

# MAXIMUM EFFICIENCY

## SUNGROW'S PID RECOVERY



### DID YOU KNOW?

Studies have found that the **decrease in power** exclusively **due to PID** could be close to **-10 % to -15 %** in PV modules. \*

### WHAT IS PID?

Potential Induced Degradation refers to a long-term performance loss of PV panels, caused by so-called stray currents or leakage currents between the PV module circuit and its metal frame.

### FULL POWER & LESS COSTS WITH SUNGROW'S SOLUTIONS

Sungrow's inverters come with integrated and free of charge solutions to protect your plant from significant power decreases: In this factsheet we show you our PID Recovery Solution for Residential and Commercial products. Sungrow also offers Anti-PID, which is available for Utility-Scale inverters only.

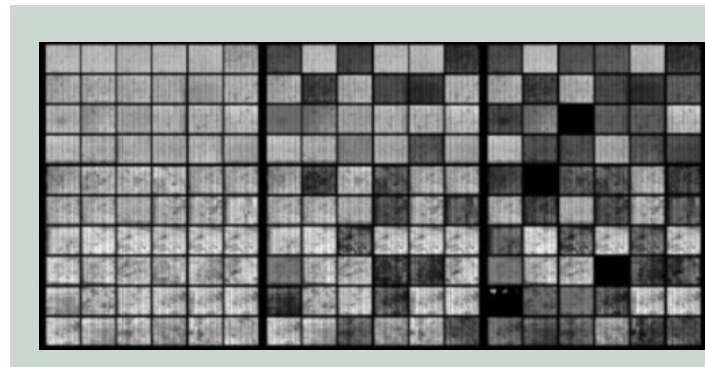
\* Martínez-Moreno, F., Figueiredo, G., Lorenzo, E., 2018. In-the-field PID related experiences. Solar Energy Materials. Solar Cells 174, 485–493. <https://doi.org/10.1016/j.solmat.2017.09.037>

# PID - HARD FACTS

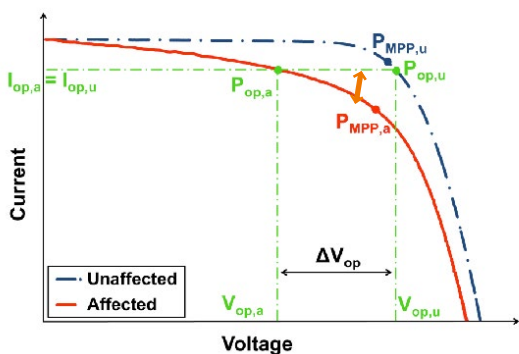
## HOW TO DETECT PID?

PID can be detected in the plant through a combination of IV curves, IV data and EL images.

As an example, the picture on the right shows attenuation, which will affect the power generation. In practice, the affected area will reduce the power generation, and will continue to increase.



From left to right is the attenuation process, and the energy conversion capability of the dark area will decrease under the influence of PID.



A reduction of Rsh (shunt resistance), related to PID translates into different operating voltages between the affected ( $V_{op, a}$ ) and the unaffected ( $V_{op, u}$ ) PV modules connected in series along the same string.

The slight difference between  $P_{MPP, u}$  and  $P_{op, u}$  represents the losses due to the maximum power point (MPP) tracking strategy of the inverter. (See orange arrow on the left graph.)

# PID-RECOVERY

## WHAT IT DOES

Increasing the PV- to ground to a high positive potential thus reversing the polarization effect that arises during operation.

## HOW IT WORKS

- While the PID is executed at night, the AC relay will disconnect the DC side from the power grid
- Time period is between 22:00-05:00 (can be self-adjusted)
- Voltage difference between PV+ and PV- is less than 150 V
- Works during night time
- Set to reverse target voltage (default is  $\pm 500$  V, can be set up to 1000V)
- Works with grid systems (TT, TN, IT)

# 2 POSSIBLE SCHEMES

## Positive Scheme

### PID-Recovery | P-Type Modules

Raise the PV- to ground voltage of P-type solar panel to the target voltage.

Operation Voltage: PV- to ground voltage < 1350 V

## Negative Scheme

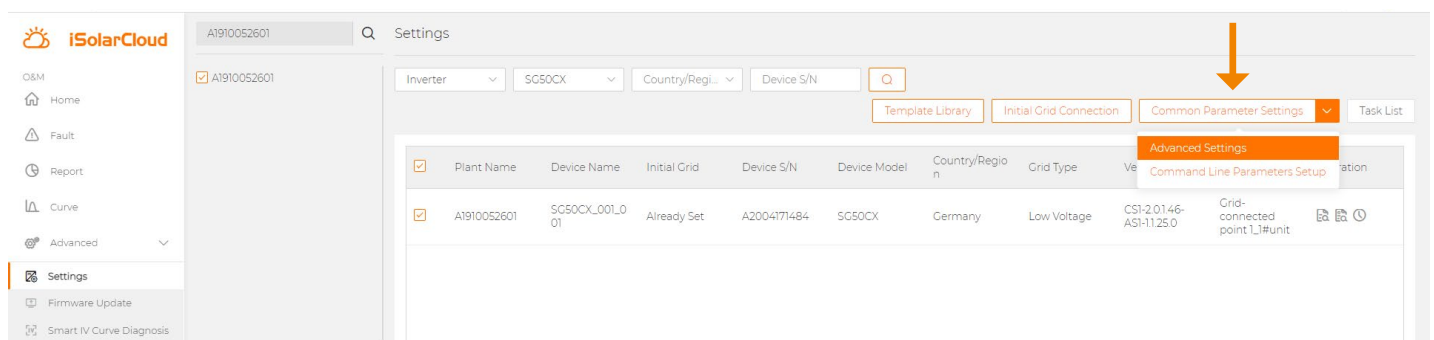
### PID-Recovery | N-Type Modules

Decrease PV+ to ground voltage of N-type solar panel to the negative value of target voltage at night.

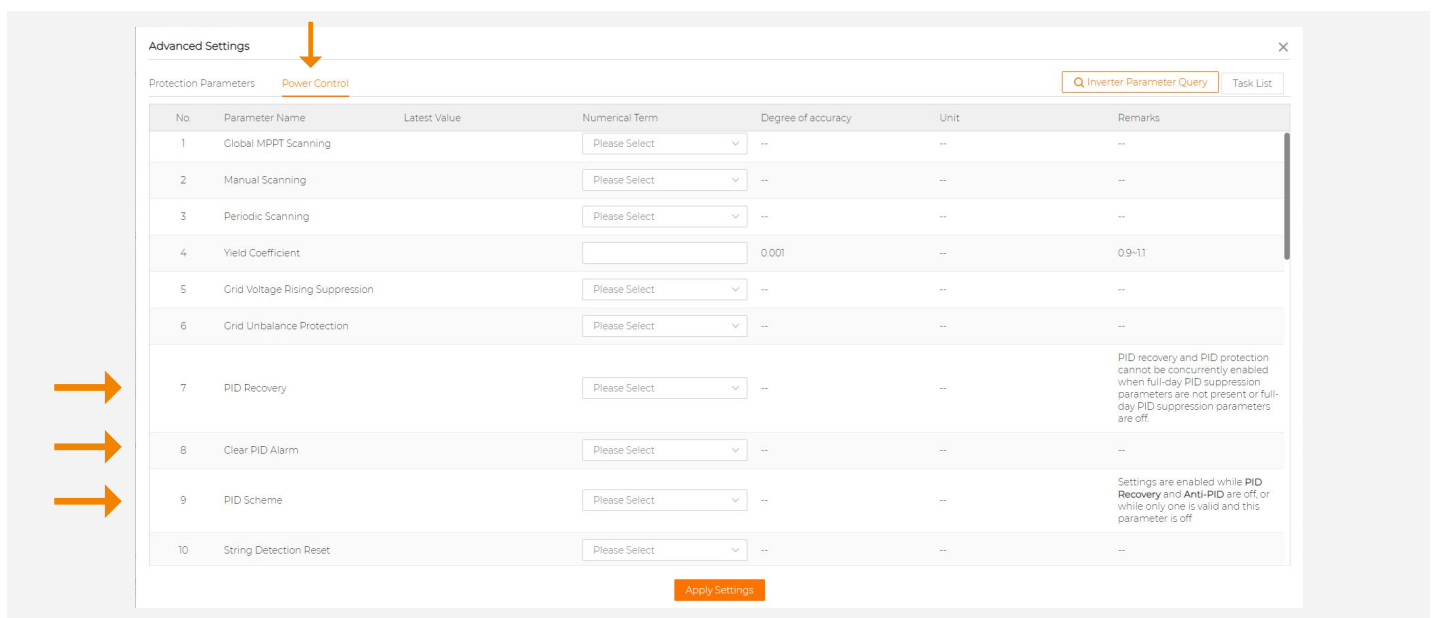
Operation Voltage: PV+ to ground voltage > -1350 V

## HOW TO ACTIVATE PID RECOVERY

1. Choose the desired plant and inverter, then click the down arrow next to common parameters settings and select advanced settings.



2. Click on power control, enable PID recovery and choose the appropriate PID Scheme. The Clear PID Alarm function can be enabled to deactivate any alarm that have been already reviewed and discarded.



# ASK OUR SPECIALIST



**Elsa Cubillas**  
Product Manager  
Residential & Commercial

## 1 **Is it applicable to any size of PV plants?**

Yes, but it is more commonly found in Commercial and Utility-Scale plants because of the advanced detection methods.

## 2 **How long should PID-Recovery be enabled?**

This varies from plant to plant. It also depends on the level of degradation that the modules have suffered. The plant can be monitored on a regular basis to see improvements, but studies have shown recovery within 2 - 4 months.

## 3 **Does PID-Recovery consume a lot of energy?**

No, PID-Recovery doesn't consume a lot of energy. As a reference, if PID-Recovery is enabled during a complete year, it consumes only 15 kW.

## 4 **Is PID-Recovery compatible with other parameter settings?**

Generally yes, but when Q@night is enabled, PID-Recovery should be switched off as in PID-Recovery mode the PV side is disconnected from the grid.

## 5 **Is there a set voltage range where PID-Recovery should be working?**

P-type solar panel: PV- to ground voltage < 1350 V

N-type solar panel: PV+ to ground voltage > -1350 V

## 6 **Are there any differences with other type of new cell technologies?**

Since c-Si modules are widely predominant in the market, these are the most known that are affected by PID.

## 7 **Are any further steps required after activating PID-Recovery?**

Professionals can be invited to clean the system components regularly. There is no need to change the position of the PV system components since PID is reversible, Sungrow's PID-Recovery function will quickly help to regenerate the modules.

## 8 **Which Commercial products come with integrated PID-Recovery?**

SG33/40/50/75/110CX  
SG25/30/33/36/40/50/125CX-P2  
Anti-PID function is only available for utility scale inverters.

## 9 **Which Residential products come with integrated PID-Recovery?**

SG3.0-20RT, SG3.0-20RT-P2 models come with integrated PID-Recovery.  
SG2.0-3.0RS-S, SG3.0-6.0RS and SH3.0-6.0RS only support P-type modules and therefore only the positive scheme.

## 10 **What happens if PID recovery function is enabled after panels have been restored ?**

No technical problems that could happen, there would be only a small amount of energy consumption on the inverter side.