

Voltage Limits

New eDART web-based functionality to allow Transmission Owners (TOs) to update and view current voltage limits on buses.

- Available via the TERM Main Menu.
- TOs submit changes to Voltage Limits: company defaults or per station/voltage combination with effective date.
- PJM approves changes to Voltage Limits.
- Tickets implemented in PJM's EMS by PJM or implemented without approval if limits already updated in PJM's EMS.
- Report for PJM & TOs to see effective voltage limits and PJM defaults.

- Initial Voltage Limits in eDART will be populated with data in PJM Manual 03.
- New stations will be assigned the company default limits as part of the model build.
- eDART Voltage Limits only includes companies and stations with PJM monitored equipment:
 - MP1: Reliability & Markets
 - MP2: Reliability BES
 - MP6: Reliability non-BES

- **Company**
 - Voltage Limits per Voltage level.
 - Company Voltage Limits will be applied to all Stations in the company per voltage level.
 - Station tickets can be created for exceptions.
- **Station**
 - Voltage Limits per Station per Voltage level
 - Not needed if following Company defaults.

- **Submitted**
 - Ticket has been submitted to PJM
- **Received**
 - Acknowledgement that PJM received the ticket
 - Changes to Received ticket will result in status change to Submitted
- **Approved**
 - Ticket has been reviewed, accepted as valid & approved by PJM

- **Implemented**
 - Data from approved ticket has been reconciled in PJM EMS
 - Actual Start Date confirms that ticket is in use by EMS
- **Implemented w/o Approval**
 - Data from non-approved ticket has been reconciled in PJM EMS
 - Ticket was automatically generated based on PJM EMS data
 - Actual Start Date confirms that ticket is in use by PJM EMS
- **Cancelled by Company/PJM Admin Closure**
 - Ticket can be cancelled by PJM or TO for various reasons

- **Restored**
 - Station ticket status for restoring station limits to company limits
- **Restored w/o approval**
 - Station ticket status when station limits from PJM EMS matches company limits without ticket being approved.
- **Completed**
 - The ticket is completed due to a new implemented ticket
 - Actual End Date confirms that ticket is no longer in use by PJM EMS

- **Retired**
 - Ticket is for station that has been retired or company that is longer a part of Voltage Limits
 - PJM is no longer monitoring company or station

TERM Main Menu

Create New Ticket View/Revise Tickets Effective Ratings
Bulk Upload Historical Bulk Report

TERM Reports

Status Reports Recently Restored History Report
Expiring Temp. Tickets Unrated Facilities Equip. Historical Change Log

Submitted Tickets

Submitted: 1/1 Revised: 0/0 Received: 1/2

Approved Tickets

(Temporary) Approved: 0/4 Implemented: 2100/46
(Permanent) Approved: 0/0 Implemented: 4925/1363

Base Data

Adjust R, X, B Adj. Tariff Data R, X, B Adjust Report
Adj. Tariff Data Report Annual Tariff Review

R, X, B Adjustment Monitored Status
Submitted: 10/7 Submitted: 0

Voltage Limits

Create New Ticket View/Revise Tickets Effective Limits
Implemented w/o Approval Late Tickets Back to PJM Defaults
PJM Default Limits Overview Report

Red buttons indicate attention required

- To create a company limits ticket, select Voltage and leave station as **** ALL ****.
 - Adj. limits is prepopulated with Initial Company limits; user can edit fields as needed
- To follow PJM defaults, check the Follow PJM Defaults box.

New Voltage Limits Ticket

Ticket ID: New Company: Voltage: 230 KV Station: **** ALL ****

Est. Start: Follow PJM Defaults: Ticket Status: Submitted

Date (MM/DD/YYYY)

Comments:

PJM Comments:

By default, PJM does not monitor/control to Emergency High voltage limits unless there exists separation between the Normal High (NH) and Emergency High (EH).

- If EH = NH, the PJM equipment owner is indicating that no EH rating exists and effectively PJM ignores the EH limit. EH = NH are leveraged to support trending of exceedances prior to Load Dump (LD) rating.
- If EH > NH, the EH will be processed / controlled.

	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop Warning (%)	Voltage Drop Limit (%)
	Low	High	Low	High			
Initial PJM	218.5	241.5	211.6	241.5	207.0	5.0	8.0
Initial Company	218.5	241.5	211.6	241.5	207.0	5.0	8.0
Adj. Limits	<input type="text" value="218.5"/>	<input type="text" value="241.5"/>	<input type="text" value="211.6"/>	<input type="text" value="241.5"/>	<input type="text" value="207.0"/>	<input type="text" value="5.0"/>	<input type="text" value="8.0"/>

Submit Form
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- To create a station limits ticket, select Voltage and station.
 - Adj. limits is prepopulated with Initial Station limit; user can edit fields as needed
- To follow Company Limits, check the Follow Company Limits box.

New Voltage Limits Ticket

Ticket ID: New Company: Voltage: 230 KV Station: L

Est. Start: Follow Company Limits: Ticket Status: Submitted

Date (MM/DD/YYYY)

Comments:

PJM Comments:

By default, PJM does not monitor/control to Emergency High voltage limits unless there exists separation between the Normal High (NH) and Emergency High (EH).

- If EH = NH, the PJM equipment owner is indicating that no EH rating exists and effectively PJM ignores the EH limit. EH = NH are leveraged to support trending of exceedances prior to Load Dump (LD) rating.
- If EH > NH, the EH will be processed / controlled.

	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop Warning (%)	Voltage Drop Limit (%)
	Low	High	Low	High			
Initial PJM	218.5	241.5	211.6	241.5	207.0	5.0	8.0
Initial Company	218.5	241.5	211.6	241.5	207.0	5.0	8.0
Initial Station	218.5	241.5	211.6	241.5	207.0	5.0	8.0
Adj. Limits	<input type="text"/>	<input type="text"/>					

Submit Form
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Main Menu

Voltage Limits View/Revise Reports Filter			
Company	Voltage	Station	Voltage Limits Type
PJM TEST	▼	▼	▼
Ticket Status	Current/Historical	Revert to PJM / Company Level Only	Late Only
<ul style="list-style-type: none"> Approved Cancelled by Company Completed Denied Implemented Implemented w/o Approval PJM Admin Closure Received Restored Restored w/o Approval Retired 	<input type="radio"/> Current <input type="radio"/> Historical <input type="radio"/> Both Ticket ID: <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tickets Occurring (mm/dd/yyyy)	Start Date (mm/dd/yyyy)	End Date (mm/dd/yyyy)	Limit Details
From: <input type="text"/> To: <input type="text"/>	From: <input type="text"/> To: <input type="text"/>	From: <input type="text"/> To: <input type="text"/>	<input type="radio"/> Adj. <input type="radio"/> Adj. + Initial <input type="radio"/> Adj. + Initial + Curr.

Apply Filter Refresh Help Main Menu

Select how much details will be displayed

Voltage Limits View/Revise

By default, PJM does not monitor/control to Emergency High voltage limits unless there exists separation between the Normal High (NH) and Emergency High (EH).

- If EH = NH, the PJM equipment owner is indicating that no EH rating exists and effectively PJM ignores the EH limit. EH = NH are leveraged to support trending of exceedances prior to Load Dump (LD) rating.
- If EH > NH, the EH will be processed / controlled.

Ticket ID	Company	Voltage	Station	Voltage Limits Type	Status	Revert to PJM or Company level	Est. Start	Act. Start	Act. End	Limits								
										Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit		
		Low	High	Low	High													
1474		500 KV		Company	Implemented	Yes	03/26/20	03/25/20 12:00										
Adj.		500.0	550.0	485.0	550.0		475.0		2.5	5.0								
1429		500 KV		Station	Implemented w/o Approval	No	03/04/20	03/04/20 13:30										
Adj.		500.0	542.5	485.0	542.5		475.0		2.5	5.0								
1219		500 KV		Station	Implemented	No	02/11/20											
Adj.		500.0	542.5	485.0	542.5		475.0		2.5	5.0								

Refresh

Download

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Yellow

- Indicates that Voltage Limit of current level is different from Voltage Limit of the next level up.
 - Company limit is different from PJM Default.
 - Station limit is different from Company default limit.

Red

- Indicates that Station Voltage Limit is different from Company default limit but the same as PJM Default.

Voltage Limits Ticket

Ticket ID: **1429** Company: _____ Voltage: **500 KV** Station: _____

Est. Start: 03/04/20 Est. Implementation: _____ Follow Company Limits: Ticket Status: Implemented w/o Approval

Actual Start: 03/04/20 13:30 Actual End: _____

Comments:

Automatically created due to EMS data.

PJM Comments:

Automatically created due to EMS data.

By default, PJM does not monitor/control to Emergency High voltage limits unless there exists separation between the Normal High (NH) and Emergency High (EH).

- If EH = NH, the PJM equipment owner is indicating that no EH rating exists and effectively PJM ignores the EH limit. EH = NH are leveraged to support trending of exceedances prior to Load Dump (LD) rating.
- If EH > NH, the EH will be processed / controlled.

	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop Warning (%)	Voltage Drop Limit (%)
	Low	High	Low	High			
Initial PJM	500.0	550.0	485.0	550.0	475.0	2.5	5.0
Initial Company	500.0	544.0	485.0	544.0	475.0	2.0	5.0
Initial Station	500.0	544.0	485.0	544.0	475.0	2.0	5.0
Adj. Limits	500.0	542.5	485.0	542.5	475.0	2.5	5.0
Current PJM	500.0	550.0	485.0	550.0	475.0	2.5	5.0
Current Company	500.0	550.0	485.0	550.0	475.0	2.5	5.0
Current Station	500.0	542.5	485.0	542.5	475.0	2.5	5.0

History Log
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Log of ticket status changes

- Report of Voltage Limits effective on selected dates
- TOs can view effective limits of other TOs.
- Report types
 - All
 - Follow PJM Defaults
 - Not Following PJM Defaults
 - Exceptions
 - Non-Exceptions
 - Overview Report : Company Version of Manual 03 Report

Defaults to user's company
User can pick other TOs from the Company list

Effective Voltage Limits			
Company	Voltage	Station	Voltage Limits Type
Company			
Eff. Date (mm/dd/yyyy)	Sort by	Report type	
	<input checked="" type="radio"/> Comp./Voltage <input type="radio"/> Voltage/Comp.	All	
Apply Filter Refresh Main Menu			

Defaults to today if left blank

Check to display all stations
- stations following company limits are hidden by default

Check to display all limit levels
- if limits match only the lowest level is displayed by default

Effective Voltage Limits for 04/19/20 (All)

By default, PJM does not monitor/control to Emergency High voltage limits unless there exists separation between the Normal High (NH) and Emergency High (EH).

- If EH = NH, the PJM equipment owner is indicating that no EH rating exists and effectively PJM ignores the EH limit. EH = NH are leveraged to support trending of exceedances prior to Load Dump (LD) rating.
- If EH > NH, the EH will be processed / controlled.

Show Duplicates Show Details

Equip ID	Company	Voltage	Station	Voltage Limits Type	Follow PJM Default	Eff. Date	Term. Date	Limits						Action		
								Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning		Voltage Drop (%) Limit	
								Low	High	Low	High					
1055		230 KV		Company	Yes	01/13/20		Company	218.5	241.5	211.6	241.5	207.0	5.0	8.0	
3650		230 KV		Station	No	03/04/20		Station	218.5	234.6	211.6	241.5	207.0	5.0	8.0	Revert to Company Limits
1721		230 KV		Station	No	01/13/20		Station	218.5	236.0	211.6	241.5	207.0	5.0	8.0	Revert to Company Limits
3862		230 KV		Station	No	03/04/20		Station	218.5	239.2	211.6	241.5	207.0	5.0	8.0	Revert to Company Limits

Download CSV export of the report

Click on the Action to open a new, prepopulated ticket

Report of tickets in Implemented w/o Approval and Restored w/o Approval status.

Voltage Limits View/Revise																													
<p>By default, PJM does not monitor/control to Emergency High voltage limits unless there exists separation between the Normal High (NH) and Emergency High (EH).</p> <ul style="list-style-type: none"> If EH = NH, the PJM equipment owner is indicating that no EH rating exists and effectively PJM ignores the EH limit. EH = NH are leveraged to support trending of exceedances prior to Load Dump (LD) rating. If EH > NH, the EH will be processed / controlled. 																													
Ticket ID	Company	Voltage	Station	Voltage Limits Type	Status	Revert to PJM or Company level	Est. Start	Act. Start	Act. End	Limits																			
1473		765 KV		Station	Implemented w/o Approval	No	03/24/20	03/24/20 18:03		<table border="1"> <tr> <th colspan="2">Normal (KV)</th> <th colspan="2">Emergency (KV)</th> <th rowspan="2">Load Dump</th> <th rowspan="2">Voltage Drop (%) Warning</th> <th rowspan="2">Voltage Drop (%) Limit</th> </tr> <tr> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> </tr> <tr> <td>Adj.</td> <td>726.8</td> <td>803.3</td> <td>703.8</td> <td>803.3</td> <td>688.5</td> <td>5.0</td> <td>10.0</td> </tr> </table>	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit	Low	High	Low	High	Adj.	726.8	803.3	703.8	803.3	688.5	5.0	10.0
Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit																							
Low	High	Low	High																										
Adj.	726.8	803.3	703.8	803.3	688.5	5.0	10.0																						
1429		500 KV		Station	Implemented w/o Approval	No	03/04/20	03/04/20 13:30		<table border="1"> <tr> <th colspan="2">Normal (KV)</th> <th colspan="2">Emergency (KV)</th> <th rowspan="2">Load Dump</th> <th rowspan="2">Voltage Drop (%) Warning</th> <th rowspan="2">Voltage Drop (%) Limit</th> </tr> <tr> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> </tr> <tr> <td>Adj.</td> <td>500.0</td> <td>542.5</td> <td>485.0</td> <td>542.5</td> <td>475.0</td> <td>2.5</td> <td>5.0</td> </tr> </table>	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit	Low	High	Low	High	Adj.	500.0	542.5	485.0	542.5	475.0	2.5	5.0
Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit																							
Low	High	Low	High																										
Adj.	500.0	542.5	485.0	542.5	475.0	2.5	5.0																						
3009		500 KV		Station	Implemented w/o Approval	No	01/07/20	01/07/20 00:03		<table border="1"> <tr> <th colspan="2">Normal (KV)</th> <th colspan="2">Emergency (KV)</th> <th rowspan="2">Load Dump</th> <th rowspan="2">Voltage Drop (%) Warning</th> <th rowspan="2">Voltage Drop (%) Limit</th> </tr> <tr> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> </tr> <tr> <td>Adj.</td> <td>500.0</td> <td>542.5</td> <td>485.0</td> <td>542.5</td> <td>475.0</td> <td>2.5</td> <td>5.0</td> </tr> </table>	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit	Low	High	Low	High	Adj.	500.0	542.5	485.0	542.5	475.0	2.5	5.0
Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit																							
Low	High	Low	High																										
Adj.	500.0	542.5	485.0	542.5	475.0	2.5	5.0																						

Download CSV export of the report

Report of Company tickets created to follow PJM Defaults.

Voltage Limits View/Revise																					
<p>By default, PJM does not monitor/control to Emergency High voltage limits unless there exists separation between the Normal High (NH) and Emergency High (EH).</p> <ul style="list-style-type: none"> • If EH = NH, the PJM equipment owner is indicating that no EH rating exists and effectively PJM ignores the EH limit. EH = NH are leveraged to support trending of exceedances prior to Load Dump (LD) rating. • If EH > NH, the EH will be processed / controlled. 																					
Ticket ID	Company	Voltage	Station	Voltage Limits Type	Status	Revert to PJM or Company level	Est. Start	Act. Start	Act. End	Limits											
										Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit					
		Low	High	Low	High																
1094		138 KV		Company	Submitted	Yes	03/16/20														

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Report of Voltage Levels that PJM is monitoring and the corresponding PJM Default limits

PJM Default Voltage Limits									
User:		Company:						<input type="checkbox"/> Show Archived	
Voltage	Normal (KV)		Emergency (KV)		Load Dump (KV)	Voltage Drop Warning	Voltage Drop Limit	Delete/Archive	Last Modified
	Low	High	Low	High					
13 KV	14.0	15.0	12.0	15.0	12.0	5%	5%	<input type="checkbox"/>	02/01/20 12:58
69 KV	65.6	72.5	63.5	72.5	62.1	5%	10%	<input type="checkbox"/>	01/13/20 16:09
115 KV	109.3	120.8	105.8	120.8	103.5	5%	10%	<input type="checkbox"/>	01/13/20 16:09
138 KV	131.1	144.9	127.0	144.9	124.2	5%	10%	<input type="checkbox"/>	01/13/20 16:09
144 KV	151.0	152.0	150.0	153.0	143.0	6%	7%	<input type="checkbox"/>	04/11/20 14:18
161 KV	153.0	169.1	148.1	169.1	144.9	5%	10%	<input type="checkbox"/>	01/13/20 16:09
230 KV	218.5	241.5	211.6	241.5	207.0	5%	8%	<input type="checkbox"/>	01/13/20 16:09
345 KV	327.8	362.3	317.4	362.3	310.5	5%	8%	<input type="checkbox"/>	01/13/20 16:09
500 KV	500.0	550.0	485.0	550.0	475.0	2.5%	5%	<input type="checkbox"/>	01/13/20 16:09
765 KV	726.8	803.3	703.8	803.3	688.5	5%	8%	<input type="checkbox"/>	01/13/20 16:09

Check to display data that was deleted or archived by PJM

Company Version of PJM Manual 03 Report

Effective Voltage Limits for 01/13/20 (Overview Report)							
Voltage: 230 KV							
	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit
	Low	High	Low	High			
PJM Default	500.0	550.0	485.0	550.0	475.0	2.5	5.0
Follow PJM Default Companies:							
Company							
Voltage: 138 KV							
	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit
	Low	High	Low	High			
PJM Default	131.1	144.9	127.0	144.9	124.2	5.0	10.0
Company	135.0	144.9	131.0	144.9	128.0	3.5	7.0
Voltage: 69 KV							
	Normal (KV)		Emergency (KV)		Load Dump	Voltage Drop (%) Warning	Voltage Drop (%) Limit
	Low	High	Low	High			
PJM Default	65.6	72.5	63.5	72.5	62.1	5.0	10.0
Company	67.5	72.5	65.5	72.5	63.5	3.5	7.0
Company Station: APPLE	67.5	72.5	65.5	72.5	63.5	5.0	9.0

230 KV: Company is following PJM Default

138 KV: Company is not following PJM Default

69kV: Company is not following PJM Default APPLE station is not following Company Default

The Overview Report will also be available on PJM.com.

<https://edart.pjm.com/reports/voltage/limits.csv>

- It is a reflection of the current PJM EMS voltage limits, updated daily.
- It provides PJM Default Voltage and Voltage Stability Limits by voltage class.

In addition, any Equipment Owner (Company) or Station deviations by voltage class can be identified where the 'Follow PJM' column is set to 'No'. Companies only have a line entry for voltage classes for which that have that voltage level of equipment under the control of PJM. (i.e., Only those companies that have a given level of equipment under PJM control are listed.)

<https://edart.pjm.com/reports/voltagelimits.csv>

	A	B	C	D	E	F	G	H	I	J	K
1	TIMESTAMP: 01-02-20xx 00:02:01										
2	<p>The table below is a reflection of the current PJM EMS voltage limits, updated daily. It provides PJM Default Voltage and Voltage Stability Limits by voltage class. In addition, any Equipment Owner (Company) or Station deviations by voltage class can be identified where the 'Follow PJM' column is set to 'No'. Companies only have a line entry for voltage classes for which that have that voltage level of equipment under the control of PJM. (i.e., Only those companies that have a given level of equipment under PJM control are listed.) By default, PJM does not monitor/control to Emergency High voltage limits unless there exists separation between the Normal High (NH) and Emergency High (EH). If EH = NH, the PJM equipment owner is indicating that no EH rating exists and effectively PJM ignores the EH limit. EH = NH are leveraged to support trending of exceedances. When EH > NH, the EH will be processed / controlled.</p>										
3											
4	Company	Voltage	Follow PJM	Station	Load Dump	Emergency Low (KV)	Normal Low (KV)	Normal High (KV)	Emergency High (KV)	Voltage Drop Warning(%)	Voltage Drop Limit(%)
5	PJM Default	765 KV			688.5	703.8	726.8	803.3	803.3	5	8
6	Company 1	765 KV	No		688.5	703.8	726.8	803.3	803.3	5	10
7	Company 2	765 KV	No		688.5	703.8	726.8	803.3	803.3	5	10
8	Company 2	765 KV	No	Station 1	688.5	703.8	726.8	803.5	803.5	5	10
9	Company 2	765 KV	No	Station 2	688.5	688.5	726.8	803.3	803.3	5	10
10	Company 3	765 KV	No		688.5	703.8	726.8	803.3	803.3	7	10
11	PJM Default	500 KV			475	485	500	550	550	2.5	5
12	Company 1	500 KV	Yes		475	485	500	550	550	2.5	5
13	Company 2	500 KV	Yes		475	485	500	550	550	2.5	5
14	Company 3	500 KV	Yes		475	485	500	550	550	2.5	5
15	Company 4	500 KV	Yes		475	485	500	550	550	2.5	5
16	Company 5	500 KV	Yes		475	485	500	550	550	2.5	5
17	Company 6	500 KV	Yes		475	485	500	550	550	2.5	5
18	Company 7	500 KV	Yes		475	485	500	550	550	2.5	5
19	Company 8	500 KV	Yes		475	485	500	550	550	2.5	5