

# JRC SCIENTIFIC INFORMATION SYSTEMS AND DATABASES REPORT

## Distribution Network Models platform guideline

*2020 – Version 3*

Flammini, M.G., Grzanic, M., Prettico, G.,  
Cavestro, J., Vitiello, S.



**DiNeMo** (Distribution Network Models module)

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**Contact information**

Name: Giuseppe Prettico

Email: [giuseppe.prettico@ec.europa.eu](mailto:giuseppe.prettico@ec.europa.eu)

Tel.: +39 0332783675

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## **Abstract**

The Distribution Network Model (DiNeMo) is the collaborative platform where it is possible to model the electricity distribution grids of your community, city or region. This document provide a helpful guideline to the user.

DiNeMo homepage is hereby presented.

1. Log in into DiNeMo platform to perform Network Computation Request.

European Commission > JRC > Smart Electricity Systems and Interoperability > Maps & Tools

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**dinemø**

REGISTRATION LOG IN

Welcome to DiNeMo (Distribution Network Models), the collaborative platform where modelling the electricity distribution grids of your community, city or region is now possible. More than one hundred actors - from industry to academia, from government to regulation - started working with our representative models.

Don't miss out the opportunity to contribute to model and design the smart electricity systems of tomorrow!


[More info on DiNeMo](#) a.

- a. When clicking on "More info on DiNeMo" the following page appear.

<b>Researchers / Service Providers</b>	<b>Distribution System Operators</b>	<b>Software Developers</b>
Are you a researcher, a service provider, or an SME active in the power sector? If the answer is yes, then <a href="#">DiNeMo</a> can help you get the network models of the area you are working on. As a result of your network computation request, several types of files will be provided as output of <a href="#">DiNeMo</a> (XLS, GIS, <a href="#">MatPower</a> , PNG) directly downloadable.	Are you Distribution System (or Network) Operator? If the answer is yes, then <a href="#">DiNeMo</a> can help you get the optimal distribution grid network of the area you are working on or just interested in. Researchers might need your help to validate their network models in the area in which you operate. Why not helping them on having more reliable distribution grid models?	Are you a Software Developer and you like the <a href="#">DiNeMo</a> project? If the answer is yes, why don't you help us to develop new features that other user might find very important for their daily work? Your work will be acknowledged and you will take an active role in the <a href="#">DiNeMo</a> community. We use mainly Python language for the open part of the platform.

To make a New Network Computation Request on DiNeMo homepage:

1. Click on add new Network Computation Request;
- a. Search within all the Network Computation Request elaborated and published by the authors;
- b. Visualize all the Network Computation Request you have elaborated;
- c. Create a new City Project (coming soon, only view mode is currently available)

**DiNeMo (Distribution Network Models)**ses\_guest\_user


Dear **ses\_guest\_user**

Welcome on your **Dashboard** page. From here you can:

- Create a new distribution grid model by starting a new **Network Computation Request**;
- Collaborate on a **City Project** in which other users have shared their grid models;
- Search for previous **Network Computation Request** or new **City Projects** to join.

### NETWORK COMPUTATION


Network 1	PROCESSED
Venezia	DRAFT
Roma	PROCESSED
<input type="button" value="SEE ALL"/>	






add new  
**NETWORK  
COMPUTATION  
REQUEST**

### CITY PROJECT

Network 1	PROCESSED
Venezia	DRAFT
Roma	PROCESSED
<input type="button" value="SEE ALL"/>	



add new  
**CITY PROJECT**




After adding the New Network Computation Request:

1. Enter the title of New Network Computation Request (mandatory);
2. Click on next to save the title and proceed.

The remaining buttons have the following meanings:

- a. Save as a draft the title and move to your network computation request lists;
- b. Cancel the title and go back to the dashboard.

 **DiNeMo (Distribution Network Models)** ses\_guest\_user

a.




2.

b.

EDIT NETWORK COMPUTATION REQUEST


Title \*

Network 1 1.

If you process on save as draft, you will visualize the dashboard with all the Network Computation Request.


- a. Create a new Network Computation Request;
- b. Visualize the summary of the input parameters, such as parameters, settings;
- c. Edit the parameter in order to complete Venezia Network Computation Request;
- d. Visualize the results of the elaboration;
- e. Delete the Network Computation Request;
- f. Create or Show a City Project



**DiNeMo (Distribution Network Models)**

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[< GO BACK](#)



### MY NETWORK COMPUTATION REQUESTS


Title	Created at	Last update	Status	City Project	Completion	Actions
<a href="#">Network 1</a>	2020-01-30 10:10:26	2020-01-30 15:11:04	PROCESSED			<div style="display: flex; gap: 10px;"> <div style="border: 2px solid green; padding: 2px;">b.</div> <div style="border: 2px solid green; padding: 2px;">f.</div> </div>
<a href="#">Venezia</a>	2020-01-30 10:05:46	2020-01-30 10:05:46	DRAFT		<div style="display: flex; align-items: center;"> <div style="background-color: #007bff; color: white; padding: 2px 5px; font-weight: bold;">25%</div> <div style="flex-grow: 1; border: 1px solid #ccc; margin-left: 5px;"></div> </div>	<div style="display: flex; gap: 10px;"> <div style="border: 2px solid green; padding: 2px;">c.</div> <div style="border: 2px solid green; padding: 2px;">e.</div> </div>
<a href="#">Roma</a>	2020-01-28 10:30:43	2020-01-28 10:45:57	PROCESSED	✓		<div style="display: flex; gap: 10px;"> <div style="border: 2px solid green; padding: 2px;">d.</div> </div>

After saving the title of New Network Computation Request and clicked on next, the following page will appear where you can search the area of interest. The steps to following in this section are:


1. Enter the name of the area of interest;
2. Press search.

The remaining buttons have the following meanings:

- a. Go back to enter a different title for the Network Computation Request;
- b. Save as draft the current project;
- c. Proceed to the next page where you will be able to set the technical parameter (first it is necessary to select an area of interest);
- d. Cancel the current project and go back you network computation request;
- e. DiNeMo platform is informing you that the title of your project is stored.


 The Network Computation Request (Network 1) has been added.


e.


 **DiNeMo (Distribution Network Models)** ses\_guest\_user


**NETWORK 1**

DRAFT Created on 2020-01-30 10:10:26

a. 

b. 

c. 

d. 

1. Search in the map. **Use the default zoom 16.**  
The **first** step is to indicate the area you want to process through the platform.

Milano

1.

SEARCH

2.



From the proposed Search results, choose the one representing your area of interest:

1. Select within the proposed area found with the name typed.

The remaining buttons have the following meanings:

- a.. Search again for a new area of interest.

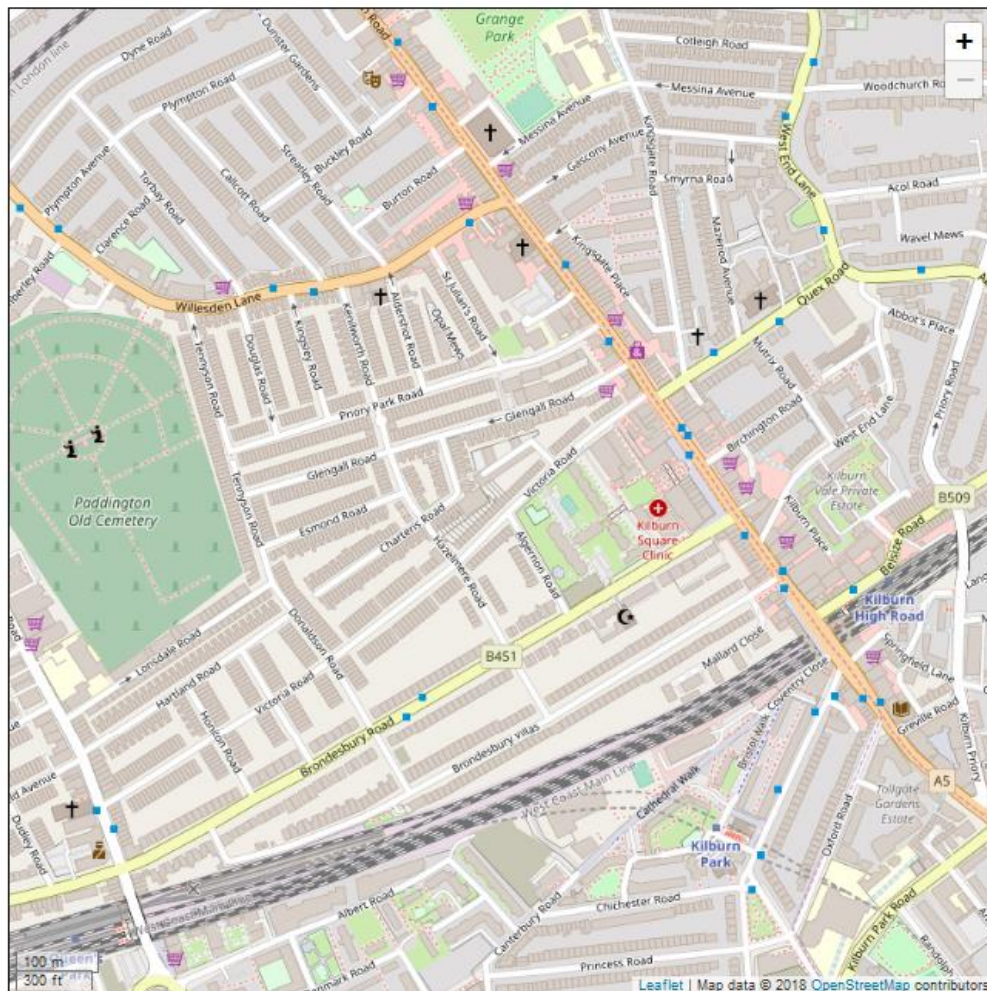
SEARCH

a.

Search results:

- [Milan, Lombardy, Italy](#)
- [El Milano, Comarca de Vitigudino, Salamanca, Castile and León, Spain](#)
- [Milano, Milam County, Texas, 76556, United States of America](#)
- [Milano, Spolète, Perugia, Umbria, 06049, Italy](#)
- [Milan, Lombardy, Italy](#)

1.



1. Search and navigate through the map below to fit the area of interest;
2. Press Capture button to save the image of the area.

a.. Search again for a new area of interest.

1.



After pressing the Capture button, a notification will appear “The map has been captured and saved on the server”. On the following screen you need to:

- 1 Click on next to proceed to the page where you will be able to locate the substation.

The remaining buttons have the following meanings:

- a. Save the latitude of the area of interest;
- b. Save the longitude of the area of interest;
- c. Save the zoom level according to OpenStreetMap settings;
- d. Save the top left X coordinates of the map in Universal Transverse Mercator (UTM);
- e. Save the top left Y coordinates of the map in Universal Transverse Mercator (UTM).

< GO BACK

SAVE DRAFT

NEXT 1.

CANCEL

1. Search in the map. **Use the default zoom 16.**  
The **first** step is to indicate the area you want to process through the platform.

Milano

SEARCH

Search results:

- [Milan, Lombardy, Italy](#)
- [El Milano, Comarca de Vitigudino, Salamanca, Castile and León, Spain](#)
- [Milano, Milam County, Texas, 76556, United States of America](#)
- [Milano, Spolète, Perugia, Umbria, 06049, Italy](#)
- [Milan, Lombardy, Italy](#)

2. Capture the image. The **second** step is to capture the image needed for processing, click on the capture button.

CAPTURE

Coordinates of the centre of the map

a. Latitude  
45.461350

b. Longitude  
9.159508

c. Zoom Level  
16

Coordinates of the top left corner

d. TOPLEFT X  
511.7981

e. TOPLEFT Y  
5034.8824



After clicking on next the following page will appear where a summary of the information saved are provided.

- a. The map of the Network Computation Request named Network 1 has been updated;
- b. This box provided information concerning the map image, latitude, longitude, country, zoom level and the scale that will be used for further calculation.

The map for the Network Computation Request (Network 1) has been updated.

a.

**DiNeMo (Distribution Network Models)**

ses\_guest\_user

NETWORK 1

DRAFT

Created on 2020-01-30 10:10:26

< GO BACK

SAVE DRAFT

NEXT

b.

CANCEL

Show the information about the map inserted

The image zoom with a click on the image

Latitude

45.461350

Longitude

9.159508

Country

Italy

Zoom Level

16

Scale  
(pixels/meter)

1.673685

BoundingBox

A bounding box is an area defined by two longitudes and two latitudes.

Latitude

45.455330

45.467369

Longitude

9.150925

9.168091

1. Search and navigate through the map and click where you want to locate the HV/MV substation. In case you do not know where to locate it, the platform will set it in the middle of the map;
2. Transform the coordinates of the substation into UTM, and click on next in top part of the page to proceed.

HV/MV Substation Location

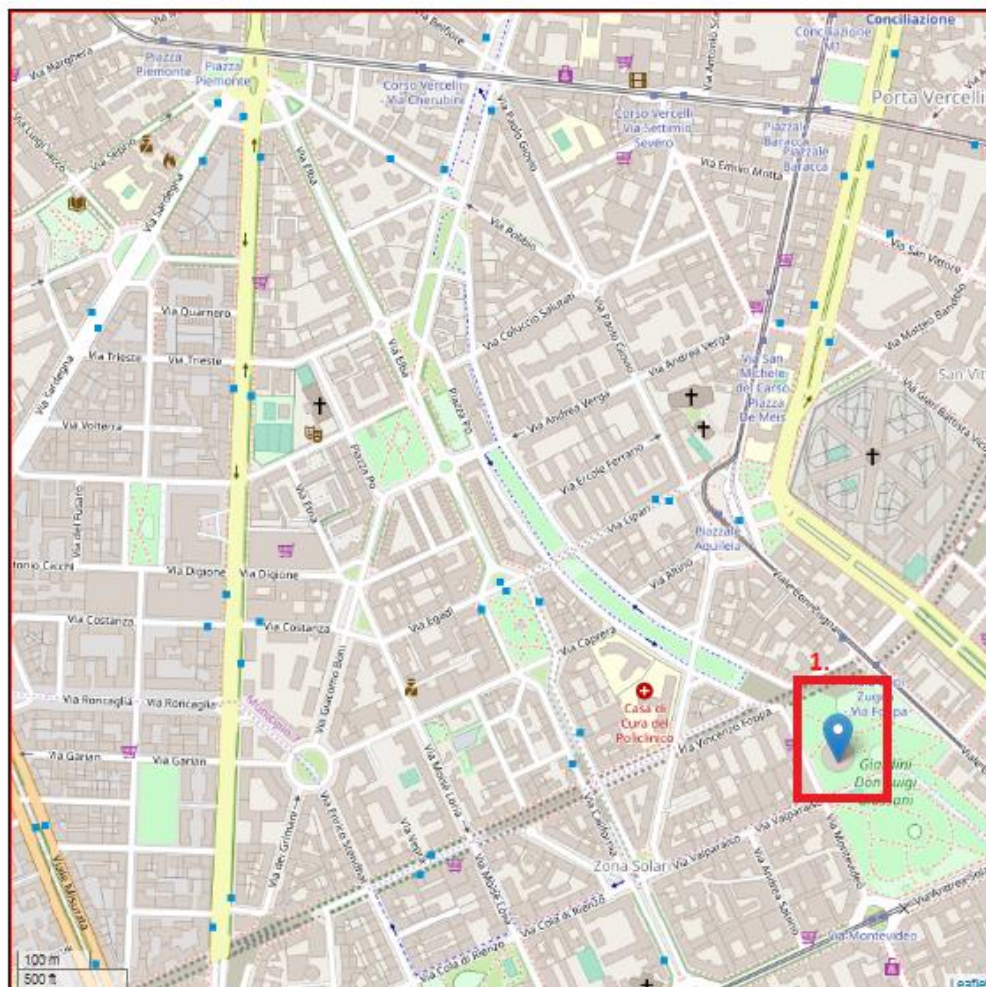
45.458164

9.165354

2.

512.9281

5033.8620



After clicking on next, thus having selected the location of the HV/MV substation, the following page will appear where you need:

1. Set the HV and MV voltage levels parameters according to your network characteristics. The options of HV and MV depends on the country that you select. The LV level is locked to 0.4 kV as it is the most used in all Europe;
2. Set the demand parameters, thus the power factor, the maximum demand of MV voltage consumers, the maximum demand of LV consumers, and the density of metering points per km<sup>2</sup>;
3. Enter the numbers of metering points per building, and the frequency to find the number of metering points (%). The sum of probabilities of consumers per building must be 100%.

< GO BACK
SAVE DRAFT
NEXT
CANCEL

1.

### Parameters

#### Voltage Levels



High voltage \*

132  
(kV)



Medium voltage \*

20  
(kV)



Low voltage

0.40  
(kV)

2.

#### Demand



Power factor \*

0.95  
[0.00-1.00]



Maximum demand of MV \*

100  
(kW)



Maximum demand of LV \*

8.8  
(kW)



Density of metering points \*

2000  
(nr/km<sup>2</sup>)

#### Number of metering points per building

0 0 0 0

#### Frequency to find the number of metering points stated above (%)

0.00 0.00 0.00 0.00

3.

In the same parameter page, the user is able to:

1. Change lower and upper limit of MV/LV substation;
2. Check the overhead lines and underground cables characteristics according to chosen voltage level;
3. Check transformer characteristics according to chosen voltage level.

#### Substation features \*

<b>Transformation capacity of MV/LV substations (upper limits in kVA) *</b> <input type="text" value="1000"/>	<b>Transformation capacity of MV/LV substations (lower limits in kVA) *</b> <input type="text" value="400"/>
--	---

#### ▼ Lines, Cables, Transformers

2.	Type	Classification	R (ohms/km)	X (ohms/km)	Ampacity (A)	Voltage (kV)
	OVERHEAD	LV_IA_1	0.27	0.25	271	0.40
	OVERHEAD	LV_IA_2	0.32	0.08	228	0.40
	OVERHEAD	MV_A_1	0.29	0.34	325	20.00
	OVERHEAD	MV_A_2	0.60	0.36	205	20.00
	UNDERGROUND	LV_US_1	0.09	0.07	420	0.40
	UNDERGROUND	LV_US_2	0.16	0.07	320	0.40
	UNDERGROUND	MV_S_1	0.13	0.11	472	20.00
	UNDERGROUND	MV_S_2	0.56	0.13	211	20.00

3.	Type	Classification	Capacity (kVA)	Secondary voltage (kV)	No load losses (kW)	Load losses (kW)
	INTERURBAN	CT_C_06	400	0.40	0.92	7.97
	INTERURBAN	CT_C_07	630	0.40	1.00	11.24
	INTERURBAN	SEI10	80000	20.00	47.00	0.61
	INTERURBAN	SEI12	120000	20.00	71.00	0.90
	INTERURBAN	SEI3	20000	20.00	16.00	0.19
	INTERURBAN	SEI5	40000	20.00	33.00	0.38
	URBAN	CT_LS_06	400	0.40	0.92	7.97
	URBAN	CT_LS_07	630	0.40	1.00	11.24
	URBAN	CT_L_08	1000	0.40	1.70	18.19
	URBAN	SEU10	80000	20.00	47.00	0.61
	URBAN	SEU12	120000	20.00	71.00	0.90
	URBAN	SEU3	20000	20.00	16.00	0.19
	URBAN	SEU5	40000	20.00	33.00	0.38

If you proceed with the Network Computation Request by clicking the following page will open where you can:

1. Select or unselect all categories you would like to keep at the end of the DiNeMo elaboration or, select specific categories from the list you would like to keep at the end of the DiNeMo elaboration and;
2. Click on Finish to complete the Network Computation Request process.

The remaining buttons have the following meanings:

- a. The parameters of the Network Computation Request named Network 1 has been updated.

The parameters for the Network Computation Request (Network 1) has been updated.

a.

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ses\_guest\_user

DRAFT

Created on **2020-01-30 10:10:26**

< GO BACK

**FINISH** 2.

CANCEL

Select for each category the information you would like to keep at the end of the DiNeMo elaboration.

**Select / Unselect all** 1.

**Consumers**  
☐ Consumer (Excel)  
☐ Customers (Image)  
☐ Consumer (ESRI)  
☐ Consumer (dBase)

**Distribution Lines**  
☐ ElectricalLines (ESRI)  
☐ ElectricalLines (dBase)  
☐ ElectricalLines (Excel)

**Mat Power**  
☐ Matpower RNM Network  
☐ Matpower Prot  
☐ Matpower Bus  
☐ Matpower Branch

**Network Image**  
☐ Network (Image)

**HV/MV Substation**  
☐ HVMV Substation (ESRI)  
☐ HVMV Substation (dBase)  
☐ HVMV Substation (Excel)

**MV/LV Substation**  
☐ MVLV Substation (ESRI)  
☐ MVLV Substation (dBase)  
☐ MVLV Substation (Excel)

**Switching Devices**  
☐ SwitchingDevices (ESRI)  
☐ SwitchingDevices (dBase)  
☐ SwitchingDevices (Excel)

**Summary**  
☐ Summary




After saving, the information you would like to keep at the end of DiNeMo elaboration, in the following page you can check that you have entered all requested parameters (100%).

1. Submit the Network Computation Request.

The remaining buttons have the following meanings:

- a. The settings of the Network Computation Request named Network 1 has been updated;
- b. Edit the Network Computation Request parameters, settings, etc.

✓ The settings for the Network Computation Request (Network 1) has been updated. a.



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< GO BACK

EDIT b.


SUBMIT 1.

**NETWORK 1**

DRAFT

Created on **2020-01-30 10:10:26**

Map



Country

**Italy**

---

Coordinates of the centre of the map

Latitude	Longitude	Zoom
45.461350	9.159508	16

Coordinates of the top-left corner (km)

X	Y
511.798100	5,034.882400

Coordinates of the HM/MV Substation

Latitude	Longitude
45.458164	9.165354


HM/MV Substation Location (Km)

X	Y
512.928100	5,033.862000

After choosing to submit the Network Computation Request, you will be asked for the last time if you want to submit or cancel. Please keep in mind that after clicking the Submit button, you will not be able to change Network Computation Request any more.

#### What's next?

1. Once you have submitted the Network Computation Request successfully (status QUEUED), you need to wait for the request being processed.

 **DiNeMo (Distribution Network Models)** ses\_guest\_user

---

### NETWORK 1

Are you sure you want to submit *Network 1*?


Once you submit, you will no longer be able to change this Network Computation Request.  
**This action cannot be undone.**

1.

Submit [Cancel](#)

Once the request is successfully processed, you can:

1. View Results of elaboration;
  - a. Verify that the Network Computation Request has been properly processed;
  - b. View Log of the elaboration.

 **DiNeMo (Distribution Network Models)** ses\_guest\_user


< GO BACK b. 1. LOGS RESULTS

---

PROCESSED a.

**NETWORK 1**  
Created on **2020-01-28 10:30:43**  
Elaborated on **2020-01-28 10:45:57**

If you choose to view Log of the elaboration, the following page will show that all requests have been successfully processed:

**DiNeMo (Distribution Network Models)**ses\_guest\_user

[Go back](#)

**NETWORK 1**  
**PROCESSED**  
Created on **2020-01-30 10:10:26**  
Elaborated on **2020-01-30 15:11:04**

List of view log

Event Date	Status	Message
2020-01-30 15:06:56	SUCCESS	Input image successfully moved!
2020-01-30 15:06:56	SUCCESS	Create catalog.csv file successful!
2020-01-30 15:09:56	SUCCESS	Input image successfully moved!
2020-01-30 15:06:56	SUCCESS	Input image successfully generated by Python Module!

If you choose to view Results of elaboration, on the following page you can download the selected result file by clicking on the icon in the box:

NETWORK 1

PROCESSED

















Created on **2020-01-28 10:30:43**

Elaborated on **2020-01-28 10:45:57**

#### Preview of processed files

If you want to get all files, you need to download the .zip file.

[Download all the results via zip](#)

Name	Description	Preview file
Consumers	This section contains information regarding low voltage and medium voltage consumers.	  
Distribution Lines	This section contains information regarding the resistance, reactance and length of conductors.	 
Mat Power	This section contains information regarding the branches and buses of the distribution lines (length, active, reactive power, etc.).	  
Network Image	This section contains the image results of the DiNeMo elaboration.	
HV/MV Substation	This section contains information regarding the transformer ratio and capacity.	 
MV/LV Substation	This section contains information regarding the transformer ratio and capacity.	 
Switching Devices	This section contains information regarding fuse, breakers and switchers.	 
Summary		

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