Performance Ratio Calculation

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Version	Created by	Date	Remarks
02	Huawei c84081314	07.11.2018	Initial version created

The performance ratio (PR) is stated as percent and describes the relationship between the actual and theoretical energy outputs of the PV plant.
NetEco1000S PR value calculation is using PR' $_{STC}$ formula as below:

$$PR'_{STC} = \frac{\sum_{k=0}^{n} P_{out,k} \times \tau_k}{\sum_{k=0}^{n} \frac{(C_k \times P_0) \times G_{i,k} \times \tau_k}{G_{i,ref}}}$$

PR' $_{STC}$ – Performance Ratio calculated under Standard Test Conditions
$P_{out,k}$ – measured power Output
τ_k – energy recording interval time
P_0 – rated power output
$G_{i,k}$ – Measured value of solar irradiation intensity
$G_{i,ref}$ – Reference value of the solar irradiation intensity
C_k – Temperature correction factor

$$C_k = 1 + \gamma \times (T_{mod,k} - 25°C)$$

γ- Component peak power temperature coefficient
$T_{mod,k}$ – Temperature of the PV modules

The actual PR value is calculated as follows:

$$PR = \frac{Actual\ power\ generation}{Theoretical\ power\ generation} = \frac{Energy\ yield}{\sum_k \left(1 + \gamma \times (T_{mod,k} - 25)\right) \times P_0 \times G_{i,k}}$$

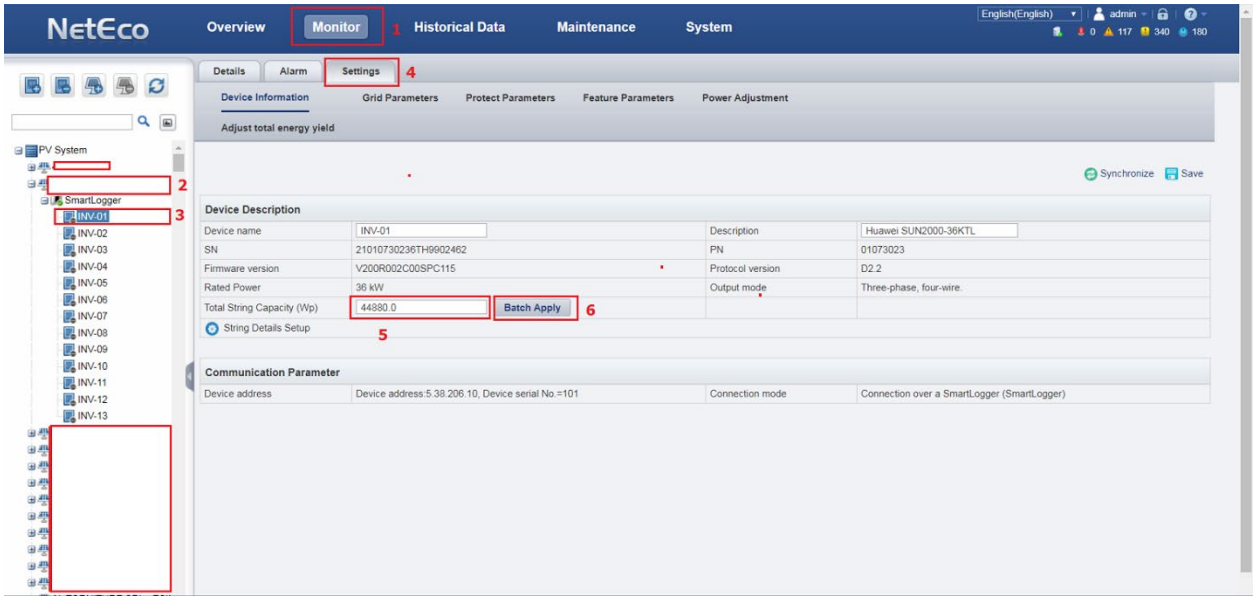
Energy Yield – Measured value of the Power Generation reported by the inverters
γ – Component peak power temperature coefficient is the peak power temperature coefficient, depending on the manufacturer components

$\mathbf{T_{mod,k}}$ –PV panel surface temperature: The temperature measurement by the EMI unit
$\mathbf{P_0}$ – Total string capacity: the total number of strings configured on the NetEco1000S
$\mathbf{G_{i,k}}$ – Solar irradiation: The radiation reported by the EMI unit
Configuration steps

In order for Neteco to provide a more precise value of the PR, the following configuration steps should performed:

1. Configuration of the inverter string capacity

$$PR = \frac{Actual\ power\ generation}{Theoretical\ power\ generation} = \frac{Energy\ yield}{\sum_k \left(1 + \gamma \times \left(T_{mod,k} - 25\right)\right) \times P_0 \times G_{i,k}}$$



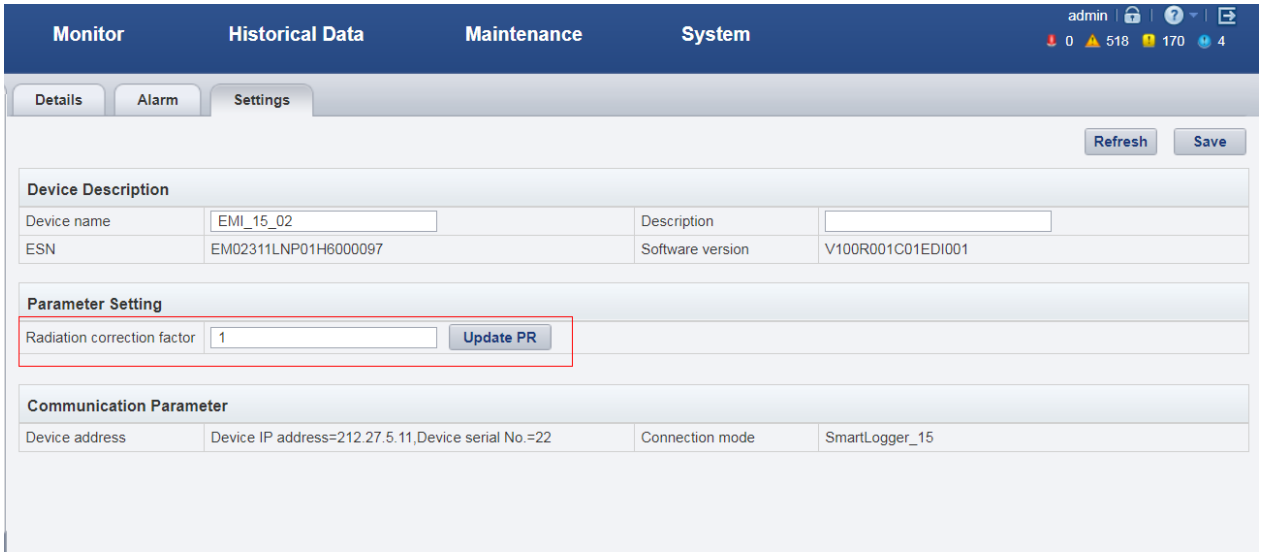
Step 1: Select Monitor menu
Step 2: Click on the Solar Farm on the right hand side and expand it
Step 3: Click on one of the inverters
Step 4: Go to “Settings”
Step 5: Put the correct value for “Total DC power Wp”

Step 6: Click on “Batch Apply”

2. Configuration of the EMI radiation parameters

When the "Daily radiation" value reported by EMI is not accurate, the NetEco 1000S can be configured with the “Radiation Correction Factor” on the basis of the original "Daily radiation" value reported by EMI.

$$PR = \frac{Actual\ power\ generation}{Theoretical\ power\ generation} = \frac{Energy\ yield}{\sum_k \left(1 + \gamma \times \left(T_{mod,k} - 25\right)\right) \times P_0 \times \left(G_{i,k} \times Radiation\ correction\ factor\right)}$$



3. Configuration of the PR value calculation parameters

The peak power temperature coefficient can be obtained from the component parameters provided by the component manufacturer

Example of PV datasheet:

YGE 72 CELL 系列 2

电性能参数

标准测试条件下的电性能参数（STC）							
组件规格			YLxxxP-35b (xxx=P_{max})				
峰值功率	P_{max}	W	320	315	310	305	300
功率公差	P_{max}	W	0 / +5				
组件效率	η_m	%	16.5	16.2	16.0	15.7	15.5
峰值功率电压	V_{mpp}	V	37.0	36.8	36.3	36.1	35.8
峰值功率电流	I_{mpp}	A	8.64	8.56	8.53	8.45	8.37
开路电压	V_{oc}	V	46.0	45.7	45.6	45.4	45.2
短路电流	I_{sc}	A	9.18	9.12	8.99	8.93	8.86

STC：辐照度1000W/m²，电池温度25°C，大气质量AM1.5，根据 EN 60904-3。
200W/m²时的平均相对效率衰减在3.3%，根据EN 60904-1。

标称工作温度下的电性能参数（NOCT）							
峰值功率	P_{max}	W	233.4	229.8	226.1	222.5	218.8
峰值功率电压	V_{mpp}	V	33.8	33.6	33.1	32.9	32.7
峰值功率电流	I_{mpp}	A	6.91	6.85	6.82	6.76	6.70
开路电压	V_{oc}	V	42.5	42.2	42.1	41.9	41.7
短路电流	I_{sc}	A	7.42	7.37	7.27	7.22	7.16

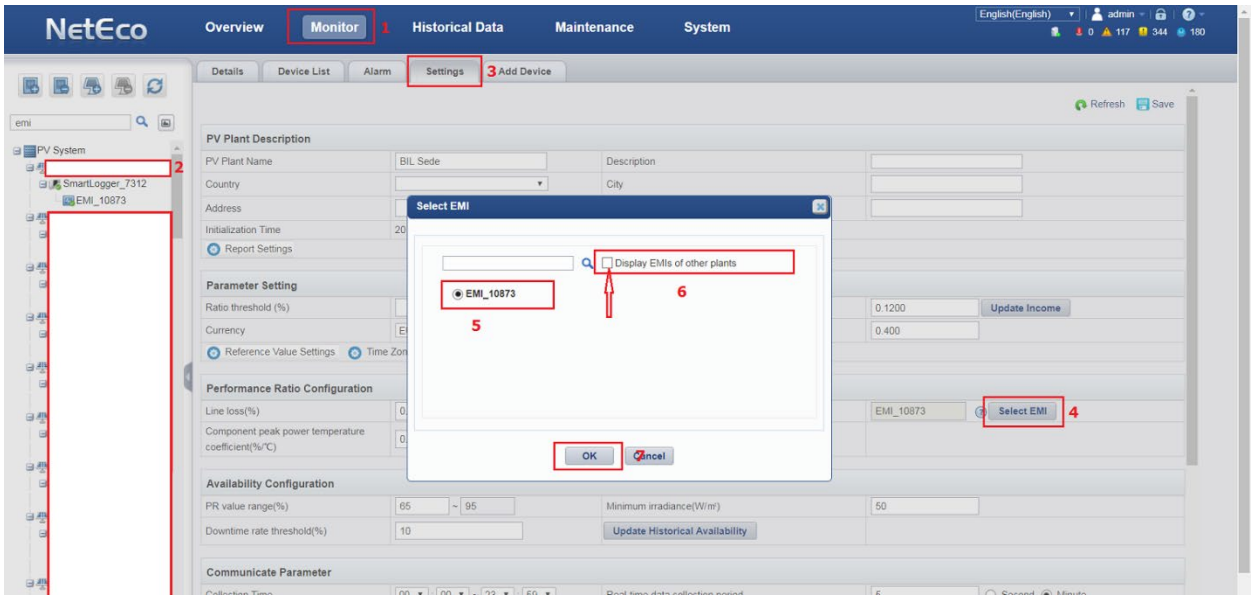
NOCT：在辐照度800W/m²，环境温度20°C，风速1m/s的条件下组件在开路状态下的工作温度。

温度特性

标称工作温度	NOCT	°C	46 +/- 2
峰值功率（P_{max}）的温度系数	γ	%/°C	-0.42
开路电压（V_{oc}）的温度系数	β_{Voc}	%/°C	-0.32
短路电流（Isc）的温度系数	α_{Isc}	%/°C	0.05

The significance of this parameter is that if the temperature is higher than 25 C° degree Celsius, the power generation efficiency will be reduced by 0.42%

4. Configuration of the EMI unit



Step 1: Select Monitor menu
Step 2: Click on the Solar Farm on the right hands site
Step 3: Go to “Settings”
Step 4: Go to “Select EMI” and choose one Weather Station (please select one of the weather stations or Pyranometer if there is EMI units that do not measure irradiation value as if you select the “Mean Value” option it will take a reading from all of the EMI units and create an average data value which would be incorrect due to a wind sensor not recording irradiation data)
Step 5: Select the EMI
Step 6: If you select Display EMI’s of other plants you can use other EMI installed in other plant if it is in the near area
Step 7: OK