《风电场测风塔实时数据上传技术要求》

2.6测量数据采集

2.6.1风速风向

2.6.1.1风速的采样速率为每秒钟1次，计算5分钟的算术平均值和5分钟的风速标准偏差；以 5 分钟平均值计算小时平均值。

2.6.1.2风向的采样速率为每秒钟1次，求5分钟的矢量平均值。

2.6.2温度湿度 、 气压

温度 、 湿度 、 气压的采样速率为每10秒1次， 计算5分钟的算术平均值。

2.6 Measurement data collection

2.6.1 Wind speed and direction

2.6.1.1 The sampling rate of wind speed is 1 time per second, calculate the 5-minute arithmetic average and 5-minute wind speed standard deviation; calculate the hourly average with the 5-minute average.

2.6.1.2 The sampling rate of the wind direction is 1 time per second, and find the average value of the vector for 5 minutes.

2.6.2 Temperature, Humidity, Air Pressure

The sampling rate of temperature, humidity, and air pressure is once every 10 seconds, and the arithmetic average of 5 minutes is calculated.

《NB/T 31079-2016 风电功率预测系统测风塔数据测量技术要求》

4 测量要素的采样与算法

4.1 平均风速

每秒采样 l次，自动计算和记录每 5min 的算术平均风速，单位为 m/s。

4.2 平均风向

与风速同步采集该风速的风向，自动计算和记录每5min 的平均风向，单位为（°）。

4.3 风速标准偏差

以5min 为时段，每秒采集和l记录瞬时风速，自动计算和记录每 5min 的风遮标准偏差，单位为 m/s 。

4.4 气温

每10s 采样 l次，在每分钟采样的 6 个样本中去掉异常值、1个最大值和 l 个最小值，余下样本的算术平均为该分钟的瞬时值，若余下样本数为 0，则本次瞬时值缺测。以瞬时值为样本，自动计算和记录每5min的算术平均值，单位为℃。

4.5 相对湿度

每 10s 采样 1 次，在每分钟采样的6个样本中去掉异常值、1 个最大值和 l 个最小值，余下样本的算术平均为该分钟的瞬时值，若余下样本数为 0，则本次瞬时值缺测。以瞬时值为样本，自动计算和记录每 5min 的算术平均值，无量纲值，一般用百分数表示。

4.6 气压

每 10s 采样 1 次，在每分钟采样的6个样本中去掉异常值、1 个最大值和 l 个最小值，余下样本的算术平均为该分钟的瞬时值，若余下样本数为 0，则本次瞬时值缺测。以瞬时值为样本，自动计算和记录每 5min 的算术平均值，单位为hPa。

4 Sampling and algorithm of measurement elements

4.1 Average wind speed

Sampling 1 times per second, automatically calculate and record the arithmetic average wind speed every 5 minutes, the unit is m/s.

4.2 Average wind direction

Collect the wind direction of the wind speed synchronously with the wind speed, automatically calculate and record the average wind direction every 5 minutes, the unit is (°).

4.3 Wind speed standard deviation

Take 5 minutes as the time period, collect and record the instantaneous wind speed every second, automatically calculate and record the standard deviation of the wind cover every 5 minutes, and the unit is m/s.

4.4 Air temperature

Sampling l times every 10s, remove the outliers, 1 maximum and l minimum from the 6 samples sampled every minute. The arithmetic average of the remaining samples is the instantaneous value of the minute. If the number of remaining samples is 0, then the The second instantaneous value is missing. Take the instantaneous value as the sample, automatically calculate and record the arithmetic average value every 5 minutes, and the unit is °C.

4.5 Relative humidity

Sampling is performed once every 10s, and outliers, 1 maximum and l minimum are removed from the 6 samples sampled every minute. The arithmetic average of the remaining samples is the instantaneous value of the minute. If the number of remaining samples is 0, the The second instantaneous value is missing. Take the instantaneous value as a sample, automatically calculate and record the arithmetic average every 5 minutes, dimensionless value, generally expressed as a percentage.

4.6 Air pressure

Sampling is performed once every 10s, and outliers, 1 maximum and l minimum are removed from the 6 samples sampled every minute. The arithmetic average of the remaining samples is the instantaneous value of the minute. If the number of remaining samples is 0, the The second instantaneous value is missing. Take the instantaneous value as a sample, automatically calculate and record the arithmetic mean value every 5 minutes, and the unit is hPa.

《光伏发电站集中监控系统通信及数据标准》

9 性能技术指标

9.1 系统实时性

9.1.1 遥测信息响应时间应满足下列规定：

a）组串式子阵内模拟量越死区传送时间（至站控层）不大于5s；

b）集中式子阵内模拟量越死区传送时间（至站控层）不大于2s；

c）组串式子阵内从遥测量越死区至站控层显示的延迟时间不大于5s；

d）集中式子阵内从遥测量越死区至站控层显示的延迟时间不大于2s；

e）现地测控单元模拟量越死区传送时间（至站控层）不大于2s.

9.1.2 遥信变化响应时间应满足下列规定：

a）组串式子阵内遥信变位传送时间（至站控层）不大于5s；

b）集中式子阵内遥信变位传送时间（至站控层）不大于2s；

c）组串式子阵内从遥信变位至站控层显示的延迟时间不大于5s；

d）集中式子阵内从遥信变位至站控层显示的延迟时间不大于2s；

e）现地测控单元从遥信变位至站控层显示的延迟时间不大于2s。

9.1.3 现地测控单元事件顺序记录点（sequence of event, SOE）分辨率应不大于2ms。

9.1.4 区域集控中心到新能源子站的遥控、遥调命令传送时间应不大于4s。

9.1.5 新能源子站监控系统接收控制指令到开始执行的时间应不大于ls。

9.1.6 电能量计量系统数据响应时间应满足下列规定：

a）从收到召唤计量系统电能量命令到向区域集控/转发中心发出报文的延迟时间不大于2s；

b）从收到召唤电能表电能量命令到向区域集控/转发中心发出报文的延迟时间不大于5s。

9.1.7 光功率预测系统数据响应时间应满足下列规定：

a）天气预报文件、短期预测结果文件、理论功率文件应在每天9:00之前上送到区域集控/转发中心；

b）超短期预测结果文件、功率预测系统状态文件上送到区域集控/转发中心的延迟时间不大于5min。

9.2 系统资源

9.2.1 新能源子站主到区域集控/转发中心的通信网络负载率宜小于30%。

9.2.2 数据网关机CPU平均负荷率应满足下列规定：

a）正常时（任意30min内）不大于30%；

b) 电力系统故障时（10s内）不大于50%。

9.3 系统对时性能指标

新能源子站监控系统对时精度误差应不大于ls。

9 Performance technical indicators

9.1 System real-time

9.1.1 The response time of telemetry information shall meet the following requirements:

a) The dead zone transmission time (to the station control layer) of the analog quantity in the string sub-array is not more than 5s;

b) The transmission time (to the station control layer) of the analog quantity exceeding the dead zone in the centralized sub-array is not more than 2s;

c) The delay time from the remote measurement dead zone to the station control layer display in the string sub-array is not more than 5s;

d) In the centralized sub-array, the delay time from the remote measurement dead zone to the station control layer display is not more than 2s;

e) The transfer time (to the station control layer) of the analog quantity over the dead zone of the local measurement and control unit is not more than 2s.

9.1.2 The response time of remote signaling changes shall meet the following requirements:

a) The transmission time (to the station control layer) of the remote signal displacement in the string sub-array is not more than 5s;

b) The transmission time of remote signal displacement in the centralized sub-array (to the station control layer) is not more than 2s;

c) The delay time from the remote signal displacement to the station control layer display in the string sub-array is not more than 5s;

d) The delay time from the remote signal displacement to the display on the station control layer in the centralized sub-array is not more than 2s;

e) The delay time of the local measurement and control unit from the remote signal displacement to the station control layer display is not more than 2s.

9.1.3 The resolution of the sequence of event (SOE) points of the on-site measurement and control unit should not be greater than 2ms.

9.1.4 The transmission time of remote control and remote adjustment commands from the regional centralized control center to the new energy sub-station shall not exceed 4s.

9.1.5 The time from when the new energy sub-station monitoring system receives the control instruction to the start of execution should not be greater than ls.

9.1.6 The data response time of the electric energy metering system shall meet the following requirements:

a) The delay time from receiving the energy command of the call metering system to sending a message to the regional centralized control/forwarding center is not more than 2s;

b) The delay time from receiving the energy command to call the electric energy meter to sending the message to the regional centralized control/forwarding center is not more than 5s.

9.1.7 The data response time of the optical power prediction system shall meet the following requirements:

a) Weather forecast files, short-term prediction results files, and theoretical power files should be sent to the regional centralized control/forwarding center before 9:00 every day;

b) The delay time for the ultra-short-term prediction result file and power prediction system status file to be sent to the regional centralized control/forwarding center is not more than 5 minutes.

9.2 System Resources

9.2.1 The load rate of the communication network from the new energy substation master to the regional centralized control/forwarding center should be less than 30%.

9.2.2 The average CPU load rate of the data gateway machine shall meet the following requirements:

a) Normally (within any 30min) not more than 30%;

b) When the power system fails (within 10s), no more than 50%.

9.3 System time synchronization performance indicators

The time synchronization accuracy error of the new energy sub-station monitoring system should not be greater than ls.

《山东光伏电站并网运行管理实施细则》

**第十四条** 光伏电站应具备有功功率调节能力，需配置有功功率控制系统，接收并自动执行电力调度机构远方发送的AGC（有功功率控制）信号，确保光伏电站最大有功功率值不超过电力调度机构的给定值，且调节速率、响应时间、调节精度满足下列要求:

（1）调节速率



公式中：

Pd为指令周期结束时场站实际出力;

Pp为指令周期开始时场站实际出力;

S为场站装机容量;

T为AGC指令周期，目前取1分钟。

新能源场站的调节速率应满足1分钟调节速率不小于8%装机容量/分钟、10分钟调节速率28%装机容量/10分钟。

（2）响应时间：

响应时间是指从调度机构下达AGC指令算起，到场站开始执行指令止(即场站有功变化量大于等于死区时)的时间间隔。新能源场站AGC响应时间≤30秒。

（3）调节精度：

调节精度是指响应稳定以后，实际出力和AGC指令之间偏差的绝对值。新能源场站AGC调节精度≤1.0MW（或装机容量的1%取大值）。

**Article 14** Photovoltaic power plants shall have the ability to regulate active power, and need to be equipped with active power control systems to receive and automatically execute AGC (active power control) signals sent by the power dispatching agency from a distance to ensure that the maximum active power value of the photovoltaic power plant does not exceed the power dispatching agency The given value, and the adjustment rate, response time, and adjustment accuracy meet the following requirements:

(1) Adjust the rate



formula:

Pd is the actual output of the station at the end of the command cycle;

Pp is the actual output of the station at the beginning of the command cycle;

S is the installed capacity of the station;

T is the AGC instruction cycle, currently 1 minute.

The adjustment rate of the new energy plant should meet the requirements of a 1-minute adjustment rate of not less than 8% of the installed capacity per minute, and a 10-minute adjustment rate of 28% of the installed capacity per 10 minutes.

(2) Response time:

The response time refers to the time interval from when the dispatching agency issues the AGC instruction to the station and starts to execute the instruction (that is, when the active power change of the station is greater than or equal to the dead zone). The AGC response time of the new energy field station is less than or equal to 30 seconds.

(3) Adjustment accuracy:

The adjustment accuracy refers to the absolute value of the deviation between the actual output and the AGC command after the response is stable. The AGC adjustment accuracy of new energy stations is ≤1.0MW (or 1% of the installed capacity, whichever is greater).