

# Appendix H - Explanation of Terms and Instructions for Data Preparation of NX-9H

## ISO New England Transmission Equipment Rating, Characteristic, and Operational Data

### Series Device

**Effective Date: January 25, 2021**

**Review By Date: January 25, 2023**

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## I. EQUIPMENT REQUIREMENTS

Data for all series reactive devices designated as part of the Bulk Electric System<sup>1</sup> (BES) or connecting to the New England Transmission System<sup>2</sup> at a voltage of 69 kV or greater shall be provided by the Transmission Owners and Market Participants who own the equipment.<sup>3</sup>

If a series reactive device cannot be switched in or out independently of the associated line, the impedance and rating information for the series reactive device may be combined with the line data and the combined total may be submitted on a single NX-9A form. On all new and revised NX-9A forms, if a series reactive device is combined with a line and reported on a single combined NX-9A form, the MP or TO shall update the Participant Equipment Notes field to indicate that the NX-9A form includes the series reactive device information.

Data for series reactive devices connected at voltages that are less than 69 kV may be required when ISO determines that the data is necessary for reliable operation of the New England Transmission System. When required by ISO, the TO or MP shall submit the data within thirty (30) calendar days of ISO's notification.

## II. GENERAL DATA INSTRUCTIONS

The NX-9H form provides for entry of both ISO and MP/TO data. ISO fields cannot be modified by the MP or TO. The MP or TO is responsible for providing data for all non-ISO fields via the NX Application.

The circuit number shall initially be entered by the MP or TO for new equipment and thereafter maintained by ISO.

Select the terminals that reflect the connection points of the equipment. Terminals are created and maintained by ISO. The user should contact the ISO NX-9 Administrator ([nx9admin@iso-ne.com](mailto:nx9admin@iso-ne.com)) if terminal additions or changes are needed.

To remove equipment from service, select the Remove Equipment From Service checkbox. Equipment is removed from service either when the equipment is retiring from service or if new forms are being submitted as a replacement due to a change in configuration.

To assist in completing the NX-9H form, completed sample NX-9H forms are attached (Examples 1, 2 and 3).

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<sup>1</sup> Bulk Electric System (BES) is defined in the NERC Glossary of Terms Used in NERC Reliability Standards.

<sup>2</sup> New England Transmission System is defined in the ISO Transmission, Markets, and Services Tariff, Section I.2.2.

<sup>3</sup> Generally, under Section I of Operating Procedure No. 16, data shall be provided by Transmission Owners (TOs) and Market Participants, *i.e.* Market Participants who own the equipment or Lead Market Participants for Generator Assets (collectively MPs).

### III. RATING DATA INSTRUCTIONS

Facility rating data shall be provided in MVA (rounded down to the nearest whole number) and in accordance with Planning Procedure 7, "Procedures for Determining and Implementing Transmission Facility Ratings in New England" (PP7). The definition of Thermal Ratings is described in PP7 Section 2.0 Collaborative Development of Rating Procedures. A facility rating shall equal the rating of the most limiting individual equipment.

The NX-9H form provides for entry of both summer (April 1 through October 31) and winter (November 1 through March 31) thermal ratings. The ambient temperature (reported in Fahrenheit) and wind speed (reported in feet per second) used to establish the normal ratings shall be entered for each rating set. If ratings for special conditions or configurations are added to the NX-9H form, comments that describe the associated circumstances for use of the special ratings are required. The MP or TO is also responsible for providing a statement as to the authority of ISO and the Local Control Center (LCC) for use and distribution of these special ratings.

### IV. CHARACTERISTIC AND OPERATIONAL DATA INSTRUCTIONS

Indicate the device type by selecting capacitor, inductor or reactor in the Device Type field.

Provide positive sequence impedance data in percent on a 100 MVA base. Impedance data provided shall represent the incremental impedance that is realized when the series device is in service. Impedance for the associated line will account for total impedance when the series device is out of service. Impedance on NX-9H forms shall be calculated and provided out to at least the 3<sup>rd</sup> decimal place.

R = resistance

X = reactance

### V. EXPLANATION OF DATA CHANGES

Any time an NX-9H form is modified or created, a brief description of the reason(s) for the entry shall be provided in the Revision Comments field. It will provide a written record of the change and clearly identify the equipment changes made in the field and/or other reasons that necessitated the update of the NX-9H form. For example: Rating changes due to replacement of switch XYZ.

This data is utilized by ISO in the NX-9H form review and approval process.

## VI. EQUIPMENT NOTES

The Equipment Notes field is used to provide explanations of data or other pertinent or operational information. For example: In the normal configuration, equipment is bypassed and out of service.

Fields are provided for both ISO and MP/TO notes. An additional private field is available to the MP or TO for internal notes that can be edited and viewed only by the MP or TO owning the record.

Equipment notes are carried forward when an NX-9H form is updated. MPs and TOs should review and modify or delete any MP or TO note that is no longer pertinent. ISO is responsible for maintaining ISO notes.

**EXAMPLE 1, NX-9H SERIES DEVICE-REACTOR**

**ISO New England Equipment Rating, Characteristic,  
and Operational Data Implementation Form  
Series Device (NX-9H)**

<b>Reference</b> 1502100001	<b>Participant ID</b> L123 Reactor
<b>Participant</b> Test Company	<b>ISO ID</b> L123_Reac
<b>Form State</b> Preliminary	<b>Ckt</b> 1
<b>Device Type</b> Reactor	<b>ISO EMS ID</b> L123_Reac
<b>Terminal A</b> Station1 115kV	<b>Bus #</b> 456789 <b>EMS</b> STATION1
<b>Terminal B</b> Station1 Series Reactor 115kV	<b>Bus #</b> 345678 <b>EMS</b> STATION1
<b>Nominal System Voltage (kV)</b> 115	

**Default Summer** 100 F

	<u>MVA</u>	<u>Limiting Device / Description</u>	<u>Location</u>
<b>Normal</b>	189	Conductor -	Substation1
<b>LTE</b>	217	Conductor -	Substation1
<b>STE</b>	283	Reactor -	Substation1
<b>DAL</b>	283	Reactor -	Substation1

**Default Winter** 50 F

	<u>MVA</u>	<u>Limiting Device / Description</u>	<u>Location</u>
<b>Normal</b>	202	Conductor -	Substation1
<b>LTE</b>	233	Conductor -	Substation1
<b>STE</b>	283	Reactor -	Substation1
<b>DAL</b>	283	Reactor -	Substation1

**Impedance Data (%) (100 MVA Base)**

R 0.024 X 2.956

**Revision Comments** Series Reactor Example - new equipment.

**Equipment Notes** Impedance reflects incremental impedance added when device is in service.  
Ratings include only the additional equipment in the path when the device is in service.

<b>Data Revision Number</b> 1	<b>Date Created</b> 02/10/2015	<b>Prepared By</b> Participant Username
<b>Requested Effective Date</b> 02/11/2015	<b>Date Received</b>	<b>Approved By</b>
<b>Actual Effective Date</b>	<b>ISO EMS Implementation Date</b>	

**EXAMPLE 2, NX-9H SERIES DEVICE-CAPACITOR**

**ISO New England Equipment Rating, Characteristic,  
and Operational Data Implementation Form  
Series Device (NX-9H)**

Reference 1502120001

ParticipantID L123 Series Capacitor

Participant Test Company

ISO ID L123\_SC

Form State Preliminary

Ckt 1

Device Type Capacitor

ISO EMS ID L123\_SC

Terminal A Station1 115kV

Bus # 456789 EMS STATION1

Terminal B Station1 Series Cap 115kV

Bus # 345678 EMS STATION1

Nominal System Voltage (kV) 115

Default Summer 100 F

	<u>MVA</u>	<u>Limiting Device / Description</u>	<u>Location</u>
Normal	217	Series Capacitor-	Substation1
LTE	217	Series Capacitor-	Substation1
STE	217	Series Capacitor-	Substation1
DAL	217	Series Capacitor-	Substation1

Default Winter 50 F

	<u>MVA</u>	<u>Limiting Device / Description</u>	<u>Location</u>
Normal	217	Series Capacitor-	Substation1
LTE	217	Series Capacitor-	Substation1
STE	217	Series Capacitor-	Substation1
DAL	217	Series Capacitor-	Substation1

**Impedance Data (%) (100 MVA Base)**

R 0 X -2.4

Revision Comments Install new series capacitor on line L123

Equipment Notes Impedance reflects incremental impedance added when device is in service.  
Ratings include only the additional equipment in the path when the device is in service.

Data Revision Number 2 Date Created 02/12/2015 PreparedBy ParticipantUsername

Requested Effective Date 02/13/2015 Date Received Approved By

Actual Effective Date ISO EMS Implementation Date

**EXAMPLE 3, NX-9H SERIES DEVICE-INDUCTOR**

**ISO New England Equipment Rating, Characteristic,  
and Operational Data Implementation Form  
Series Device (NX-9H)**

<b>Reference</b> 1502120002	<b>ParticipantID</b> L123 IND
<b>Participant</b> Test Company	<b>ISO ID</b> L123-1W
<b>Form State</b> Preliminary	<b>Ckt</b> 1
<b>Device Type</b> Inductor	<b>ISO EMS ID</b> L123-1W
<b>Terminal A</b> Station1 115kV	<b>Bus #</b> 456789 <b>EMS STATION1</b>
<b>Terminal B</b> Station1 Reactor 115kV	<b>Bus #</b> 654321 <b>EMS STATION1</b>
<b>Nominal System Voltage (kV)</b> 115	

**Default Summer** 100 F

	<u>MVA</u>	<u>Limiting Device / Description</u>	<u>Location</u>
Normal	525	Reactor-	Substation1
LTE	525	Reactor-	Substation1
STE	525	Reactor-	Substation1
DAL	525	Reactor-	Substation1

**Default Winter** 50 F

	<u>MVA</u>	<u>Limiting Device / Description</u>	<u>Location</u>
Normal	553	Reactor-	Substation1
LTE	553	Reactor-	Substation1
STE	553	Reactor-	Substation1
DAL	553	Reactor-	Substation1

**Impedance Data (%) (100 MVA Base)**

R 0.0115      X 2.05

**Revision Comments** New equipment installation

**Equipment Notes** Impedance reflects incremental impedance added when device is in service.  
Ratings include only the additional equipment in the path when the device is in service.

<b>Data Revision Number</b> 3	<b>Date Created</b> 02/12/2015	<b>PreparedBy</b> ParticipantUsername
<b>Requested Effective Date</b> 02/13/2015	<b>Date Received</b>	<b>Approved By</b>
<b>Actual Effective Date</b>	<b>ISO EMS Implementation Date</b>	

**VII. OP-16 APPENDIX H REVISION HISTORY**

**Document History** (This Document History documents action taken on the equivalent NEPOOL Procedure prior to the RTO Operations Date as well as revisions made to the ISO New England Procedure subsequent to the RTO Operations Date.)

Rev. No.	Date	Reason
Rev 0	11/06/15	Initial version
Rev 1	08/05/16	Globally all footers, added the required corporate document identity; Update equipment requirements to include BES equipment;
Rev 2	11/03/17	Biennial review by procedure owner; Globally, made editorial changes to be consistent with current practices and management expectations (e.g., grammar changes from "must" to "shall" and "which" to "that" as appropriate; and remove capitalization from non-defined terms; Add language allowing data for series reactive devices that cannot be operated independently to be combined with the associated line and reported on a single NX-9A form; Clarify circumstance for ISO to require reporting of equipment connected at voltages that are less than 69 kV is because it is needed for reliable operation of the New England Transmission System;
Rev 2.1	06/06/19	Annual review by procedure owner requiring no changes; Made administrative changes required to publish the Minor Revision;
Rev 2.2	01/25/21	Annual review by procedure owner requiring no changes; Made administrative changes required to publish the Minor Revision;