



WebdynSunPM

Application note

Power regulation

Introduction

This application note describes how to implement the **active power control** script.

This script is used to control the active power of the inverters on a photovoltaic production site as a function of one or more active power measurements to comply with a given injection or consumption setpoint.

The script also considers the start-up of generators by cutting the production of the inverters.



The use of this script requires the purchase of a licence. Please contact the Webdyn sales department (<https://www.webdyn.com/contact>) to obtain a licence.

Operating principle

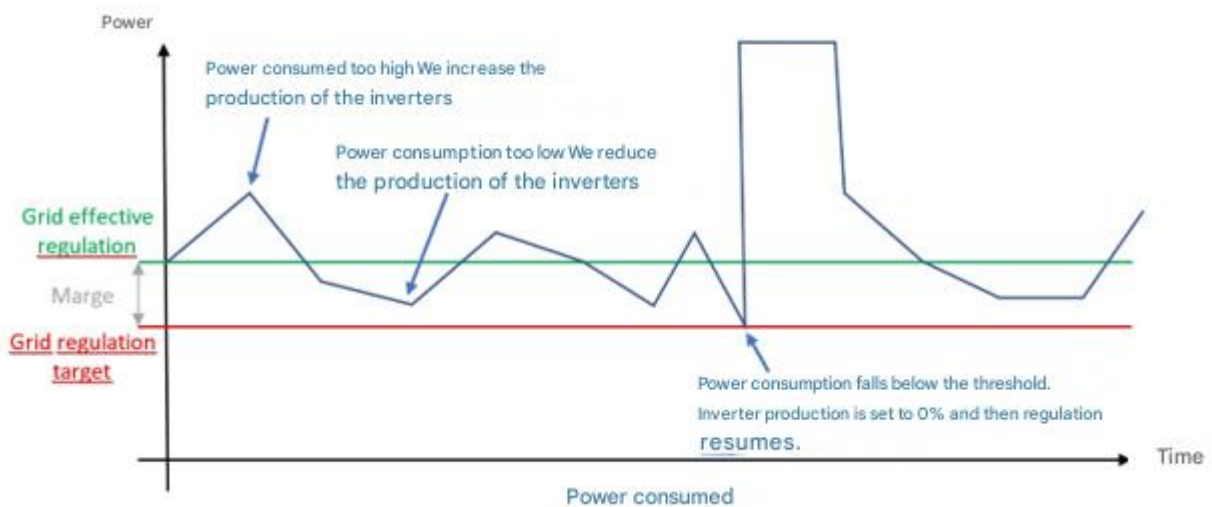
The WebdynSunPM script sends active power production limitation commands equally distributed between all the inverters in a power plant in order to comply with a **Grid regulation target**. This target can be defined as either an extraction target or an injection target defined by the **Grid regulation type** parameter.

A dynamic control loop adapts the command sent to the inverters according to their current production and the local consumption of the production site.

To do this, the script takes into account one or more energy meters reflecting the active power at the point of injection and calculates the deviation from the regulation point corresponding to the **Grid regulation target (kW)** to which is added a margin **Grid effective regulation (%)** expressed as a percentage of the installed power **Total plant solar power (kW)**

In the case of "zero injection" regulation, **Grid regulation type** should be set to consumption and **Grid regulation target** to zero.

The percentage of **Grid effective regulation** margin that should be chosen depends on the variations experienced by the production site's grid. A site with industrial machines that can be stopped or restarted frequently will require a high percentage (30%). A site with no variations will require a low percentage (2%). By default, we recommend a value of 5%.



If the power at the point of injection is higher than the target threshold, the photovoltaic production is insufficient: the output of the inverters is increased accordingly.

If the power at the point of injection is below the target threshold, photovoltaic production is too high: inverter output is reduced accordingly.

If the power at the injection point falls below the **Grid regulation target** threshold, photovoltaic regulation switches to 0%.

The sign convention used for meters should be as follows: Positive values indicate withdrawal and negative values indicate injection.

The "**Regulation speed**" parameter is used to limit the command sent to the inverters to allow the meter(s) to reflect the previous command and not create a divergent system. This latency is not respected in the event of an emergency (loss of communication with the meter or value below the **Grid regulation target**). The script respects regulation constraints requiring correction in the event of a fault of less than 2s.

The "**Phase control**" parameter can be used to fine-tune regulation by considering the power details of each phase for three-phase systems. To do this, use the "**Min of the 3 phases**" value of this parameter. In this case, the WebdynSunPM script will consider the power of the phase closest to the regulation threshold. If there is an imbalance between the phases, this could lead to production reductions that may seem greater than necessary.

Using the value "**single phase or sum of the 3 phases**" will reduce production losses but will not prevent injection on a particular phase.

For single-phase installations, the "**Phase control**" parameter in the script must be in "**single phase or sum of the 3 phases**" mode.

If communication with the counter is lost or if the script is stopped, the behaviour selected via the "**On error**" parameter is applied.

When the fault disappears, the script starts regulating again.

When a loss of communication with the meter is detected, an alarm file is instantly sent to the portal.



How it works

When the script starts, there is a transitional phase of 60s, corresponding to the average inverter start-up time. No commands are sent during this period.

When WebdynSunPM is restarted or updated, the script is stopped and then restarted. Which applies the strategy defined by the "**On error**" parameter

Prerequisites

WebdynSunPM must be updated to firmware version 4.6.5 or higher.

The script is available in the WebdynSunPM script library from version 5.0.10.

However, it can be retrieved by following the link below and imported via the web interface or the server <http://www.webdyn.com/download/ActivePowerRegulation.zip>

An "ActiveControl" licence specific to the WebdynSunPM being used is required.

Please contact the sales department (<https://www.webdyn.com/contact>) to obtain it. You will be asked for your gateway identifier.

Knowledge of the basic principles of WebdynSunPM operation is strongly recommended.

Please refer to the WebdynSunPM user manual (https://www.webdyn.com/wp-content/uploads/2024/10/WebdynSunPM-User-Manual_EN_V5.03.pdf) for the following information:

- Chapter **§3.2.3.2.2.1 Adding a device** page 102
- Chapter **§3.1.2.2.2 Contents of the definition file** page 66
- Chapter **§3.2.4.1 Importing a service or licence** page 151
- Chapter **§3.1.2.1.4 "<UID>_scl.ini" file** page 63

The settings described below for the inverter and meter definition files are already made in most of the files included in the WebdynSunPM internal library.

In such cases, using the script does not require any additional specific parameterisation of the definition files.

Setting the counters

It is advisable to use meters that communicate via an Ethernet link (Modbus TCP) for faster interrogation and better control performance.

If communication via a serial link is preferred, it is recommended that this interface be dedicated exclusively to communication with the meter itself.

In each definition file used by the meters connected to the concentrator, the following elements must be entered:

- **Category (equipment identification)**

In the header of the definition files, the category field (first line, 2nd column) must be defined with the name "meter". This name is used to identify all the meters to be taken into account by the script.

Generally, a single meter is required to supply the active power at the point of injection.

However, under certain conditions it may be necessary to combine data from several meters in order to obtain the power at the point of injection.

The script automatically adds up the power of all the equipment declared in the "meter" category.

Tips : If a meter needs to be subtracted, in the case of a production meter and a consumption meter for example, simply change the sign of the gain (coef A : column H) of the variables used in the file for the meter to be subtracted.

- **Tags (variable identification)**

In the definition file(s) for the meters connected to the concentrator, you need to identify the power variables, check that they are expressed in kW, adjust the coefficient A (gain) if necessary, and assign them the following tags:

- If the "Phase control" script parameter is set to "Min of the 3 phases".

Active power of phase L1 in kW: "ActivePow1kW" tag

Active power of phase L2 in kW: "ActivePow2kW" tag

Active power of phase L3 in kW: "ActivePow3kW" tag

- If the "Phase control" scrip parameter is set to "single phase or sum of the 3 phases".

Active power of the 3 phases in kW: "ActivePowSumkW" tag

Tags" must be entered in column G (field 7) of the equipment definition file.

If necessary, refer to the equipment manufacturer's manual to identify the necessary variables.



Meter power must be expressed in kW

The sign convention used for meters should be as follows:

Positive values indicate withdrawal and negative values indicate injection.

Example:

meter" category

Tag of instantaneous power variables

```
modbusTCP;meter;Janitza;UMG-604-TCP
1;4;19020;F32;;Real power L1-N;ActivePow1kW;0.001000;0.000000;kW;4
2;4;19022;F32;;Real power L2-N;ActivePow2kW;0.001000;0.000000;kW;4
3;4;19024;F32;;Real power L3-N;ActivePow3kW;0.001000;0.000000;kW;4
4;4;19026;F32;;Psum3=P1+P2+P3;ActivePowSumkW;0.001000;0.000000;kW;4
```

Configuring inverters

The following elements are required in each definition file used by the inverters connected to the concentrator:

- **Category (equipment identification)**

In the definition file header, the category field (first line, 2nd column) must be defined with the name "Inverter". This name is used to identify all the inverters to be controlled.

Tips: To exclude inverters from regulation, simply define another category in their definition file. This may require the file to be duplicated and renamed if it is also used by equipment to be controlled.

- **Tags (variable identification)**

All equipment identified by the "Inverter" category must have the following tags:

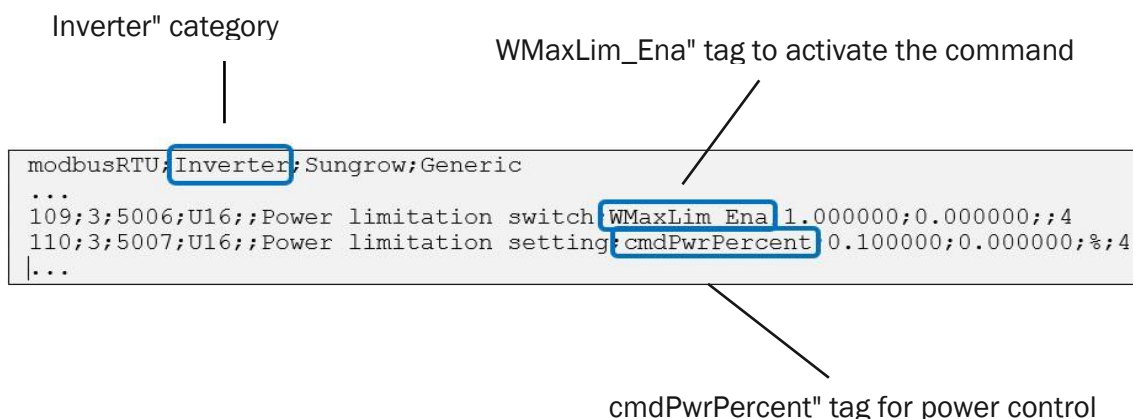
RealPower" tag Used to identify the variable containing the instantaneous active power. This variable is not used directly by the regulation algorithm but is used to test communication with the inverter. In addition, the information appears in the script logs (see Script Log chapter) and is used to confirm the application of power reduction commands.

Tag " **cmdPwrPercent** " : Used to identify the variable receiving the power reduction commands

WMaxLim_Ena" tag (depending on the inverter): Used to identify the power control activation variable.

Tags" must be entered in column G (field 7) of the equipment definition file.

Example:



WebdynSunPM IO settings

Unlike other definition files, it is possible to configure WebdynSunPM IOs directly from the Web interface.

- **Digital input**

The presence of a "DIN1" tag on one of the digital inputs configured as a status read (**dry contact**) enables the inverters to be put into "standby" mode, taking into account the start-up of a *genset* by setting the inverters' output to 0% as long as this contact is active.

By default, closing the contact (changeover to one) stops the inverters, but it is possible to reverse the digital input logic by configuring the digital input with a gain of -1 and an offset of 1.

- **Relay output**

When the "onError" script parameter is configured with the value "Stop with contactor relay", the relay output must be configured with the "RelayOutput" tag.

This device ensures that there is no injection if the control system fails.

Controlling a *Schneider Electric* LC1D115004P7 type power contactor to switch off generation requires the use of a Finder 55.32.9.024.0000 type intermediate relay, as WebdynSunPM's internal relay does not have sufficient switching capacity to provide this function.

Example:

```
1 io;WebdynSunPM;Webdyn:io/SunPM
2 1;2;1;1;;digital1;DIN1;1.000000;0.000000;;4
3 2;2;2;1;;digital2;;1.000000;0.000000;;4
4 3;2;3;1;;digital3;;1.000000;0.000000;;8
5 4;1;1;1;;analog1;;1.000000;0.000000;°C;4
6 5;1;2;1;;analog2;;1.000000;0.000000;None;4
7 6;1;3;1;;analog3;;0.006250;-175.000000;°C;4
8 7;1;4;1;;analog4;;1.000000;0.000000;None;4
9 8;3;1;;;output;RelayOutput;1.000000;0.000000;;4
10
```

DIN1" tag for monitoring dry contacts

RelayOutput" tag for relay control

Script

Loading the script and licence

The script is available in the WebdynSunPM script library from version 5.0.10. However, it can be retrieved via the following link:

<http://www.webdyn.com/download/ActivePowerRegulation.zip>

From the **control** page you can load the script by clicking on the "Add script/licence file" button.

The screenshot shows the 'Services' page in the WebdynSunPM interface. A table lists various services with their names, descriptions, versions, license statuses, and overall status. The 'ActivePowerRegulation' service is highlighted with a red box, showing a 'Missing/Invalid' license. A red arrow points from the 'Add script/licence file' button in the bottom right to the 'Add script/licence file' dialog box, which is also highlighted with a red box. The dialog box has a 'Choose file' section with a 'Script or licence file' button and 'Cancel' and 'Add' buttons.

Name	Description	Version	License	Status
ActivePowerRegulation	Active power regulation	6.0	Missing/Invalid	Disabled
Decouplage	Decouplage	8	Missing/Invalid	Disabled
GenSet-V1_04	Generator	1.04	Missing/Invalid	Disabled
LocalDisplay	Local Display	8	Not required	Disabled
RelayControl	Relay Control	2.0	Not required	Disabled
SendCommand	Send Command	1.0	Not required	Disabled

Checking licence integration:

If the licence is not loaded in the product, the message "Missing/Invalid" appears in the License column.

Add the licence by clicking on the "Add script/licence file" button

The screenshot shows the 'Services' page in the WebdynSunPM interface. The 'ActivePowerRegulation' service is now highlighted with a red box, and its license status has changed from 'Missing/Invalid' to 'Active'. The overall status remains 'Disabled'.

Name	Description	Version	License	Status
ActivePowerRegulation	Active power regulation	6.0	Active	Disabled

The "License" field must read "Active".

Setting up the script and starting it from the Web interface:

Click on the 3 dots at the end of the line to access the extended menu, then click on **Script arg**

Name	Description	Version	License	Status	
ActivePowerRegulation	Active power regulation	6.0	Missing/Invalid	Disabled	⋮
Decouplage	Decouplage	8	Missing/Invalid	D	
GenSet-V1_04	Generator	1.04	Missing/Invalid	D	
LocalDisplay	Local Display	8	Not required	Disabled	

ActivePower

Total plant solar power (kW):

Grid regulation type:

Grid regulation target (kW):

Grid effective regulation (%):

Regulation speed (s):

Phase control:

On error:

A control point is calculated from the parameters entered.

It corresponds to the **Grid regulation target (kW)** to which is added a margin **Grid effective regulation (%)** expressed as a percentage of the installed power **Total plant solar power (kW)** (see *operating principal* section above).

-The "**Grid regulation type**" parameter is used to select an injection or consumption target, as the value of the **Grid regulation target** parameter (kW) must always be positive.

The "**Regulation speed**" parameter is used to limit the command sent to the inverters to allow the meter(s) to reflect the previous command and not create a divergent system. This latency is not respected in the event of an emergency (loss of communication with the meter or value below the **Grid regulation target**).

The "**Phase control**" parameter is used to select whether injection monitoring is to be carried out on the sum of the 3 phases (or on a single phase in the case of a single-phase installation). "**Single phase or sum of the 3 phases**" or on each phase independently: "**Min of the 3 phases**".

-The "On error" parameter is used to select the behaviour of the script when WebdynSunPM is stopped (loss of power, update) or when communication with the counter is lost.


It is possible to perform no action; "none" or to force a predefined percentage for the inverters: "set inverter to" followed by a value in the appropriate field.

On error	Set Percentage
Set inverters to (%)	100

We recommend using it with a value of zero, as this is the safest configuration for preventing injection when there is no contactor installed on site.

Finally, it is possible to select the "stop with contactor relay" parameter, in which case the relay tag must be configured and a power contactor of the "Schneider Electric LC1D115004P7" type must be installed to switch off the production. This requires the use of an intermediate relay of the Finder 55.32.9.024.0000 type, as the WebdynSunPM's internal relay does not have sufficient switching capacity to provide this functionality.

After activating the script using the button at the end of the line, you can access the script log:

Name	Description	Version	License	Status
ActivePowerRegulation	Active power regulation	6.0	Active	Enabled 
Decouplage	Decouplage	8	Missing/Invalid	D
GenSet-V1_04	Generator	1.04	Missing/Invalid	D

- Script arg
- Script logs
- Delete

Logs


```

2024-10-31 10:53:19 [ActivePowerRegulation.luaw 96] ACTIVE CONTROL V6.0 started
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 170] missing tag DIN1
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 189] missing tag RelayOutput
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 224] 3 inverters found
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 239] Inverter 1(INV2) has tag: cmdPwrPercent
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 254] Inverter 1(INV2) has tag: NominalPower
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 270] Inverter 1(INV2) has tag: RealPower
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 239] Inverter 2(INV3) has tag: cmdPwrPercent
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 254] Inverter 2(INV3) has tag: NominalPower
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 270] Inverter 2(INV3) has tag: RealPower
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 239] Inverter 0(INV1) has tag: cmdPwrPercent
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 254] Inverter 0(INV1) has tag: NominalPower
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 270] Inverter 0(INV1) has tag: RealPower
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 311] Error reading Nominal Power on inverter 1
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 311] Error reading Nominal Power on inverter 2
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 311] Error reading Nominal Power on inverter 3
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 319] Warning: nominal power :(calc Vs Declared) 0 / 200.0
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 350] 1 meters found
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 375] Meter 0(Meter1) has tag: ActivePowSumkW
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 148] Power control initialized
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 149] SolarRatedPowerkW200.0
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 150] Regulation limit -0.0 kW
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 151] Regulation target 10.0 kW (5.0 %)
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 152] Regulation speed 5.0
2024-10-31 10:53:19 [ActivePowerRegulation.luaw 251] Meter 1 reading fail

```

When the script is started, the log file summarises the equipment found and the tags present in the files associated with this equipment.

If one of the tags is missing, the script will not start, and the log file will show the missing tags:

Name	Description	Version	License	Status
ActivePowerRegulation	Active power regulation	6.0	Active	Error 

```

2024-10-31 13:09:41 [ActivePowerRegulation.luaw 96] ACTIVE CONTROL V6.0 started
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 224] 3 inverters found
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 239] Inverter 1(INV2) has tag: cmdPwrPercent
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 254] Inverter 1(INV2) has tag: NominalPower
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 273] inverter 1(INV2) missing tag: RealPower
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 276] Load balancing mandatory
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 239] Inverter 2(INV3) has tag: cmdPwrPercent
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 254] Inverter 2(INV3) has tag: NominalPower
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 273] inverter 2(INV3) missing tag: RealPower
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 276] Load balancing mandatory
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 239] Inverter 0(INV1) has tag: cmdPwrPercent
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 254] Inverter 0(INV1) has tag: NominalPower
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 273] inverter 0(INV1) missing tag: RealPower
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 276] Load balancing mandatory
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 311] Error reading Nominal Power on inverter 1
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 311] Error reading Nominal Power on inverter 2
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 311] Error reading Nominal Power on inverter 3
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 319] Warning: nominal power :(calc Vs Declared) 0 / 200.0
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 350] 1 meters found
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 375] Meter 0(Meter1) has tag: ActivePowSumkW
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 426] Config error
2024-10-31 13:09:41 [ActivePowerRegulation.luaw 427] STOP
    
```



During operation, if communication with the counter is lost, the strategy defined by the "on error" parameter is applied and a connection to the remote server is initiated in order to deposit an alarm file.

Setting up and starting the script from the remote server

From the remote server, the "<uid>_scl.ini" file is used to configure and activate scripts, and is located in the /Config directory.

The **SCRIPT_Enable[n]** parameter indicates the operating state and enables activation (=1) and deactivation (=0) of the script identified by the **SCRIPT_File[n]** parameter, which in this case is ActivePowerRegulation.luaw.

The **SCRIPT_Args[n]** parameter in the "<uid>_scl.ini" file.

It uses the same configuration elements as those described in the Web interface.

The correspondence between the names of the different parameters is described in the table below.

Example.UID_scl.ini file

```
1  SCRIPT_Args[0]="solarRatedPowerKW":200,"gridRegulationType":"injection","gridRegulationTargetKW":0,"gridEffectiveRegulationPercent":5,"reg
2  SCRIPT_Enable[0]=1
3  SCRIPT_File[0]=ActivePowerRegulation.luaw
4  SCRIPT_Args[1]=
5  SCRIPT_Enable[1]=0
6  SCRIPT_File[1]=Decouplage.luaw
7  SCRIPT_Args[2]=
8  SCRIPT_Enable[2]=0
9  SCRIPT_File[2]=GenSet-V1_04.luaw
10 SCRIPT_Args[3]=
11 SCRIPT_Enable[3]=0
12 SCRIPT_File[3]=LocalDisplay.lua
13 SCRIPT_Args[4]=
14 SCRIPT_Enable[4]=0
15 SCRIPT_File[4]=RelayControl.lua
16 SCRIPT_Args[5]=
17 SCRIPT_Enable[5]=0
18 SCRIPT_File[5]=SendCommand.lua
```

```
SCRIPT_Args[n]={ "solarRatedPowerKW":200, "gridRegulationType": "consumption",
"gridRegulationTargetKW":0, "gridEffectiveRegulationPercent":5, "regulationSpeedS":5, "phaseControl":
"sum", "errorAction": "setTo", "setToPercent":0}
```

Description of script parameters :

Name of the script parameter in the web interface	Name of the parameter in the "<uid>_scl.ini" file.	Description	Type	Default value	Name of the script parameter in the web interface	Name of the parameter in the "<uid>_scl.ini" file.	Description	Type	Default value
Total plant solar power	solarRatedPowerKW	Maximum power in kW of the solar power plant	Whole number positive	200	Total plant solar power	solarRatedPowerKW	Maximum power in kW of the solar power plant	Whole number positive	200
Grid regulation type	gridRegulationType	Type of control : -injection: The regulation target value (gridRegulationTargetKW) is an injection value (positive): see below. -consumption: The control target value (gridRegulationTargetKW) is a (positive) consumption value: see below.	List : - injection - consumption	injection	Grid regulation type	gridRegulationType	Type of control : -injection: The regulation target value (gridRegulationTargetKW) is an injection value (positive): see below. - consumption: The control target value (gridRegulationTargetKW) is a (positive) consumption value: see below.	List : - injection - consumption	injection

Grid regulation target	gridRegulationTargetKW	<p>Target value in kW for regulation, the operation of this value depends on the type of regulation (gridRegulationType)</p> <p>-injection: The regulation target value (gridRegulationTargetKW) represents the maximum value that can be injected.</p> <p>- consumption : The regulation target value (gridRegulationTargetKW) is the minimum value that you are allowed to consume.</p>	Whole number positive	0	Grid regulation target	gridRegulationTargetKW	<p>Target value in kW for regulation, the operation of this value depends on the type of regulation (gridRegulationType)</p> <p>-injection: The regulation target value (gridRegulationTargetKW) represents the maximum value that can be injected.</p> <p>- consumption: The regulation target value (gridRegulationTargetKW) is the minimum value that you are allowed to consume.</p>	Whole number positive	0
Grid effective regulation	gridEffectiveRegulationPercent	<p>as a % of the installed solar power; this value is used to calculate the regulation operating point.</p> <p>This information indicates the margin calculated in relation to the target</p>	Whole number positive	5	Grid effective regulation	gridEffectiveRegulationPercent	<p>as a % of the installed solar power; this value is used to calculate the regulation operating point.</p> <p>This information indicates the margin calculated in relation to</p>	Whole number positive	5

		(top margin) and the actual value of the regulation.					the target (top margin) and the actual value of the regulation.		
Regulation speed	regulationSpeedS	Time of each step in seconds of regulation management	Whole number positive	5	Regulation speed	regulationSpeedS	Time of each step in seconds of regulation management	Whole number positive	5
Phase control	phaseControl	Regulation can be managed in 2 different ways: Single phase or sum of the 3 phases (sum): On all phases in three-phase or on one phase in single-phase. -Min of the 3 phases (min) On the weakest phase (only possible for a three-phase installation)	List : -sum -min	sum	Phase control	phaseControl	Regulation can be managed in 2 different ways: Single phase or sum of the 3 phases (sum): On all phases in three-phase or on one phase in single-phase. -Min of the 3 phases (min) On the weakest phase (only possible for a three-phase installation)	List : -sum -min	sum
On error	errorAction	In the event of an equipment error or script stoppage, there are 3 possible scenarios: -none: Current regulation -Set inverters to (setTo): Percentage control in relation to a value entered in the "setToPercent" parameter.	List : -none -setTo -stop	none	On error	errorAction	In the event of an equipment error or script stoppage, there are 3 possible scenarios: -none: Current regulation -Set inverters to (setTo): Percentage control in relation to a value entered	List : -none -setTo -stop	none

		-Stop with contactor relay (stop): Relay opens (set relay parameters using the "RelayOutput" tag)					in the "setToPercent" parameter. -Stop with contactor relay (stop): Relay opens (set relay parameters using the "RelayOutput" tag)		
	setToPercent		Percentage of desired power in the event of an error. (Only if the "errorAction" parameter is in "setTo" mode)	Whole number positive	100	setToPercent	Percentage of desired power in the event of an error. (Only if the "errorAction" parameter is in "setTo" mode)	Whole number positive	100

Exploiting logs

See chapter 4.1.8.2: "Script logs" in the WebdynSunPM manual.

The script logs accessible from the concentrator's web interface are available on the remote server or a file is saved each time a connection is made in the /LOG directory in the following format: WPM000000_LUA_ActivePowerRegulation_241031_150000.log.gz

With the example below:

```
24/10/04-08:52:59;RegulationPoint:1.80kW ;RegulationLimit:0.00kW ;loop:5.0 s
24/10/04-08:52:59;tune;state:running;meterValue:40.61596875 kW ;requested variation:21.564427083333 % ;inv command:100 %
24/10/04-08:53:00;meter value is 40.31971484375
24/10/04-08:53:01;meter value is 25.328072265625
24/10/04-08:53:01;meter value is 25.328072265625
24/10/04-08:53:01;no new meter value
24/10/04-08:53:02;meter value is 24.556755859375
24/10/04-08:53:02;meter value is 24.0140078125
24/10/04-08:53:03;meter value is 24.26965234375
24/10/04-08:53:03;meter value is 24.26965234375
24/10/04-08:53:03;no new meter value
24/10/04-08:53:04;meter value is 23.78146484375
24/10/04-08:53:05;meter value is 22.245443359375
24/10/04-08:53:05;meter value is 21.78450390625
24/10/04-08:53:06;meter value is 21.78450390625
24/10/04-08:53:06;no new meter value
24/10/04-08:53:06;meter value is 22.246576171875
24/10/04-08:53:06;variation(21.564427083333->11.359208984375 %)
24/10/04-08:53:06;command(100->100 %)
24/10/04-08:53:06;command sent:100(100%) to inverter 1(43538/60KW)
24/10/04-08:53:06;command sent:100(100%) to inverter 2(40272/60KW)
24/10/04-08:53:06;command sent:100(100%) to inverter 3(39766/60KW)
24/10/04-08:53:06;RegulationPoint:1.80kW ;RegulationLimit:0.00kW ;loop:5.0 s
24/10/04-08:53:07;tune;state:running;meterValue:22.246576171875 kW ;requested variation:11.359208984375 % ;inv command:100 %
24/10/04-08:53:07;meter value is 24.85178515625
24/10/04-08:53:08;meter value is 21.26494921875
24/10/04-08:53:08;meter value is 18.313375
24/10/04-08:53:09;meter value is 18.313375
24/10/04-08:53:09;no new meter value
24/10/04-08:53:09;meter value is 19.121578125
24/10/04-08:53:10;meter value is 17.48408984375
24/10/04-08:53:10;meter value is 17.095189453125
24/10/04-08:53:11;meter value is 17.095189453125
24/10/04-08:53:11;no new meter value
24/10/04-08:53:12;meter value is 19.07495703125
24/10/04-08:53:12;meter value is 21.75724609375
24/10/04-08:53:13;meter value is 20.2193359375
24/10/04-08:53:13;variation(11.359208984375->10.232964409722 %)
24/10/04-08:53:13;command(100->100 %)
24/10/04-08:53:13;command sent:100(100%) to inverter 1(43573/60KW)
24/10/04-08:53:13;command sent:100(100%) to inverter 2(40292/60KW)
24/10/04-08:53:13;command sent:100(100%) to inverter 3(39876/60KW)
24/10/04-08:53:13;RegulationPoint:1.80kW ;RegulationLimit:0.00kW ;loop:5.0 s
24/10/04-08:53:13;tune;state:running;meterValue:20.2193359375 kW ;requested variation:10.232964409722 % ;inv command:100 %
```

Each control loop repeats the following 2 lines

```
24/10/04-08:52:59;RegulationPoint:1.80kW ;RegulationLimit:0.00kW ;loop:5.0 s
24/10/04-08:52:59;tune;state:running;meterValue:40.61596875 kW ;requested variation:21.564427083333 % ;inv command:100 %
```

The first summarises the settings:

-RegulationPoint corresponds to the effective regulation point (threshold + percentage of total power)

-RegulationLimit corresponds to the threshold defined by **Grid regulation target**, in this case zero injection.

-loop refers to the "**Regulation speed**" parameter in the configuration. These 2 lines are repeated approximately every 5s.

The second gives the result of the analysis of the control algorithm

- The first 2 fields indicate the control status
 - The first field is set to "tune" in normal operation and "warn" if the counter value is below the threshold limit.
 - The second field will indicate *state: running* in the first case and *state: limit* in the second.
- MeterValue* indicates the reference value supplied by the meter(s).
- Requested variation* shows the change in the percentage of power required in relation to the actual control value.
- Finally, the *inv command* field indicates the percentage of command sent to each inverter.

Between 2 control loops, the meter continues to be monitored and the values read are displayed. The "no new meter value" log indicates that the meter value has not changed. The meter register table has probably not been updated on the meter side.

Below is an example of a log showing a reduction in inverter power and an immediate command being sent following a meter reading below the threshold limit.

The 5s delay is then ignored.

```
24/10/04-09:35:08;RegulationPoint:1.80kW ;RegulationLimit:0.00kW ;loop:5.0 s
24/10/04-09:35:08;tune;state:running;meterValue:1.1867084960937 kW ;requested variation:-0.34071750217014 % ;inv command:61.743374892341 %
24/10/04-09:35:09;meter value is 1.1760515136719
24/10/04-09:35:10;meter value is 1.6058214111328
24/10/04-09:35:10;meter value is 1.7040106201172
24/10/04-09:35:11;meter value is 1.7040106201172
24/10/04-09:35:11;no new meter value
24/10/04-09:35:11;meter value is 3.1224379882812
24/10/04-09:35:12;meter value is 2.8238583984375
24/10/04-09:35:12;meter value is 2.7799497070313
24/10/04-09:35:13;meter value is 2.7799497070313
24/10/04-09:35:13;no new meter value
24/10/04-09:35:13;meter value is 1.1767595214844
24/10/04-09:35:14;meter value is 35.79412890625
24/10/04-09:35:15;meter value is 11.716805664063
24/10/04-09:35:15;variation(-0.34071750217014->5.5093364800347 %)
24/10/04-09:35:15;command(61.743374892341->67.252711372376 %)
24/10/04-09:35:15;command sent:67.252711372376(67.252711372376%) to inverter 1(40727/60KW)
24/10/04-09:35:15;command sent:67.252711372376(67.252711372376%) to inverter 2(40724/60KW)
24/10/04-09:35:15;command sent:67.252711372376(67.252711372376%) to inverter 3(40848/60KW)
24/10/04-09:35:15;RegulationPoint:1.80kW ;RegulationLimit:0.00kW ;loop:5.0 s
24/10/04-09:35:15;tune;state:running;meterValue:11.716805664063 kW ;requested variation:5.5093364800347 % ;inv command:67.252711372376 %
24/10/04-09:35:15;meter value is 11.763559570313
24/10/04-09:35:16;meter value is 11.763559570313
24/10/04-09:35:16;no new meter value
24/10/04-09:35:17;meter value is 6.1694033203125
24/10/04-09:35:17;meter value is 0.58923120117187
24/10/04-09:35:18;meter value is -6.8441318359375
24/10/04-09:35:18;variation(5.5093364800347->-4.8022954644097 %)
24/10/04-09:35:18;command(67.252711372376->62.450415907966 %)
24/10/04-09:35:18;command sent:62.450415907966(62.450415907966%) to inverter 1(40727/60KW)
24/10/04-09:35:18;command sent:62.450415907966(62.450415907966%) to inverter 2(40724/60KW)
24/10/04-09:35:18;command sent:62.450415907966(62.450415907966%) to inverter 3(40723/60KW)
24/10/04-09:35:18;RegulationPoint:1.80kW ;RegulationLimit:0.00kW ;loop:5.0 s
24/10/04-09:35:18;warn;state:limit;meterValue:-6.8441318359375 kW ;requested variation:-4.8022954644097 % ;inv command:62.450415907966 %
24/10/04-09:35:19;meter value is -6.957080078125
24/10/04-09:35:19;tempo
24/10/04-09:35:19;meter value is 22.1135546875
24/10/04-09:35:19;variation(-4.8022954644097->11.285308159722 %)
24/10/04-09:35:19;command(62.450415907966->73.735724067688 %)
24/10/04-09:35:19;command sent:73.735724067688(73.735724067688%) to inverter 1(42212/60KW)
24/10/04-09:35:19;command sent:73.735724067688(73.735724067688%) to inverter 2(40724/60KW)
24/10/04-09:35:19;command sent:73.735724067688(73.735724067688%) to inverter 3(40723/60KW)
24/10/04-09:35:19;RegulationPoint:1.80kW ;RegulationLimit:0.00kW ;loop:5.0 s
24/10/04-09:35:19;tune;state:running;meterValue:22.1135546875 kW ;requested variation:11.285308159722 % ;inv command:73.735724067688 %
```

Alternative script:

It is possible to adjust the behaviour of the script on request to Webdyn's technical support (support@webdyn.com).

It is possible, for example, to configure an alternative source as a power reference, such as a 4-20mA analogue input or a register for the Modbus Slave function.

It is also possible to enable the alarm to be sent on loss of communication with the inverters; by default, only the meter causes this to be sent.

It is also possible to send data from the script to WebdynSunPM's standard data files so that they can be used by the portal as data from a supervised device.

Recommended equipment

We can currently confirm that the script works correctly with the following equipment:

Inverters:

Sungrow; Huawei; Goodwee (MT, HT); Sofarsolar; Growatt; SMA (core2, STPX)

Counter:

Janitza (UMG604, UMG96RM); Lettel (MCX4 34V); Schneider (IEM32xx, PM55xx)

For compatibility with other equipment, please contact us at support@webdyn.com.