimum of 1/4" thick.
 - B. Shall be adequate size to accept the panel receptacles capable of 150% of the generator rating.
 - C. Shall be mounted with machine screws and nuts.
- 2.06 Conductor
- A. Shall be that of DLO type (Diesel Locomotive Cable)
 - B. Shall be a minimum of 4/0 and 600v rated.
 - C. Shall be supported so as not to cause stress on the insulation of the conductor or the lugs where being terminated.
 - D. Stranded, Copper
- 2.07 Conduit and Fittings

- A. Shall be sized appropriately for conductors.
- B. Conduit shall be galvanized ridged steel.
- C. Conduit fittings shall be malleable iron,

Part 3 Execution

3.01 General and Schedule of work

- A. A schedule of work shall be prepared by the Contractor and submitted to the Owner within 10 days of the project award. **The project must be completed and invoiced by Friday June 15th, 2012 to receive payment.**
- B. This project is located on the North Shore as well as the South Shore at total of five separate HRSD owned waste water pumping stations.
 - The North Shore Stations are:
 1. Rolling Hills – 402 Rolling Hills Dr. Williamsburg VA 23185
 2. Colonial Williamsburg – 1000 RT. 132 Williamsburg VA 23185
 - The South Shore Stations are:
 1. Rodman – 2412 Rodman Ave., Portsmouth VA 23707
 2. Suffolk – 1136 Sanders Dr., Suffolk VA 23434
 3. Quail PRS – 822 Quail Ave. Chesapeake VA 23324
- C. The installation of the aluminum plate with the appropriate amount of panel receptacles and Deep Hinged Window Kit with locking wing knobs shall be determined at each location.
- D. The location of where the junction boxes, panel receptacles, aluminum plate and Deep Hinged Window Kit with locking wing knobs will be determined at each location depending on equipment layout.
 - Special Notation
 - The preferred location will be as low to the finished floor as possible and towards the hinged side of the door or on a side of the transfer switch.
 - Where junction boxes are installed the preferred location is top of box at 6 feet from finished grade outside.
- E. The successful contractor shall perform work in a safe and workmanship manner and adhere to all applicable codes.
- F. The contractor must attend safety orientation training prior to starting construction, which will be facilitated by HRSD Safety Department. Call Jennifer See at (757) 460 - 7060 to schedule an appointment.
- G. The successful contractor shall contact HRSD personnel when entering and exiting into the pump station. On North Shore call (757) 833-1720 and (757) 460-7072 on the South Shore. HRSD access Badges and keys will be issued by HRSD. The contractor must make a log entry in the stations log book upon arrival and departure of the station.
- H. The contractor shall coordinate all shutdowns with the contact personnel. Certain weather events may dictate rescheduling a shutdown at the last minute and is up to the discretion of the owner.
- I. This work will require qualified personnel to work in proximity of energized parts; a energized work permit is required to perform work "hot".

Part 4 HRSD Contacts

4.01 Contact personnel

- A. North Shore Electrical Supervisor

Dean Lowery – 757-274-4947 cell 757-833-1702 desk

B. South Shore Electrical Supervisor
Donnie Ward – 757-376-2721 cell 757-460-7348 desk

C. Electrical Superintendent
John Haymore – 757-376-3376 cell 757-460-7033 desk

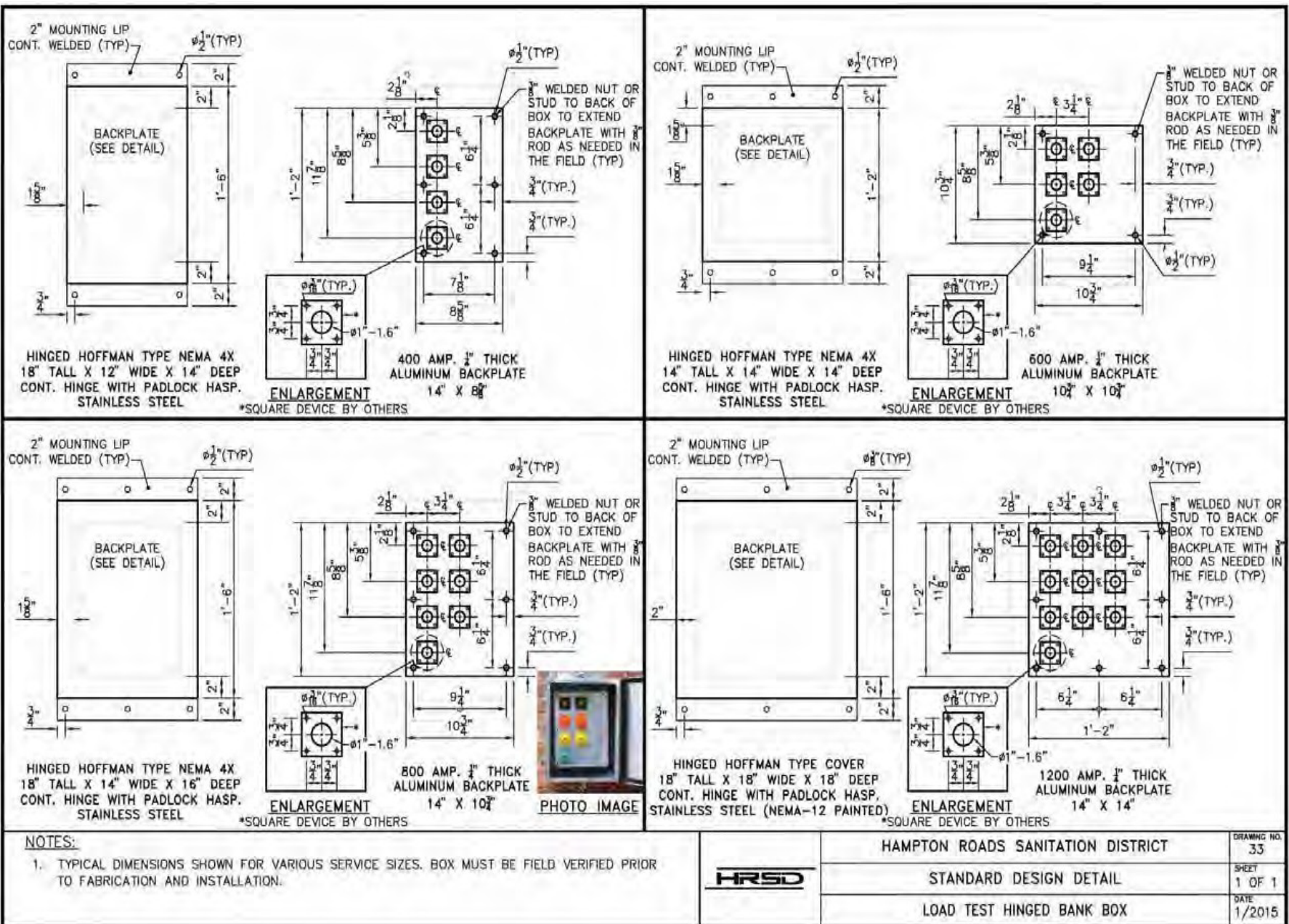
D. Electrical Manager
Sherman Pressey – 757-274-8753 cell 757-833-1715 desk

Other

- Meetings (pre-bid, pre-construction, and other coordination meetings).
- Cost estimate breakdown (includes labor, material, and other associated cost).

Attachments

A – Hoffman Window Kits
B – Leviton Connectors
C – Photos



Alternative Load Box Solution



TripleSwitch™ 3-Way Manual Transfer Switch

125 - 400A, up to 600VAC
Series: 3141-M

UL 1008 Listed

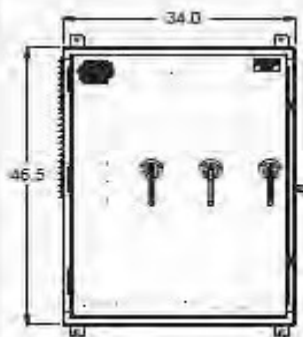
Features



- Accepts 24VDC signal from ATS to switch power during load bank testing (other signal trip voltages available)

- Quick connect solution for permanent generator load bank testing and a backup portable generator
- Mechanically interlocked mechanism prevents cross-connecting power sources
- Dry contacts provided for annunciator circuit
- Disconnects are 3-pole circuit breakers as standard (optional 4-pole breakers or molded case switches available)
- Type 3R heavy gauge galv. steel enclosure with gray powdercoat RAL 7035 (stainless steel & additional colors optional)
- Color-coded series 16 cam style connectors for easy back-up generator (male) & load bank (female) connection
- Handle cover provides security from unauthorized use
- Wall mountable; leg kits optional
- Operating instructions silkscreened on door
- Optional extended enclosure (8" deeper) for bottom conduit feed
- NEC 700.12 compliant

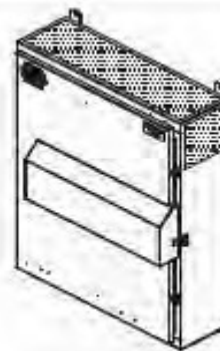
Drawing



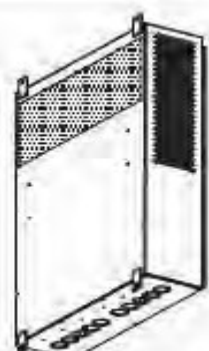
FRONT VIEW
(HANDLE COVER NOT SHOWN)



SIDE VIEW



FRONT ANGLE VIEW



REAR ANGLE VIEW

Available incoming conduit entry locations shown shaded.

Approvals

- UL/cUL 1008 Listed assembly
- UL 1691 Listed receptacles
- UL 1087 Listed molded case switch
- UL 489 Listed / OSA certified molded case circuit breaker
- OSHPD seismic certification (OSP)
- ICC-ES 156 shake-table tested/certified
- IBC 2015/ASCE 7-10 compliant

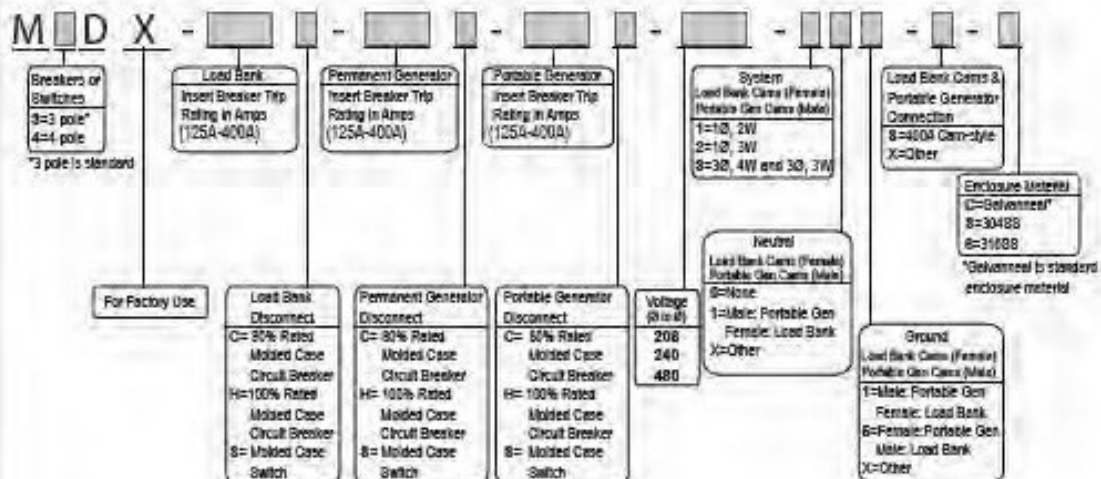
Specifications

TripleSwitch 3-Way Manual Transfer Switch
Series: 3141-M

UL 1008 Listed

Ordering Information

Example: M3D4 - 400C - 400C - 400C - 208 - 311 - S - C



Contact factory for additional options.

Ratings

Short circuit rating (breakers)	65kAIC @ 208VAC & 240VAC, 35kAIC @ 480VAC, 18kAIC @ 600VAC
Withstand rating (switches)	10kA @ 208VAC to 600VAC
Cam-style receptacles	Includes the following for both load bank & portable generator: (1)400A, 600VAC for each phase, neutral and ground
Terminals	Disconnect line terminals: (2) 2/0 - 500kcmil Load terminals: (2) 2/0 - 500kcmil Ground lug: (3) #6 - 300kcmil Neutral: (4) 2/0 - 500kcmil Other options available
Environmental	Type 3R, gasketed (Type 3RX with 304SS or 316SS option)

Packaging

Approximate product weight	370 lbs.
Approximate shipping weight	410 lbs.

TripleSwitch™ 3-Way Manual Transfer Switch

450 - 800A, up to 600VAC
Series: 3181-M

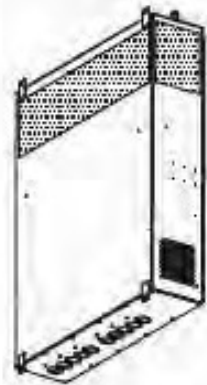
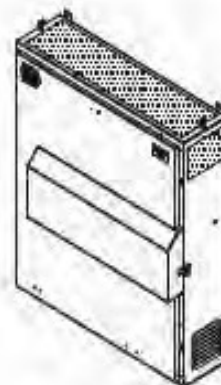
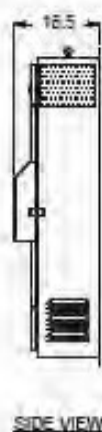
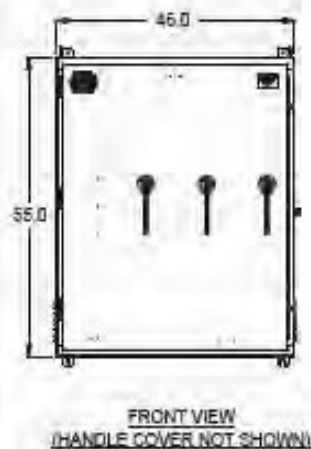
UL 1008 Listed

Features



- Accepts 24VDC signal from ATS to switch power during load bank testing (other signal trip voltages available)
- Quick connect solution for permanent generator load bank testing and a backup portable generator
- Mechanically interlocked mechanism prevents cross-connecting power sources
- Dry contacts provided for annunciator circuit.
- Disconnects are 3-pole circuit breakers as standard (optional 4-pole breakers or molded case switches available)
- Type 3R heavy gauge galv. steel enclosure with gray powdercoat RAL 7035 (stainless steel & additional colors optional)
- Color-coded series 16 cam style connectors for easy back-up generator (male) & load bank (female) connection
- Handle cover provides security from unauthorized use
- Wall mountable; leg kits are optional
- Operating instructions silkscreened on door
- Optional extended enclosure (8" deeper) for bottom conduit feed
- NEC 700.12 compliant

Drawing



Available incoming conduit entry locations shown shaded.

Approvals

- UL/cUL 1008 Listed assembly
- UL 1691 Listed receptacles
- UL 1087 Listed molded case switch
- UL 489 Listed / CSA certified molded case circuit breaker
- OSHPD seismic certification (OSP)
- ICC-ES 156 shake-table tested/certified
- IBC 2015/ASCE 7-10 compliant

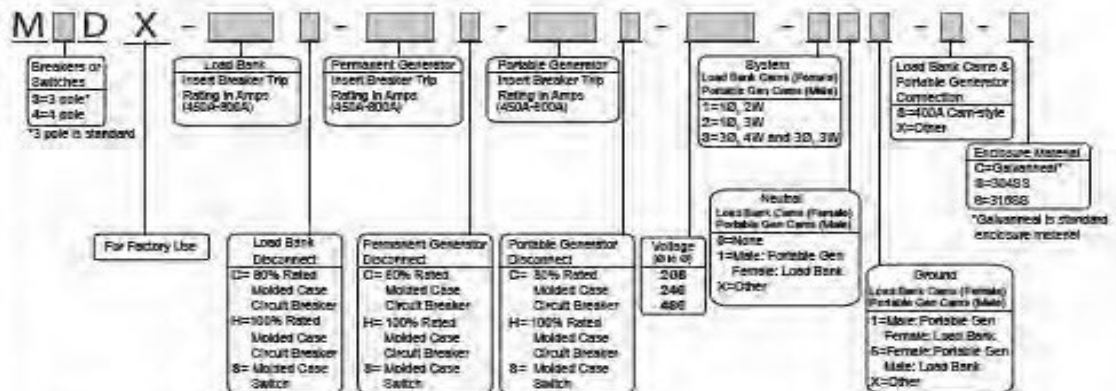
Specifications

TripleSwitch 3-Way Manual Transfer Switch
Series: 3181-M

UL 1008 Listed

Ordering Information

Example: M3D8 - 800C - 800C - 800C - 208 - 311 - S - C



Contact factory for additional options

Ratings

Short circuit rating (breakers)	65kAIC @ 208VAC & 240VAC, 35kAIC @ 480VAC, 18kAIC @ 600VAC
Withstand rating (switches)	10kA @ 208VAC to 600VAC
Cam-style receptacles	Includes the following for both load bank & portable generator: (2) Sets of 400A, 600VAC for phase & neutral (1) 400A, 600VAC for ground
Terminals	Disconnect line terminals: (3) 3/0 - 500kcmil Load terminals: (3) 3/0 - 500kcmil Ground lug: (3) #6 - 300kcmil Neutral: (6) 3/0 - 500kcmil Other options available
Environmental	Type 3R, gasketed (Type 3RX with 304SS or 316SS option)

Packaging

Approximate product weight	540 lbs.
Approximate shipping weight	575 lbs.

400A SINGLE POLE CAM STYLE MATING PLUG
(SOLD SEPARATELY)

- [REDACTED]
- [REDACTED]
- LEVITON 16 SERIES, TAPER NOSE
- [REDACTED]

SPECIFICATIONS FOR 3-WAY MANUAL TRANSFER SWITCH WITH (2) BREAKER INTERLOCK

PART 1 – GENERAL REQUIREMENTS

1.01 Scope:

- A. Contractor shall furnish, deliver, install and test the 3-way manual transfer switches as specified herein and in accordance with the drawings.

1.02 Quality Assurance:

- A. 3-way manual transfer assembly switch shall be UL listed and labeled under the UL 1008 standard.
- B. 3-way manual transfer switch shall be special seismic certified by OSHPD exclusively on the basis of approved shake table testing, and also certified to IBC 2015. Minimum IBC 2015 design parameters shall be as follows: $I_p = 1.5$, $S_{DS} = 2.0g$, $z/h = 1.0$
- C. 3-way manual transfer switch manufacturer shall provide a complete factory assembled, wired and tested 3-way manual transfer switch.
- D. 3-way manual transfer switch shall be factory Hi-pot tested for a period of not less than 60 seconds.
- E. 3-way manual transfer switch installation shall meet all applicable NEC standards.
 - 1. 2017 NEC 700.3 (F) compliant when used in conjunction with an ATS and appropriate auxiliary equipment.

1.03 Submittals:

- A. Contractor shall submit manufacturer's drawings and data of 3-way manual transfer switches for Engineer's approval prior to start of fabrication. Drawings and data shall include, as a minimum, dimensioned general arrangement drawings and wiring diagrams, UL listing information including UL file or control number, short circuit rating or withstand rating, component data, mounting provisions, conduit entry locations and installation instructions.
- B. Upon installation of 3-way manual transfer switches Contractor shall submit manufacturer's Operating & Maintenance Manual which shall include as a minimum:
 - 1. Certified as-built General Arrangement drawings and Wiring Diagram.
 - 2. Materials / Component List including part numbers.
 - 3. Maintenance and service requirements.
 - 4. Certificate of Compliance and hi-pot test data.

1.04 Warranty:

- A. 3-way manual transfer switches shall be covered by manufacturer's warranty for a minimum period of (1) one year after shipment from manufacturer.

SECTION 2 - PRODUCTS

2.01 General:

- A. All equipment shall be new.
- B. 3-way manual transfer switch manufacturer must have produced and sold UL 1008 Listed manual transfer switches as a standard product for minimum of (3) years.
- C. 3-way manual transfer switches shall be molded case circuit breaker type; knife switch or fused switches are not acceptable.
- D. Contractor shall be responsible for the equipment until it has been installed and is finally inspected, tested and accepted in accordance with the requirements of this Specification.
- E. 3- way manual transfer switches shall be TripleSwitch as manufactured by ESL Power Systems, Inc. or equal as approved by the Engineer.

2.02 3-way Manual Transfer Switches:

- A. 3-way manual transfer switch shall consist of (2) mechanically-interlocked molded case circuit breakers, and (1) independent load bank breaker with a shunt trip (shunt trip voltage to be per the drawings), male cam-style inlet connectors, female cam-style outlet connectors, power distribution blocks and grounding terminals, all housed within a padlockable enclosure.
- B. **WALL-MOUNT ENCLOSURES**
3-way manual transfer switch enclosure shall be Type 3R, constructed of continuous seam-welded, powder coated galvalume steel. The main access shall be through an interlocked, hinged door that extends the full height of the enclosure. Access for both portable generator cables with female cam-style plugs and for load bank cables with male cam-style plugs shall be via a drawn flange cable entry openings in the bottom of enclosure. A hinged flap door shall be provided to cover the cable openings when cables are not connected; the hinged flap door shall allow cable entry only after the main access door has been opened. Enclosure shall be powder coated after fabrication; color shall be wrinkle gray RAL 7035.

PAD-MOUNT ENCLOSURES

3-way manual transfer switch enclosure shall be Type 3R, constructed of continuous seam-welded, powder coated galvalume steel. The main access shall be through a hinged door that extends the full height of the enclosure. Access for both portable generator cables with female cam-style plugs and for load bank cables with male cam-style plugs shall be via a hinged lower flap door. Hinged flap door shall be provided to cover the cable openings when cables are not connected; the hinged flap door shall allow cable entry only after the main access door has been opened. Enclosure shall be powder coated after fabrication; color shall be wrinkle gray RAL 7035.

- C. Cam-style male connectors (inlets) and cam-style female connectors (outlets) shall be UL Listed single-pole separable type and rated 400 amps at 600VAC. All cam-style connectors shall be color coded. Cam-style connectors shall be provided for each phase and for ground, and shall also be provided for neutral. Each of the phase cam-style connectors and the neutral cam-style connectors within the enclosure shall be factory-wired to a molded case circuit breaker. The ground cam-style male connectors shall be bonded to the enclosure, and a ground lug shall be provided for connection of the facility ground conductor. None of the cam-style connectors shall be accessible unless all (3) molded case circuit breakers are in the "OFF" position and the main access door is open.
- D. A power distribution block shall be provided for load-side field wiring. The power distribution block shall be factory wired to the molded case circuit breakers.
- E. Molded case circuit breakers shall be UL Listed 3-pole and the short circuit interrupt rating shall be a minimum of 35kAIC at 480VAC (wall mount units) or 50kAIC at 480VAC (pad mount units). Trip rating of the molded case circuit breakers shall be as shown on the drawings. One molded case circuit breaker shall control the connection between the permanent generator and the automatic transfer switch. A second circuit breaker shall control the connection between the permanent generator and the load bank female cam-style connectors. A third circuit breaker shall control the connection between the portable generator (via male cam-style connectors) and the automatic transfer switch. All (3) molded case circuit breakers shall include UL Listed door-mounted operating mechanisms, preventing the opening of the main access door unless all (3) breakers are in the "OFF" position. All (3) molded case circuit breakers shall be mounted behind a deadfront panel. The load-side of the molded case circuit breakers shall not be ~~energizable~~ ^{de-energizable} unless the main access door is closed and one of the molded case circuit breakers is in the "ON" position. The (2) molded case circuit breakers controlling the connections between the permanent generator and the automatic transfer switch, and the connection between the portable generator and automatic transfer switch shall be safety interlocked by mechanical means to ensure that only one of these breakers can be closed at any given time.
- F. An auxiliary contact shall be provided in the circuit breaker controlling the connection from the Permanent Generator to the ATS and shall be factory wired to terminal blocks within the enclosure. The auxiliary contact is provided in compliance with NEC 2017 700.3 (F)(5) which requires a means to activate an annunciator circuit.

SECTION 3 - EXECUTION

3.01 Installation:

- A. Prior to installation of 3-way manual transfer switches, Contractor shall examine the areas and conditions under which the 3-way manual transfer switch is to be installed and notify the Engineer in writing if unsatisfactory conditions exist.
- B. 3-way manual transfer switch shall be installed as shown on the drawings and per the manufacturer's written instructions. In addition, the installation shall meet the requirements of local codes, the National Electrical Code and National Electrical Contractors Association's "Standard of Installation".
- C. Conduit entry into the 3-way manual transfer switch shall be by Contractor; Contractor shall furnish and install listed watertight conduit hubs, as manufactured by MYERS or T&B, for each conduit entry on the 3-way manual transfer switch. The incoming hub size shall match the conduit size for feeders and ground as shown on the drawings. The outgoing hub size shall match the conduit size for loads and ground as shown on the drawings. Hubs shall be properly installed and tightened to maintain Type 3R integrity of the 3-way manual transfer switch enclosure.
- D. Contractor shall terminate feeder conductors, load conductors and ground per the manufacturer's instructions. All field wiring terminations shall be torqued as required per the instructions on the 3-way manual transfer switch's power distribution blocks, circuit breakers & ground lugs.

3.02 Field Testing:

- A. Prior to energizing 3-way manual transfer switch, the Contractor shall perform the following checks and tests as a minimum:
 - 1. Verify mounting and connections are complete and secure.
 - 2. Verify internal components and wiring are secure.
 - 3. Perform continuity check of all circuits.
 - 4. Perform 1,000 VDC megger test on feeder and load cables. Prior to testing, all auxiliary circuits must be turned OFF and all fuses, microswitches and shunt trip circuits must be disconnected. It is required to take out the rating plug of any electronic trip circuit breakers while performing a megger (insulation) test.
 - 5. Verify deadfront is secure.
 - 6. With the 3-way manual transfer switch deadfront in place and the main access door closed and properly latched, actuate all (3) Operator Mechanisms; verify:
 - A). With the breaker controlling the connection between the permanent generator and the automatic transfer switch (ATS) in the "ON" position, the breaker controlling the connection between permanent generator and the load bank can be turned to the "ON" and "OFF" position and the breaker controlling the connection between the

portable generator and the automatic transfer switch cannot be turned "ON"

- B) With the breaker controlling the connection between the permanent generator and the automatic transfer switch (ATS) in the "OFF" position, the other (2) breakers controlling the connection between the permanent generator and load bank can be turned "ON" or "OFF", and the breaker controlling the connection between the portable generator and the automatic transfer switch can be turned "ON" and "OFF"
 - C) With the breaker controlling the connection between the portable generator and the automatic transfer switch (ATS) in the "ON" position, the breaker controlling the connection between the permanent generator and the automatic transfer switch (ATS) cannot be turned "ON" and the breaker controlling the connection between the permanent generator and load bank can be turned "ON" and "OFF".
- 7. Confirm operation of the 3-way manual transfer switch ground receptacle by attaching a plug to the 3-way manual transfer switch ground receptacle and then verify that the plug is grounded to the facility ground.
 - 8. Once normal power has been applied, confirm operation of 3-way manual transfer switch by following directions on main access door.

End of Section