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Document Title:

Three Phase Solid Dielectric Multi Way Modular Switchgear & Interrupter

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Related/Referenced Documents

N/A

Version History

Version	Date	Revision
01	Jan. 13, 2023	Initial release.
02	Mar. 20, 2023	Revision #1. Switchgear configuration and specification revision. Change to a basic external control ready switchgear unit. External control option removed. Modular connector kit added. Warehouse catalog number added.
03	May. 12, 2025	General format modifications, TOC updated, Sections 3, 4, 8, and 9 modified, and section order rearranged. New items added (032-85778, 032-85779, 032-86779, 032-86780 and 032-86781).

Warehouse Catalog #	Asset Suite #	Version	Date
032-84478	84478	3	05/12/2025
032-84479	84479	3	05/12/2025
032-84480	84480	3	05/12/2025
032-84481	84481	3	05/12/2025
032-85778	85778	1	05/12/2025
032-85779	85779	1	05/12/2025
032-86779	86779	1	05/12/2025
032-86780	86780	1	05/12/2025

1. Introduction

This is a general specification that covers the minimum requirements for the Three Phase Solid Dielectric Multi Way Modular Switchgear & Interrupter to be used in the distribution system in Puerto Rico. Further information will be provided by LUMA Energy at the time of order placement and will provide information on site specific conditions, quantity, and other requirements. This document includes the general electrical and mechanical characteristics of the material.

2. Special Requirements

2.1. Samples shall be furnished as requested by LUMA Energy. All documented testing required by applicable specifications and standards shall be submitted with product samples, including mechanical and electrical drawings, prior to approval. Vendors that have supplied this material to LUMA on previous orders will not have to furnish samples at bid opening. If any material or design changes were made to an approved product, it must be re-submitted to the Material Specification engineer for approval before shipping.

2.2. The product shall be furnished as described here in this specification or as amended by the purchase order. Any changes or updates to the Supplier's procedures, quality routines, and/or inspection layout shall be liable for all costs incurred for a product that is refused or rejected.

2.3. Upon inspection of incoming equipment/material, the purchaser reserves the right to refuse product shipments and to determine the acceptability or rejection of product received. The Supplier shall be liable for all costs incurred for a product that is refused/rejected.

2.4. All equipment/materials shall be warranted for a period of one year from date of installation or 18 months from the date of shipment or whichever comes first, against material defects and workmanship. The warranty shall include parts and labor to repair the defective component at the supplier's facility. The supplier also warrants that all equipment and materials supplied there under are new.

2.5. The equipment/material will be received at the LUMA's general warehouse (011) at Palo Seco, Puerto Rico. Shipping will include transportation and unloading at the indicated warehouse.

3. Literature

3.1. Descriptive and technical literature must be supplied by the vendor at time of bidding. This literature must include, but is not limited to, details of material, drawings, documented testing, and instructions for use and installation. **The literature must be an official document from and certified by the manufacturer.** Failure to submit documents on time and duly certified by the manufacturer will cause bidder disqualification.

3.2. If required by LUMA, final drawings and documentation shall be submitted by the vendor before the manufacturing and shipping process for approval.

4. Compatible with

4.1. For compatible manufacturer and model see Table 1. These models are examples of the equipment/material described in this document and do not represent a preference. LUMA will evaluate equally any model not listed here during any acquisition event.

4.2. Complementary parts (Items 2 to 8) must be compatible with the main equipment (Item 1) already in Luma's inventory. Luma reserves the right to accept or reject the proposed materials based on the items' compatibility.

5. Markings

5.1. Containers shall be marked outside with LUMA Energy's purchase order and item number.

5.2. Individual package(s) shall be clearly marked with manufacturer name and item information (part number, serial number, quantity, etc.). Packaging labels and tags shall be waterproof.

5.3. Transformers shall be marked on the cover with the point of delivery (district) and purchase order number using a label.

5.4. Packaging labels and tags shall be waterproof.

6. Packaging

6.1. All equipment/material shall be packaged and marked in such a way as to facilitate handling and protection from damage and that the receiving warehouse can readily identify it and send it, in one complete unit, to a field location without opening crates or boxes to sort items and/or parts.

6.2. A list of all parts included in the container and/or package must be provided at the time of delivery so that the receiving personnel can verify that everything requested is present, avoiding any delay in the receiving process.

6.3. Each unit shall be banded to a two-way entry, disposable pallet, or crate of the manufacturer's own design. The pallet/crate shall be of such dimensions as to provide a minimum of one inch (1") clearance at the transformers widest outside measurements, on all four sides. It shall provide a minimum of two and a half inches (2 1/2") of fork under clearance.

6.4. The transformer shall be banded to the pallet or crate, using non-metallic banding, to prevent rust and shifting of the unit during transit, while allowing the unit to be handed by sling or fork truck without removing the banding.

6.5. LUMA Energy shall allow the use of metallic banding ONLY if the transformer surface is protected from band contact.

7. Number Per Package (Logistics)

7.1. The supplier shall indicate the logistics regarding the opening bid or as required by LUMA Energy, as outlined in Table 1, or as otherwise specified by LUMA.

7.2. Standard package: One (1) unit per pallet or as requested by LUMA.

7.3. All parts and accessories shall be contained inside the package or box.

8. Acceptance Criteria

8.1. Tests required shall be certified by qualified external laboratories.

8.2. Product shall be manufactured in accordance with the latest issue below (section 8.3). When conflicts occur between the purchaser's specifications and the latest issue below, the purchaser's specification shall prevail.

8.3. Latest applicable codes, standards, and other regulations:

a. IEEE/IEC C37.60: for high-voltage switchgear and controlgear - part 111: automatic circuit reclosers and fault interrupters for alternating current systems up to 38 kV.
b. IEEE C37.74: requirements for subsurface, vault, and pad-mounted load-interrupter switchgear and fused load-interrupter switchgear for alternating current systems up to 38 kV.
c. IEEE 386: for separable insulated connector systems for power distribution systems rated 2.5 kV through 35 kV.
d. IEC 60529 (IP Ratings): rate and grade the resistance of enclosures of electric and electronic devices against the intrusion of dust and liquids.
e. IEC 62271: High-voltage switchgear and controlgear.
f. ANSI Z535: for safety signs and colors.

8.4. If any other standards different from the ones indicated in this document are used, the supplier must provide information showing compatibility with the required ones.

9. Description

9.1. The three-phase, solid dielectric, 4-way, modular switchgear, called hereafter the unit, is a sectionalizing device installed in distribution system primary feeders to interconnect other primary feeders, create branch feeders, lateral circuits, and tap off three-phase primary service laterals to energize customer's facilities. Table 1 also provides the switch & interrupter rack setup and module components for this configuration.

9.2. The unit shall be capable of providing manual switching and fault protection for underground distribution systems.

9.3. The unit and all its components must be subsurface submersible style designed to be installed in manholes subject to periodic flooding.

9.4. The unit shall be dead-front and must be operable without exposure to high voltage.

9.5. The unit shall be a modular design in which the components can be entered into a manhole through a 42" (106.7 cm) diameter round cover.

9.6. The components of the unit shall be interchangeable, upgradable, field configurable, and able to be installed in any orientation.

9.7. The unit shall consist of two (2) three phases solid dielectric vacuum switches and two (2) three phases solid dielectric vacuum interrupters mounted onto a common molded bus system to conform a four (4) ways switchgear (two (2) loadbreak switch ways, and two (2) fault interrupter ways). All switches and interrupters shall be external control ready. This equipment shall come factory assembled on a free-standing, floor-mounted or wall-mounted frame.

9.8. All the unit exterior metallic parts, including the frame and hardware, shall be stainless steel 304 or 316 and must have grounding provisions that accept #2 AWG stranded wire.

9.9. The unit must allow the addition of three phases vacuum switches and interrupters for the integration of additional ways to existing switchgears.

9.10. The unit must be delivered with the following configuration:

a. Ways 1 and 4 must have loadbreak switches for source connection.

b. Ways 2 and 3 must have fault interrupters for load connection.

9.11. The default installation orientation of the unit will be with the operating mechanism up and the common molded bus down. Position indicator and warning labels shall be oriented to conform to the default installation orientation.

9.12. The unit's main bus on the common molded bus system must be made of copper or aluminum and must be designed to comply with the equipment's current rating. The bus system shall be completely shielded and insulated with EPDM rubber.

9.13. Primary connections on common molded bus system shall be made by 600 A deadbreak bushings and must conform to ANSI/IEEE Standard 386.

9.14. The common molded bus system shall include the 15 kV interconnection jumpers and end bushings insulating caps.

9.15. The switch shall be designed for front access to cables and operators.

9.16. Electrical characteristics:

a.	Continuous current per way:	600 A
b.	Asymmetrical momentary current:	20 kA minimum
c.	Symmetrical interrupting current:	12.5 kA minimum
d.	Operating voltage:	15 kV
e.	Maximum Operating Voltage:	17 kV
f.	Frequency:	60 Hz
g.	Basic insulation level:	95 kVBIL
h.	One Minute AC Withstand:	35 kV
i.	15 Minute DC Withstand:	53 kV

9.17. The assembled switchgear dimensions shall be:

a. Maximum Height: 76.5" (194.3 cm)

b. Maximum Width: 99.0" (251.5 cm)

c. Maximum Depth: 20.0" (50.8 cm)

9.18. Solid dielectric Vacuum Switches, Interrupters, and Operating Mechanism:

a. The solid dielectric vacuum switches must provide three-pole live switching of 600 A three-phase circuits and the solid dielectric vacuum fault interrupters shall provide 600 A three-pole load switching and fault interruption. Switches and interrupters must be rated for at least two thousand (2,000) operations.

b. Switches and interrupters shall consist of three vacuum bottles encapsulated with solid dielectric material and mechanically linked to a spring-assisted operating mechanism. The housing operating mechanism shall be stainless steel. The switch shall interrupt all load currents within the vacuum bottle.

c. The solid dielectric vacuum switches and interrupters must be suitable for manual and motor operation. Switches and interrupters must be compatible with motor operators and shall be external control ready.

d. Vacuum switches and interrupters must include three (3) parking stands located on the mechanism cover.

e. Switches and interrupters shall have one bronze clamp connector for grounding provision. This connector must accept #2 AWG stranded copper wire.

f. Vacuum switches and interrupters shall have viewing windows that provide a clear view of contact for the drive rod position.

g. A cover shall be provided for each viewing window. This cover must be hotstick-removable.

h. The viewing window must be at least 1.75" diameter (44.45 mm)

i. The primary connection on switches and interrupter shall be 600 A deadbreak type and must conform to ANSI/IEEE Standard 386.

j. The main interface shall be 600 A deadbreak bushing.

k. The end Interface shall be 600 A T-body for deadbreak connection.

l. The switches shall be a dead-front design. They must be fully sealed and submersible.

m. Manual opening and closing of the switch shall be via an operating handle. The handle must allow vertical or horizontal hotstick operation. The operating handle must be padlockable to prevent inadvertent operation.

n. The operating mechanism shall indicate the switch position, which shall be clearly visible from the normal operating position.

o. The switch shall be designed for long-term operation in the harshest environments. The interrupter design must be tested to IEC60529 and achieve a protection rating of IP68, subjected to a 10' (3.05 m) head of water pressure for 7 days.

p. Vacuum fault interrupters must contain self-powered electronic control packages with no need for batteries or external power. This control must be integral to the unit, not a separate control box. The electronic control shall monitor load and fault current on all three phases of the interrupter.

q. The fault interrupter must be field programable and must have a wide range selection of time-current characteristic curves and trip settings.

r. The vacuum fault interrupters control shall be accessible via a computer connection to view or modify settings. The equipment must include the PC interface cable and programing software.

s. When the user is connected to the fault interrupter, it must be able to see real-time currents, the number of overcurrent protection operations, current magnitude of the last trip, and the phase/ground fault targets.

t. The vacuum fault interrupter shall have a visual indicator to show when it is in tripped condition.

9.19. Modular connector kit:

a. The modular connector kit is used for the interconnection of modular switchgear ways (solid dielectric vacuum switches and solid dielectric vacuum interrupters) through the high voltage bus.
b. The modular connector kit must include the bus assembly (3 - 15 kV, 600 A jumpers with deadbreak connectors), connector plates, and hardware to join two switchgear module units.

9.20. Operating Motor

a. Motor to operate the switches and interrupters of the unit. Spring-energy, load-switching devices that make, carry, and interrupt load currents.
    1. The operating voltage shall be 120 V AC.
    2. The insulation must be made from molded EPDM rubber.
    3. Completely sealed and capable of being submerged.
    4. Parts that do not require maintenance and do not need gas or oil for operation.
    5. Functional temperature ranges from -40°C to +65°C.
    6. Submersible, corrosion-resistant, and fully shielded packaging for environmental protection.
b. There will be two motors as follows:
    1. Motor to be directly linked to the vacuum load break switch module of the **ABB MVS3-21-15-6E6 switchgear system.**
    2. Motor to be directly linked to the vacuum fault interrupter module of the **ABB MVI3-21-15-6E6 interrupter system.**

9.21. Labeling

a. The unit must be furnished with compliance hazard-alerting signs.
b. The unit shall be provided with a nameplate indicating the manufacturer's name, catalog number, model number, date of manufacture, and serial number.
c. Each unit of switchgear shall be provided with a ratings label indicating the following:
    1. Voltage rating

2. Main bus continuous current rating
3. Short-circuit rating
4. Load-interrupter switch ratings, including duty-cycle fault-closing and short-time.

10. Inspection

Upon inspection of incoming equipment/material, the purchaser reserves the right to refuse product shipments and to determine the acceptability or rejection of the product received. The supplier shall be liable for all costs incurred for a product that is rejected.

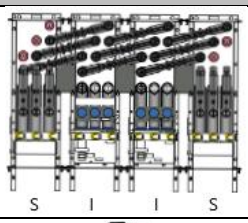
The acceptance of any equipment/material shall in no way relieve the vendor from his responsibility to meet all the requirements of this specification, and it would not prevent subsequent rejection if such equipment/materials were found later to be defective.

11. Proposal Information

11.1. Submitted proposals must include:

a. Technical information, drawings, and tests.
b. Table of Compliance completed by the bidder with reference (see Appendix 1).

Table 1: Warehouse and Asset Suite Identification Number.

Item	Description	Reference Image	Warehouse Catalog #	Asset Suite #	Compatible Manufacturer & Model	
1	Three-phase solid dielectric 4-way submersible modular switchgear, 15 kV, 600 A, 12.5 kA, external control ready, arrangement, without motor.		032-84478	84478	ABB	MS3142T2J66XXXFXE000-EC EC = External Control Ready all ways
2	Three-phase solid dielectric submersible vacuum switch module. 15 kV, 600 A, 12.5 kA, external control ready.		032-84479	84479	ABB	MVS3-21-15-6E6-EC
3	Three-phase solid dielectric submersible vacuum interrupter module. 15 kV, 600 A, 12.5 kA, external control ready.		032-84480	84480	ABB	MVI3-21-15-6E6-EC
4	Modular connector kit (Bus Assembly, Connector Plates, and Hardware) for 3Ø, 15 kV, 600A submersible switchgear.	N/A	032-84481	84481	ABB	STDCONNMODKIT
5	Three-phase solid dielectric submersible vacuum switch complete rack set up with and operating AC motor pre-assembled. 15 kV, 600 A, 12.5 kA, external control ready.		032-85778	85778	ABB	MV3121U1B66MXXEXEJMQ
6	Three-phase solid dielectric submersible vacuum interrupter complete rack set up and operating AC motor pre-assembled. 15 kV, 600 A, 12.5 kA, external control ready.		032-85779	85779	ABB	MV3121R1B66IXXEXEJMP
7	Motor Linkage Kit for Switch: 120VAC		032-86779	86779	ABB	MO3-120A-MVS
8	Motor Linkage Kit for Interrupter: 120VAC		032-86780	86780	ABB	MO3-120A-MVI

—End of Specification —

Appendix

Appendix 1: Table of Compliance

Line	Description	Pass/Fail	Comments
1	Compliance with the document 4350.280.		
2	Industry Standards: IEEE/IEC C37.60, IEEE (C37.74, 386), IEC (60529, 62271), and ANSI Z535.		
3	Technical info., tests, and drawings provided.		
4	3Ø Multi-Way Modular Switchgear		
5	Solid dielectric vacuum switch		
6	Operating Mechanism: Stainless Steel 304		
7	Mounting Frame, External Parts & Hardware: Stainless Steel 304 or 316		
8	Main Bus: Copper or Aluminum		
9	Type: dead front, modular, and submersible.		
10	Switch gear components can be entered into a 42” manhole round opening.		
11	Components: interchangeable, upgradable, field configurable, and able to be installed in any orientation.		
12	Factory assembled and ready for automation, data reporting, and external control.		
13	The bus system is completely shielded and insulated with EPDM rubber.		
14	4-Way Arrangement: 1 & 4 - Switches, 2 & 3 - Interrupters		
15	Primary Connections: 600 A deadbreak bushings, IEEE 386 compliance.		
16	15 kV modules interconnection jumpers and end bushings insulating caps included.		
17	The frame must have grounding provisions to accept #2 AWG stranded wire.		
18	Electrical requirements as per Section 9.16.		
19	Assembled Switchgear Dimensions as per Section 9.17.		

20	Switches and interrupters suitable for manual and motor operation.		
21	Switches and Interrupters shall be external control ready.		
22	Switches, Interrupters, and Operating Mechanism as per Section 9.18.		
23	Modular Connector Kit: bus assembly (3 x 15kV, 600A jumpers with deadbreak connectors), connector plates, and hardware to join two switchgear units included.		
24	Operating motor as per Section 9.20.		
25	Labeling as per Section 9.21.		

NOTE: This table is only a checklist for reference. The compliance must be with the complete document. Filling out the table with "PASS" won't be accepted as a compliance without the technical information required to certify it.

4350.280 Three Phase Solid Dielectric Multi Way Modular Switchgear & Interrupter new v(5-7-25)

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