webdyn
Flexitron group

WebdynSunPM

Application Note

PowerDirectControl

www.webdyn.com

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Introduction

This application note describes how to implement the **PowerDirectControl script**
This script allows you to control the active and reactive power of all the inverters of a power plant via the writing of applied variables:

- Directly to all inverters or
- Adjusted to obtain consistent production values from the point of view of the plant as a whole.

The control variables can be modified live by:

MODBUS	✅
FTP	✅
MQTT	✅
HTTP POST	✅

⚠ *script requires the purchase of a license, please contact Webdyn's sales department to obtain this license*

Prerequisites

- SunPM Firmware > v 4.6.5
- Script **PR08-08 PowerDirectControl** activée
  - Script available in the library from FW v 5.1.05 or direct link
  - License file acquired from Webdyn sales
- Knowledge of how the WebdynSunPM works - User Manual

The settings described below on the inverter definition files are already made in most of the files integrated into the WebdynSunPM internal library.
In such cases, the use of the script does not require any additional specific settings on the definition files.

Inverter settings

For the script to work properly, each inverter definition file that you want to check must comply with the following points.

Category (equipment identification)

In the header of the definition file, the category field (first row, 2nd column) must be defined with the name **Inverter**. It is this name that identifies all the inverters to be checked.

Tags (identification des variables)

All devices identified by the **Inverter** category must contain tags that are necessary for the script to function. Tags must be populated in column G (fields 7) of the asset definition file. Some tags are optional.

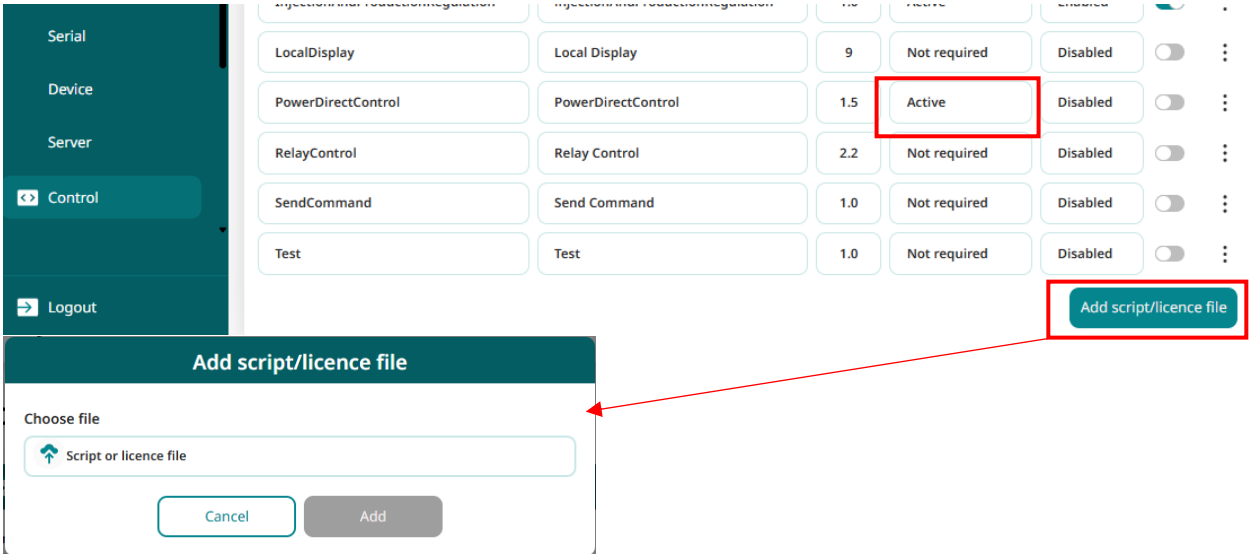
Tags	Required/ Optional	Comments
Active Power Control		
RealPower	Required	Active power of the control unit
cmdPwrPercent	Required	
WMaxLim_Ena	Optional	Enabling order fulfillment
WMaxLimPct_RmpTms	Optional	Zeroing of control ramps
WMaxLimPct_RvrtTms	Optional	Cancellation of the original power restoration instruction in the absence of writing
Reactive Power Control		
ReactivePower	Required	Reactive power of the power plant
VArPct_Mod	Optional	Enabling order fulfillment
VArPct_RmpTms	Optional	Zeroing of control ramps
VArPct_RvrtTms	Optional	Cancellation of the original power restoration instruction in the absence of writing
CmdPF	Optional	Power factor between [-1, -0.7] or [0.7, 1]
cmdPFint	Optional	Power factor between [-100, -70] or [70, 100]
cmdQPct	Optional	Reactive Power in % [-100%, 100%]
cmdAngle	Optional	Phase shift angle [-45°,45°]

No tag duplication is allowed in a definition file

Script

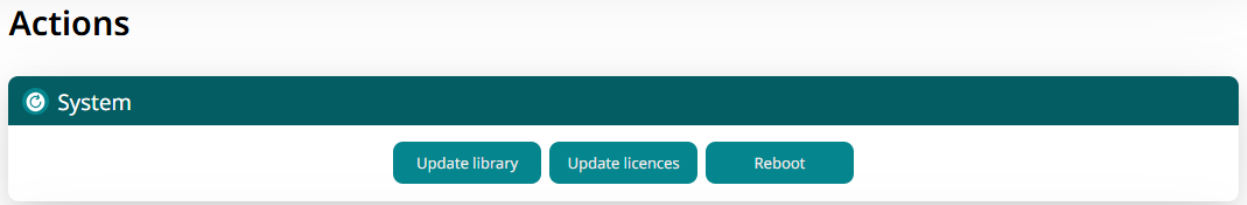
Loading the script and license

The latest up-to-date version must be retrieved – see Prerequisites.
From the **Control** page , you can load the script by clicking on the "*Add script/licence file*" button.



License Integration Verification:

If the license is not loaded into the product, the message **Missing/Invalid** appears in the License column.
The license can be automatically imported by clicking the **Update Licenses button** on the System>Actions page



Or by importing the license file that was sent to you by clicking on the **Add script/licence file button.**

The "License" field must indicate "Active"

Script Setup

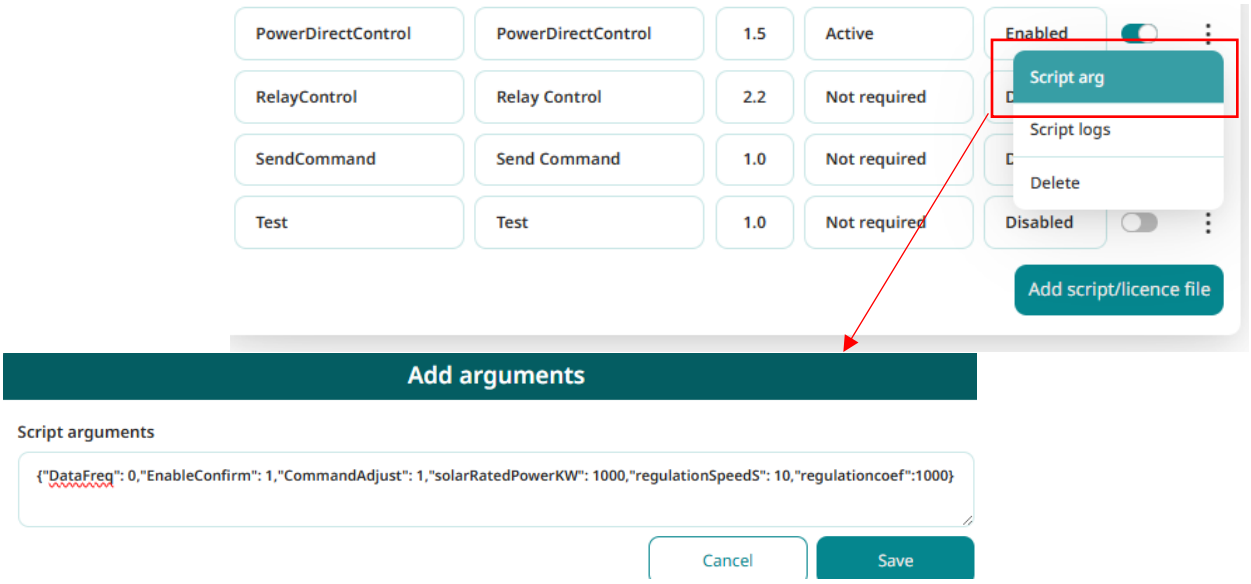
It is possible to modify some parameters of the script to adjust its behavior, the following variables can be adjusted using the "json" structure described below:

Settings	Description	Possible values
DataFreq	The interval at which the script variables (virtual device) are written to the data file transmitted to the server	0: No write to the data file > 0: Interval in sec
EnableConfirm	Sending a command to acknowledgement of the previous order. Required for some inverters.	0: Disabled 1: Enabled
CommandAdjust	Activates the adjustment of the individual inverter control. The script then uses the declared output of each inverter to correct the control based on the declared power of the installation via the "**SolarRatedPowerKW**" parameter.	0: Disabled 1: Enabled
solarRatedPowerKW	power of the system in kW	> 0
regulationSpeedS	speed of transmission of commands in seconds in order to avoid too rapid variations and to allow the system to converge.	Default: 5s
regulationCoef	The script uses powers in kW. This parameter converts the power of the inverters set to W generally	Default: 1000

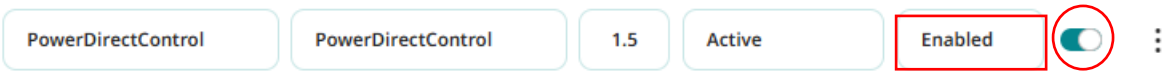
```
{
        "DataFreq":0,
        "EnableConfirm":1,
        "CommandAdjust":1,
        "solarRatedPowerKW":1000,
        "regulationSpeedS":5,
        ”regulationcoef”:1000
}
```

Setting up and starting the script from web pages.

The previously described json structure should be copied directly into the parameter input field if a change to the defaults is needed. If no configuration is required, the default settings are applied.



The script is activated by clicking on the button at the end of the line:



Setting up and starting the script from the remote server

From the remote server, the <**uid>_scl.ini** file allows the configuration and activation of scripts, it is present in the **/Config directory.**

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

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

```
SCRIPT_Args[6]={"VD_DisplayFreq": 0,"EnableConfirm": 1,"CommandAdjust": 1,"solarRatedPowerKW": 1000,"regulationSpeedS": 5}
SCRIPT_Enable[6]=1
SCRIPT_File[6]=PowerDirectControl.luaw
```

Working principle

The script provides a series of variables that are described in the "**WPMXXXXXX_Script_PowerDirectControl.csv" file** deposited in the /DEF directory of the server.

none	Script	Script	PowerDirectControl						
1			F32		PFfloat	PFfloat	1.000000	0.000000	4
2			I16		PFinteger	PFinteger	1.000000	0.000000	4
3			U16		PowerPct	PowerPct	1.000000	0.000000	4
4			U16		PowerPml	PowerPml	1.000000	0.000000	4
5			I16		Qpct	Qpct	1.000000	0.000000	4
6			U32		TotInvPower	TotInvPower	1.000000	0.000000	4
7			U32		TotInvQPower	TotInvQPower	1.000000	0.000000	4
8			I16		angle	angle	1.000000	0.000000	4

It describes the variables in the script in the same way that the other files in this directory describe the variables that are accessible on a physical device. In the case of the script, we speak of virtual equipment.

Two variables allow the reporting of the active and reactive power of the inverters

TotInvPower	Instantaneous active power of the control unit
TotInvQPower	Instantaneous reactive power of the control unit

Active Power Management

PowerPct	Active power generation control in percent of the rated power of the inverters
PowerPml	Active power generation control in per thousand of the nominal power of the inverters

Reactive Power Management

PFinterger	power factor control expressed in hundreds of cos phi with sine sign phi on ranges [-100;-70] [70; 100]
PFfloat	Cos Phi power factor control with phi sine sign on ranges [-1;-0.7] [0.7; 1]
Qpct	Reactive power control as a percentage of the nominal power of the inverters
Angle	Controlling the pH value between -45° and 45°.

In each control group (Active Power and Reactive Power), writing one variable causes the other variables in the group to update.
The last command issued is applied. There is no priority between the different media through which orders are issued.

Variables are automatically saved and reissued when the WebdynSunPM device is shut down or restarted.

Remote control of the control panel

The script contains a series of functions used to modify the values of the variables previously described.

PowerPct	♋♦	SetActivePowerPct
PowerPml	♋♦	SetActivePowerPml
PFinteger	♋♦	SetPFinteger
PFfloat	♋♦	SetPFfloat
Qpct	♋♦	SetReactivePowerPct
Angle	♋♦	SetAngle

These functions can be called up by any means made available on the WebdynSunPM

- Command file via FTP server /CMD directory
- Requests via the "command" topic of the MQTT server
- http POST requests

Control by sending orders via an FTP server

By dropping the following command file on the FTP server in the /CMD directory.
The command file must have the following format:
< uid>_cmd.json
For example, the command below causes the power of the inverters to be set to 50%.

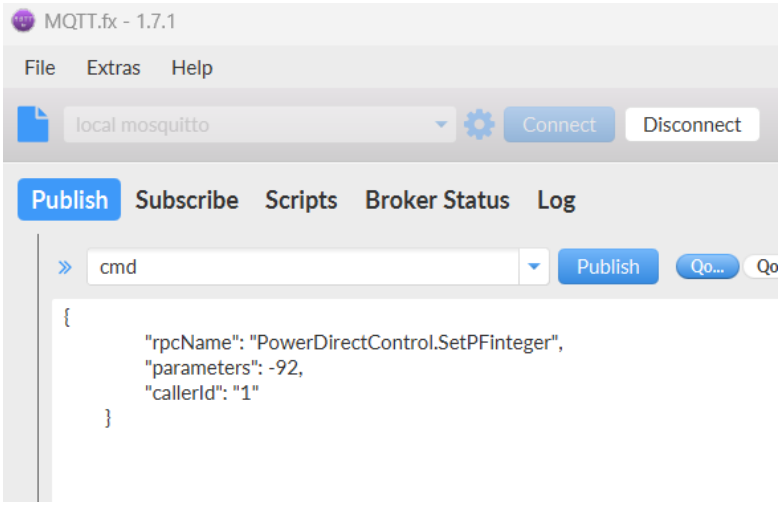
```
[
    {
        "rpcName": "PowerDirectControl.SetActivePowerPct",
        "parameters": 50,
        "callerId": "1"
    }
]
```


on the frequency of connection to the server. For immediate consideration, you should favor post requests or the MQTT server. A permanent connection is required for these types of use.

Control by sending a command via an MQTT server

To configure the connection of the WebdynSunPM to an MQTT server, refer to the user manual. As the MQTT connection does not allow the monitoring of the datalogger configuration, only server 2 can be configured with this type of connection.
Make sure you have defined a **Commandtopic** and a **ResultTopic** in order to allow the receipt of commands and the sending of the result.

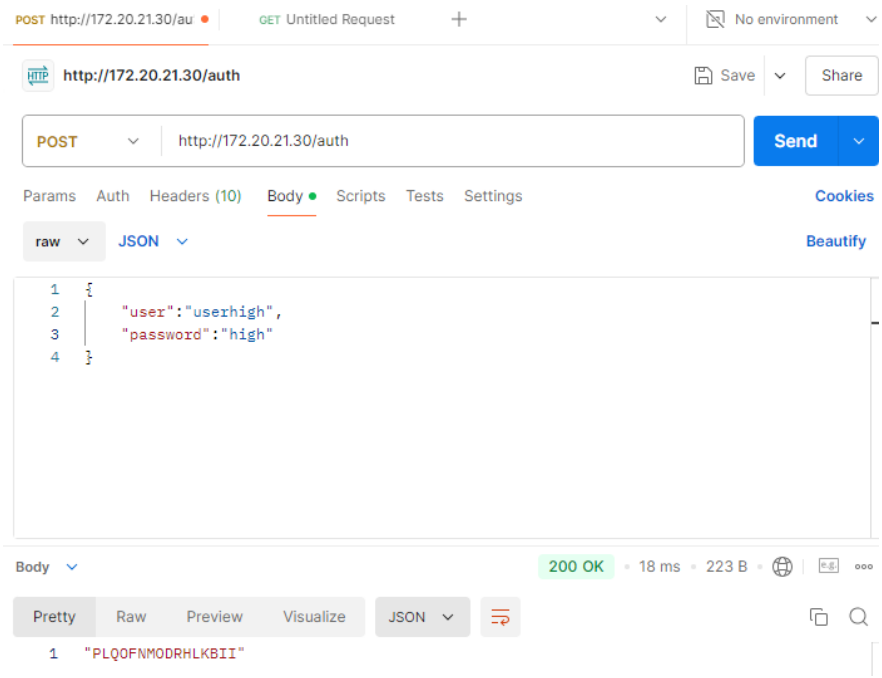
Piloting commands can be transmitted via software that allows you to subscribe to an MQTTfx broker (https://www.softblade.de/download/).
Below is an example of writing a power factor of -0.92



Sending a POST request

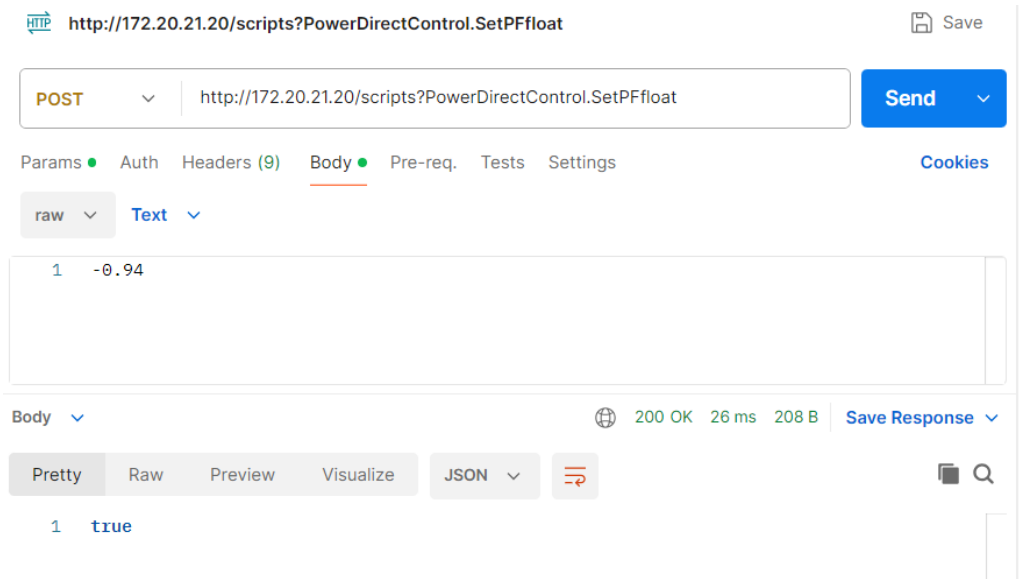
Before sending a post command to the WebdynSunPM, it is necessary to log on by sending an authentication request as follows using the Postman API for example (https://web.postman.co/).

Below is the logon command:



After authentication, you can then call the commands described above.

In the example below, a command to change the reactive power by power factor:



Local control of the plant

Controlling by sending Modbus requests

The local control of the variables described above is done by sending Modbus write requests.
To do this, you have to "map" the variables in the modbus slave using the description file of the register table internal to the WebdynSunPM. You can then send write requests to the chosen registers.

Like what:

	A	B	C	D	E	F	G	H	I	J	K
1	ModbusSlave										
2	1		0_4	U32	PowerDirectControl		TotInvPower	1	0		4
3	2		2_4	U32	PowerDirectControl		TotInvQPower	1	0		4
4	3		4	U16	PowerDirectControl		PowerPct	1	0		4
5	4		5	U16	PowerDirectControl		PowerPml	1	0		4
6	5		6_4	F32	PowerDirectControl		PFfloat	1	0		4
7	6		8	I16	PowerDirectControl		PFinteger	1	0		4
8	7		9	I16	PowerDirectControl		Qpct	1	0		4
9	8		10	I16	PowerDirectControl		angle	1	0		4

Variables in the script can be declared in any customer-only registry and available at addresses between 0 and 32000
Refer to the manual for configuring Modbus slave registers.

SendCommand scripted driving

The previously described variables can also be modified from the webdynSunPM web interface using the SendCommand script with the appropriate parameterization.
For example, below is the modification of the PFfloat variable:

Log exploitation

Script logs contain no trace until a command is sent to the UPS, so that it is easy to trace the different commands received.

In the example log below, we see the initialization of all the inverters with the active and reactive power control tags of each of the 8 inverters declared in this example.
Followed by their initialization at 100% active power and a power factor of 1

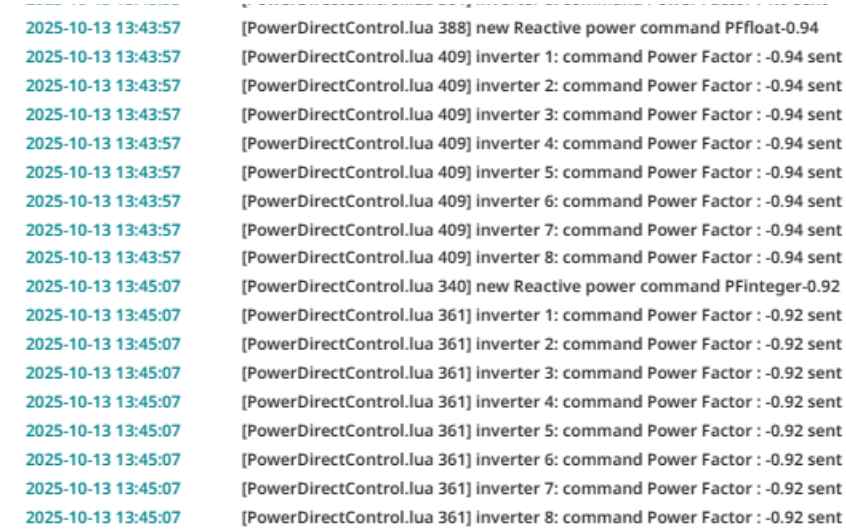
```
2025-10-10 09:06:51  [PowerDirectControl.lua 31] PowerDirectControl V1.6 started
2025-10-10 09:06:51  [PowerDirectControl.lua 81] Creation or update of template WPM0117B5_Script_PowerDirectControl.csv
2025-10-10 09:06:51  [PowerDirectControl.lua 147] 8 inverters found
2025-10-10 09:06:51  [PowerDirectControl.lua 167] Inverter 1(INV2) has tag: RealPower
2025-10-10 09:06:51  [PowerDirectControl.lua 175] Inverter 1(INV2) has tag: cmdPwrPercent
2025-10-10 09:06:51  [PowerDirectControl.lua 181] Inverter 1(INV2) has tag: cmdPF
2025-10-10 09:06:51  [PowerDirectControl.lua 167] Inverter 2(INV3) has tag: RealPower
2025-10-10 09:06:51  [PowerDirectControl.lua 175] Inverter 2(INV3) has tag: cmdPwrPercent
2025-10-10 09:06:51  [PowerDirectControl.lua 181] Inverter 2(INV3) has tag: cmdPF
2025-10-10 09:06:51  [PowerDirectControl.lua 167] Inverter 3(INV4) has tag: RealPower
2025-10-10 09:06:51  [PowerDirectControl.lua 175] Inverter 3(INV4) has tag: cmdPwrPercent
2025-10-10 09:06:51  [PowerDirectControl.lua 181] Inverter 3(INV4) has tag: cmdPF
2025-10-10 09:06:51  [PowerDirectControl.lua 167] Inverter 4(INV5) has tag: RealPower
2025-10-10 09:06:51  [PowerDirectControl.lua 175] Inverter 4(INV5) has tag: cmdPwrPercent
2025-10-10 09:06:51  [PowerDirectControl.lua 181] Inverter 4(INV5) has tag: cmdPF
2025-10-10 09:06:51  [PowerDirectControl.lua 167] Inverter 5(INV6) has tag: RealPower
2025-10-10 09:06:51  [PowerDirectControl.lua 175] Inverter 5(INV6) has tag: cmdPwrPercent
2025-10-10 09:06:51  [PowerDirectControl.lua 181] Inverter 5(INV6) has tag: cmdPF
2025-10-10 09:06:51  [PowerDirectControl.lua 167] Inverter 6(INV7) has tag: RealPower
2025-10-10 09:06:51  [PowerDirectControl.lua 175] Inverter 6(INV7) has tag: cmdPwrPercent
2025-10-10 09:06:51  [PowerDirectControl.lua 181] Inverter 6(INV7) has tag: cmdPF
2025-10-10 09:06:51  [PowerDirectControl.lua 167] Inverter 7(INV8) has tag: RealPower
2025-10-10 09:06:51  [PowerDirectControl.lua 175] Inverter 7(INV8) has tag: cmdPwrPercent
2025-10-10 09:06:51  [PowerDirectControl.lua 181] Inverter 7(INV8) has tag: cmdPF
2025-10-10 09:06:51  [PowerDirectControl.lua 167] Inverter 0(INV1) has tag: RealPower
2025-10-10 09:06:51  [PowerDirectControl.lua 175] Inverter 0(INV1) has tag: cmdPwrPercent
2025-10-10 09:06:51  [PowerDirectControl.lua 181] Inverter 0(INV1) has tag: cmdPF
2025-10-10 09:06:52  [PowerDirectControl.lua 286] new command = 100%
2025-10-10 09:06:52  [PowerDirectControl.lua 300] inverter 1: command cdePwrPercent : 100 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 300] inverter 2: command cdePwrPercent : 100 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 300] inverter 3: command cdePwrPercent : 100 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 300] inverter 4: command cdePwrPercent : 100 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 300] inverter 5: command cdePwrPercent : 100 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 300] inverter 6: command cdePwrPercent : 100 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 300] inverter 7: command cdePwrPercent : 100 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 300] inverter 8: command cdePwrPercent : 100 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 360] inverter 1: command Power Factor : 1.0 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 360] inverter 2: command Power Factor : 1.0 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 360] inverter 3: command Power Factor : 1.0 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 360] inverter 4: command Power Factor : 1.0 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 360] inverter 5: command Power Factor : 1.0 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 360] inverter 6: command Power Factor : 1.0 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 360] inverter 7: command Power Factor : 1.0 sent
2025-10-10 09:06:52  [PowerDirectControl.lua 360] inverter 8: command Power Factor : 1.0 sent
```

Then we see the receipt of an order at 5% active power and then 50%.
Receiving an order starts with the line:

[PowerDirectControl.lua 314] new command = 5.0%

```
2025-10-13 07:48:22  [PowerDirectControl.lua 314] new command = 5.0%
2025-10-13 07:48:22  [PowerDirectControl.lua 328] inverter 1: command cdePwrPercent : 5.0 sent
2025-10-13 07:48:23  [PowerDirectControl.lua 328] inverter 2: command cdePwrPercent : 5.0 sent
2025-10-13 07:48:23  [PowerDirectControl.lua 328] inverter 3: command cdePwrPercent : 5.0 sent
2025-10-13 07:48:23  [PowerDirectControl.lua 328] inverter 4: command cdePwrPercent : 5.0 sent
2025-10-13 07:48:23  [PowerDirectControl.lua 328] inverter 5: command cdePwrPercent : 5.0 sent
2025-10-13 07:48:23  [PowerDirectControl.lua 328] inverter 6: command cdePwrPercent : 5.0 sent
2025-10-13 07:48:23  [PowerDirectControl.lua 328] inverter 7: command cdePwrPercent : 5.0 sent
2025-10-13 07:48:23  [PowerDirectControl.lua 328] inverter 8: command cdePwrPercent : 5.0 sent
2025-10-13 07:50:40  [PowerDirectControl.lua 314] new command = 50.0%
2025-10-13 07:50:40  [PowerDirectControl.lua 328] inverter 1: command cdePwrPercent : 50.0 sent
2025-10-13 07:50:40  [PowerDirectControl.lua 328] inverter 2: command cdePwrPercent : 50.0 sent
2025-10-13 07:50:40  [PowerDirectControl.lua 328] inverter 3: command cdePwrPercent : 50.0 sent
2025-10-13 07:50:40  [PowerDirectControl.lua 328] inverter 4: command cdePwrPercent : 50.0 sent
2025-10-13 07:50:40  [PowerDirectControl.lua 328] inverter 5: command cdePwrPercent : 50.0 sent
```

Below is another example with the reception of a power factor command (floating) at -0.94 and then an integer at -92.



```
2025-10-13 13:43:57  [PowerDirectControl.lua 388] new Reactive power command PFfloat-0.94
2025-10-13 13:43:57  [PowerDirectControl.lua 409] inverter 1: command Power Factor : -0.94 sent
2025-10-13 13:43:57  [PowerDirectControl.lua 409] inverter 2: command Power Factor : -0.94 sent
2025-10-13 13:43:57  [PowerDirectControl.lua 409] inverter 3: command Power Factor : -0.94 sent
2025-10-13 13:43:57  [PowerDirectControl.lua 409] inverter 4: command Power Factor : -0.94 sent
2025-10-13 13:43:57  [PowerDirectControl.lua 409] inverter 5: command Power Factor : -0.94 sent
2025-10-13 13:43:57  [PowerDirectControl.lua 409] inverter 6: command Power Factor : -0.94 sent
2025-10-13 13:43:57  [PowerDirectControl.lua 409] inverter 7: command Power Factor : -0.94 sent
2025-10-13 13:43:57  [PowerDirectControl.lua 409] inverter 8: command Power Factor : -0.94 sent
2025-10-13 13:45:07  [PowerDirectControl.lua 340] new Reactive power command PFinteger-0.92
2025-10-13 13:45:07  [PowerDirectControl.lua 361] inverter 1: command Power Factor : -0.92 sent
2025-10-13 13:45:07  [PowerDirectControl.lua 361] inverter 2: command Power Factor : -0.92 sent
2025-10-13 13:45:07  [PowerDirectControl.lua 361] inverter 3: command Power Factor : -0.92 sent
2025-10-13 13:45:07  [PowerDirectControl.lua 361] inverter 4: command Power Factor : -0.92 sent
2025-10-13 13:45:07  [PowerDirectControl.lua 361] inverter 5: command Power Factor : -0.92 sent
2025-10-13 13:45:07  [PowerDirectControl.lua 361] inverter 6: command Power Factor : -0.92 sent
2025-10-13 13:45:07  [PowerDirectControl.lua 361] inverter 7: command Power Factor : -0.92 sent
2025-10-13 13:45:07  [PowerDirectControl.lua 361] inverter 8: command Power Factor : -0.92 sent
```