ENERGINET

QUICKSTART GUIDE

Power Plant & Model Test Bench (PP-MTB)
Powerfactory

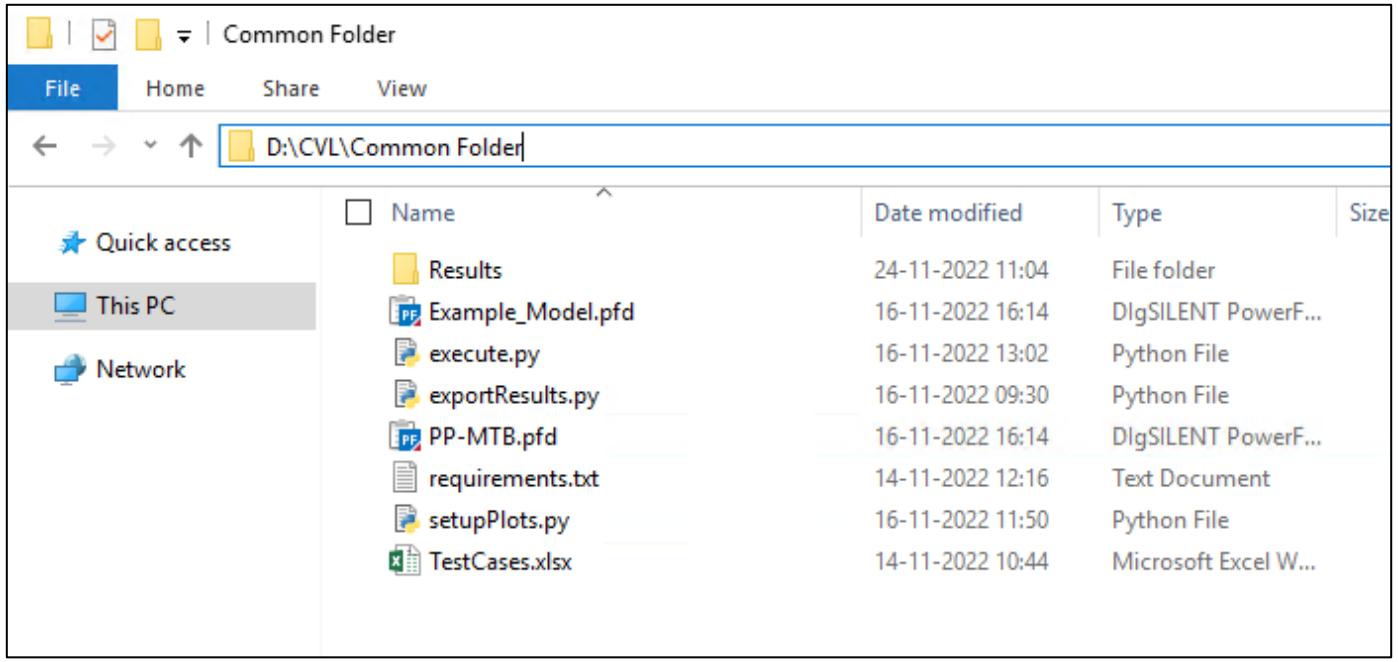
0. SYSTEM REQUIREMENTS

Developed on powerfactory 2022 SP3 with python 3.8.8. Dependencies are listed in requirements.txt and can be installed with the command:

python –m pip install –r requirements.txt

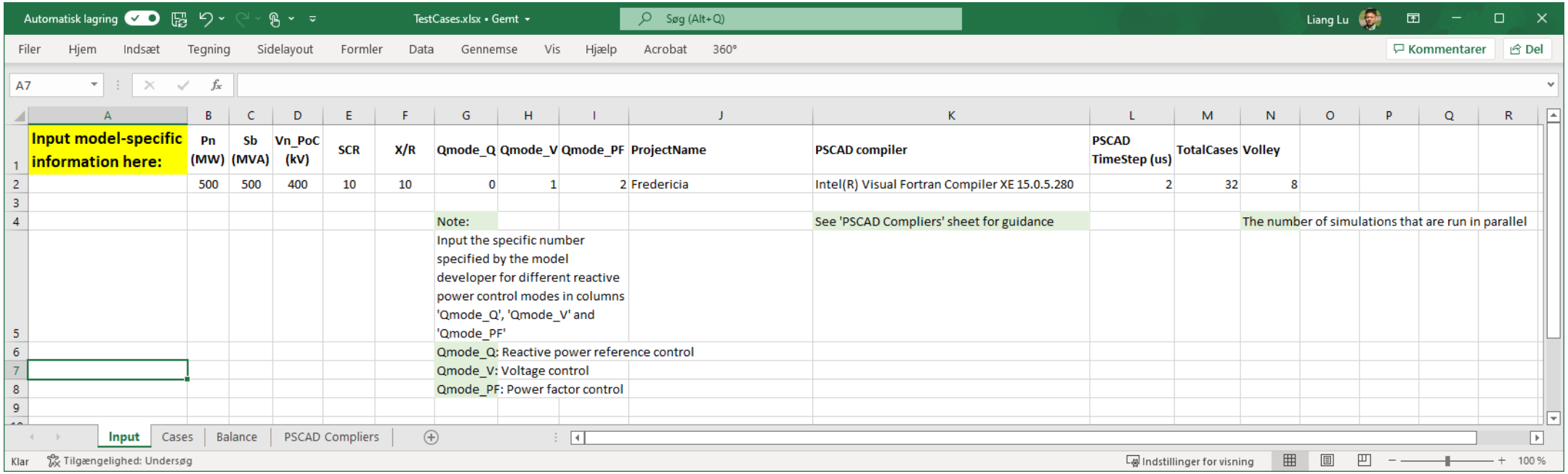
1. PREPARATION

1.1 Extract or copy all test bench files and your model into a common folder on your PC and make a subfolder for Results used later on



1. PREPARATION

1.2 Fill in the model-specific information of the '**Input**' sheet in the '**TestCases.xlsx**' file

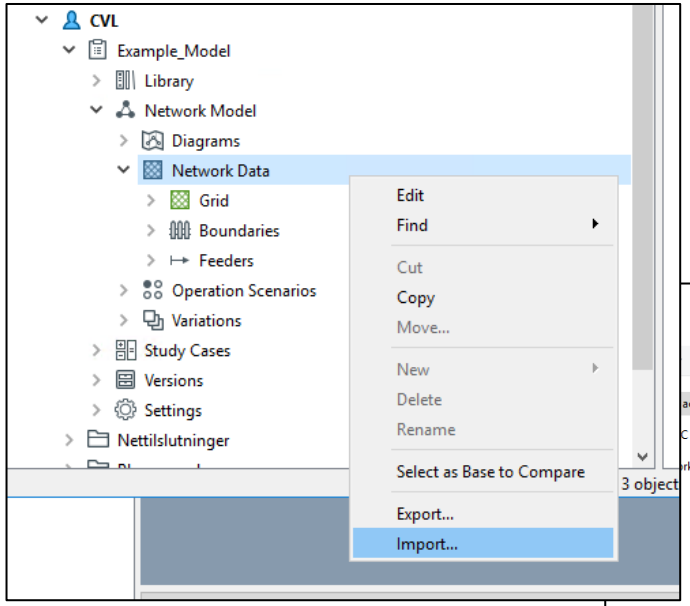


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	**Input model-specific information here:**	**Pn (MW)**	**Sb (MVA)**	**Vn_PoC (kV)**	**SCR**	**X/R**	**Qmode_Q**	**Qmode_V**	**Qmode_PF**	**ProjectName**	**PSCAD compiler**	**PSCAD TimeStep (us)**	**TotalCases**	**Volley**				
2		500	500	400	10	10	0	1	2	Fredericia	Intel(R) Visual Fortran Compiler XE 15.0.5.280	2	32	8				
3																		
4							Note:				See 'PSCAD Compliers' sheet for guidance			The number of simulations that are run in parallel				
5							Input the specific number specified by the model developer for different reactive power control modes in columns 'Qmode_Q', 'Qmode_V' and 'Qmode_PF'												
6							Qmode_Q: Reactive power reference control											
7							Qmode_V: Voltage control											
8							Qmode_PF: Power factor control											
9																		

2. MODEL SETUP IN POWERFACTORY

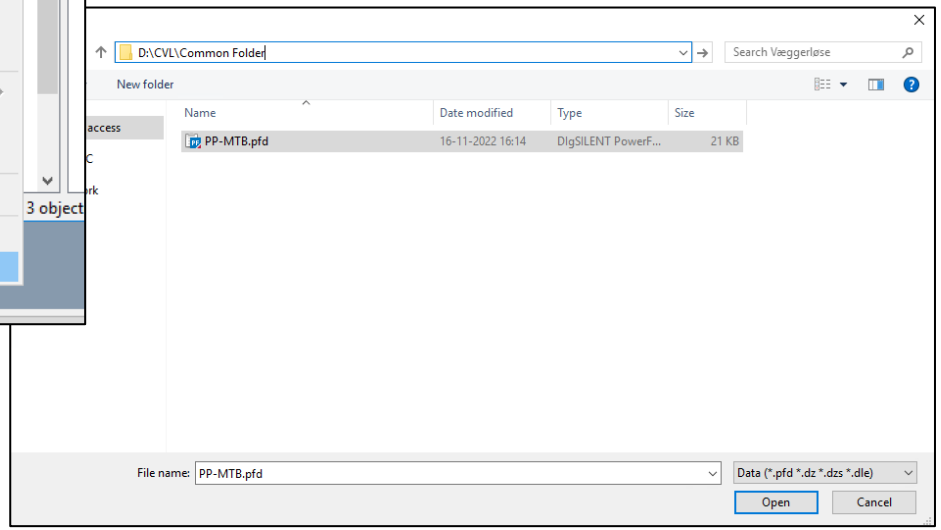
2.1 Right-click the Network Data folder in your PowerFactory model and Import PP-MTB.pfd from the common folder.

2.2 Activate the PP-MTB grid

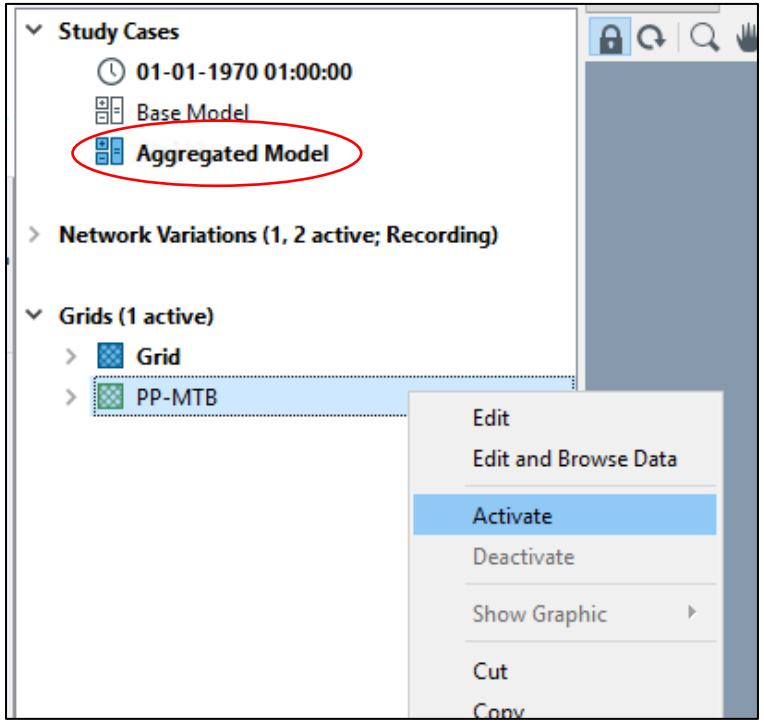


NOTE: The project must be inactive to import using this method

2.1



2.2



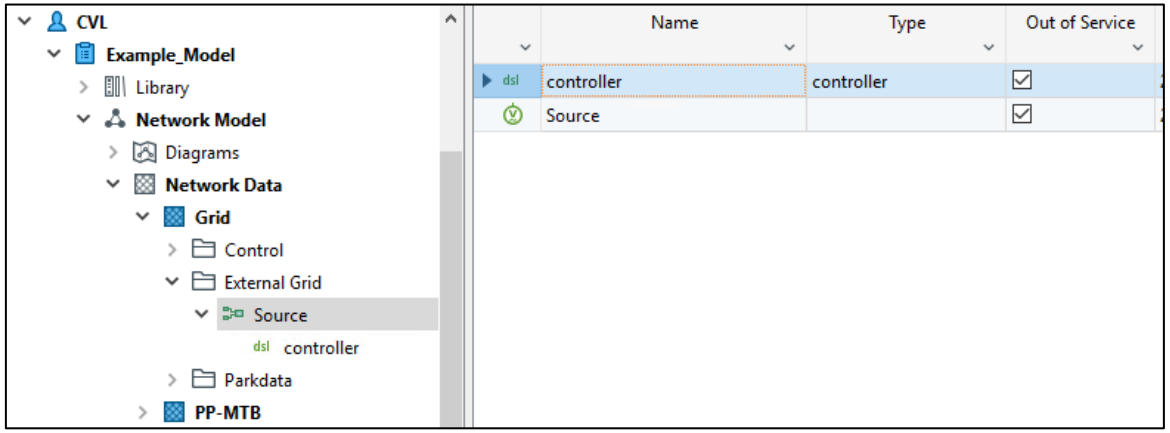
2. MODEL SETUP IN POWERFACTORY

2.3 Replace the external grid with PP-MTB

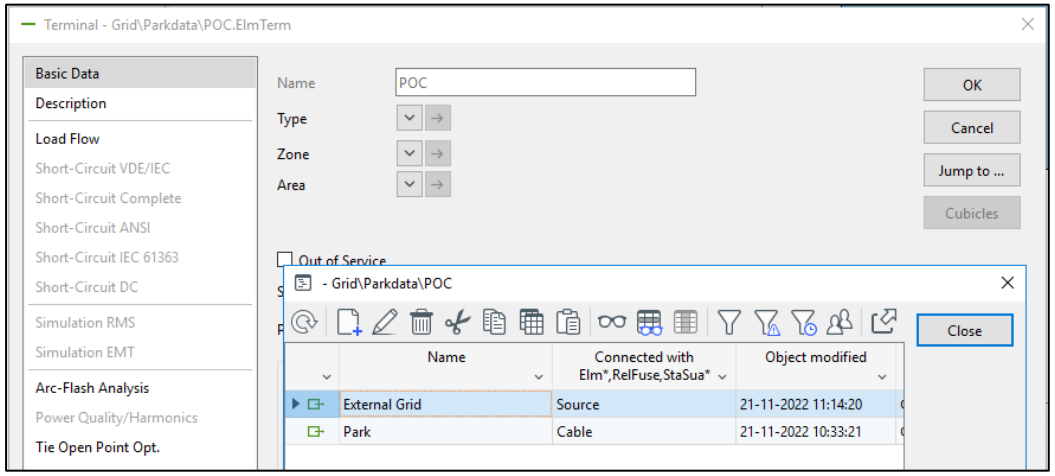
2.3.1 Deactivate the existing external grid, as well as any linked dynamic control used for the external grid, by leaving it Out of Service

2.3.2 Connect the cubicle at POC, formerly used for the external grid, to the element ”meas.ElmSind”

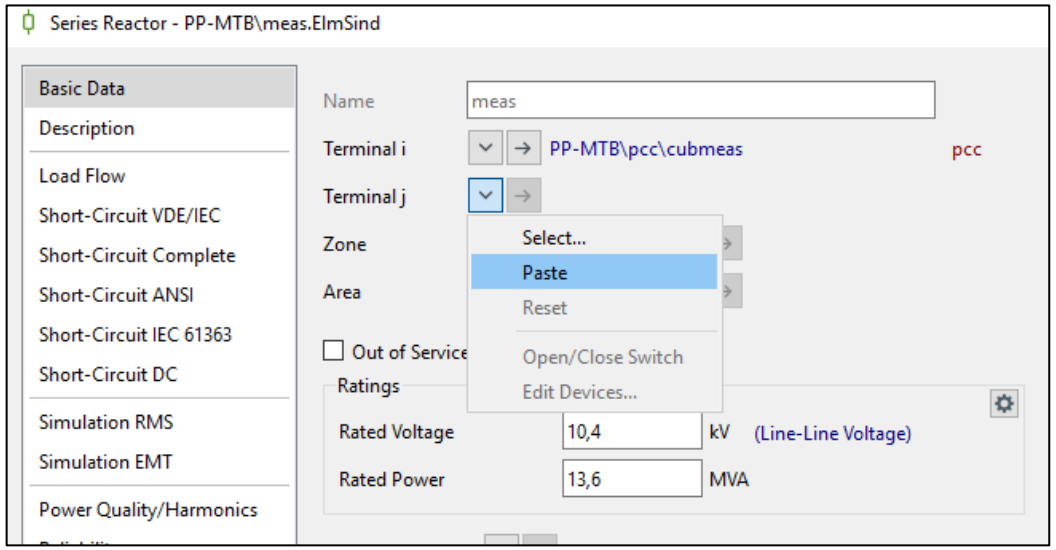
2.3.1: Select the elements and mark them as Out of Service



2.3.2 a): Copy the cubicle from the busbar used for the external grid (Ctrl+C)



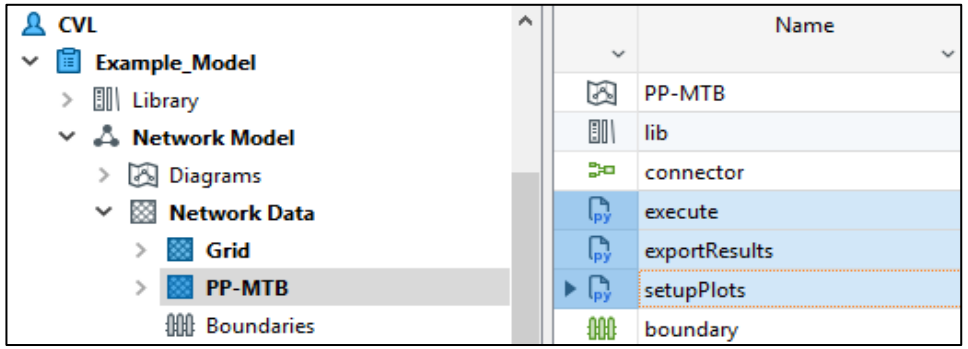
2.3.2 b): Paste the cubicle to the element ”meas.ElmSind”, Terminal j



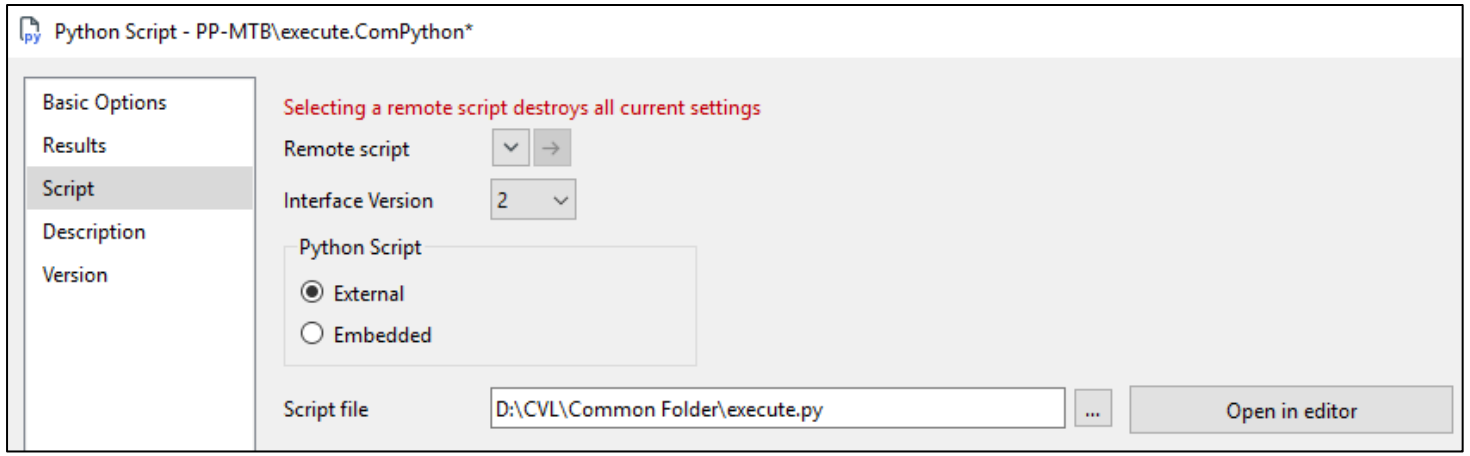
2. MODEL SETUP IN POWERFACTORY

2.4 Define a path in the scripts to point to the actual python scripts in the common folder with the matching name (e.g. execute.ComPython = execute.py)

When referring to the scripts, it is the following three under the PP-MTB folder:

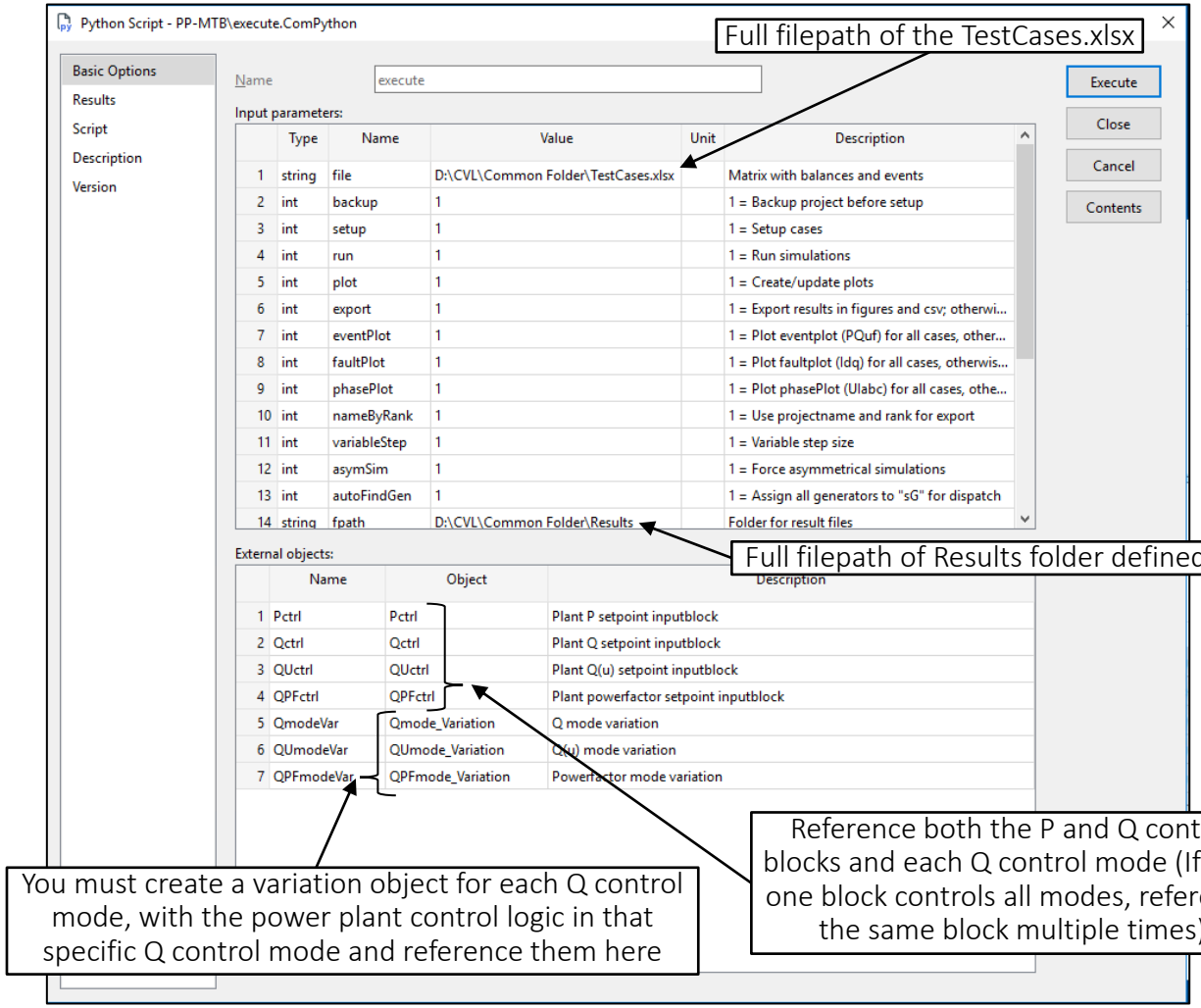


The complete filepath must be defined in the field 'Script file' – Click the '…'button and navitage to execute.py you copied or extracted to a common folder earlier and repeat for the other two scripts as well



2. MODEL SETUP IN POWERFACTORY

2.5 Setup the execute.ComPython script Basic Options



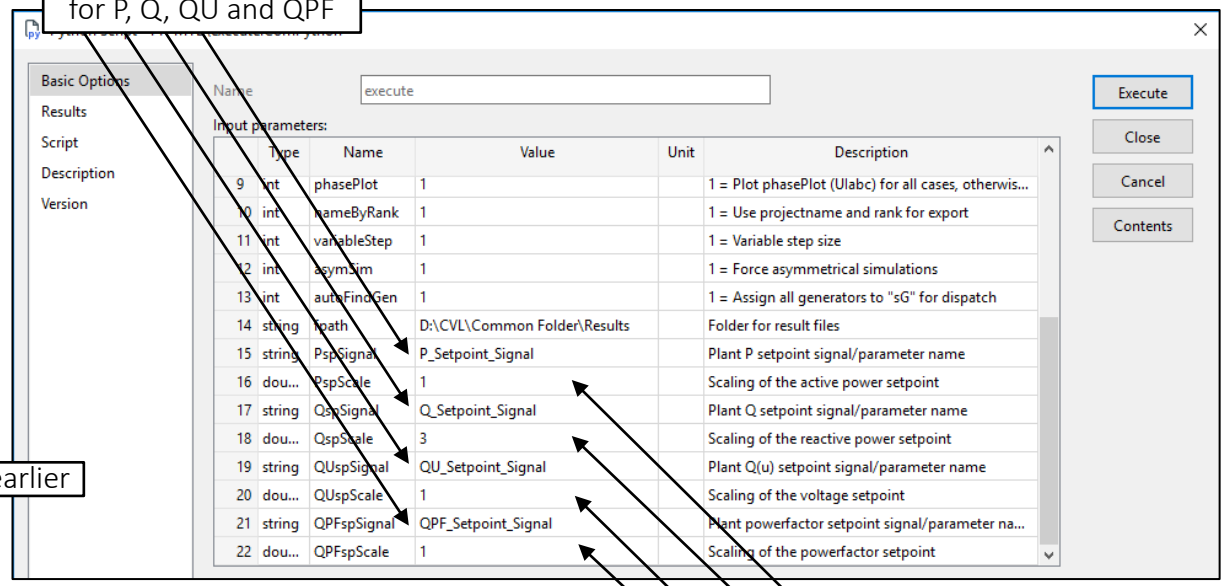
Full filepath of the TestCases.xlsx

Full filepath of Results folder defined earlier

You must create a variation object for each Q control mode, with the power plant control logic in that specific Q control mode and reference them here

Reference both the P and Q control blocks and each Q control mode (If only one block controls all modes, reference the same block multiple times)

Name of setpoint signal for P, Q, QU and QPF

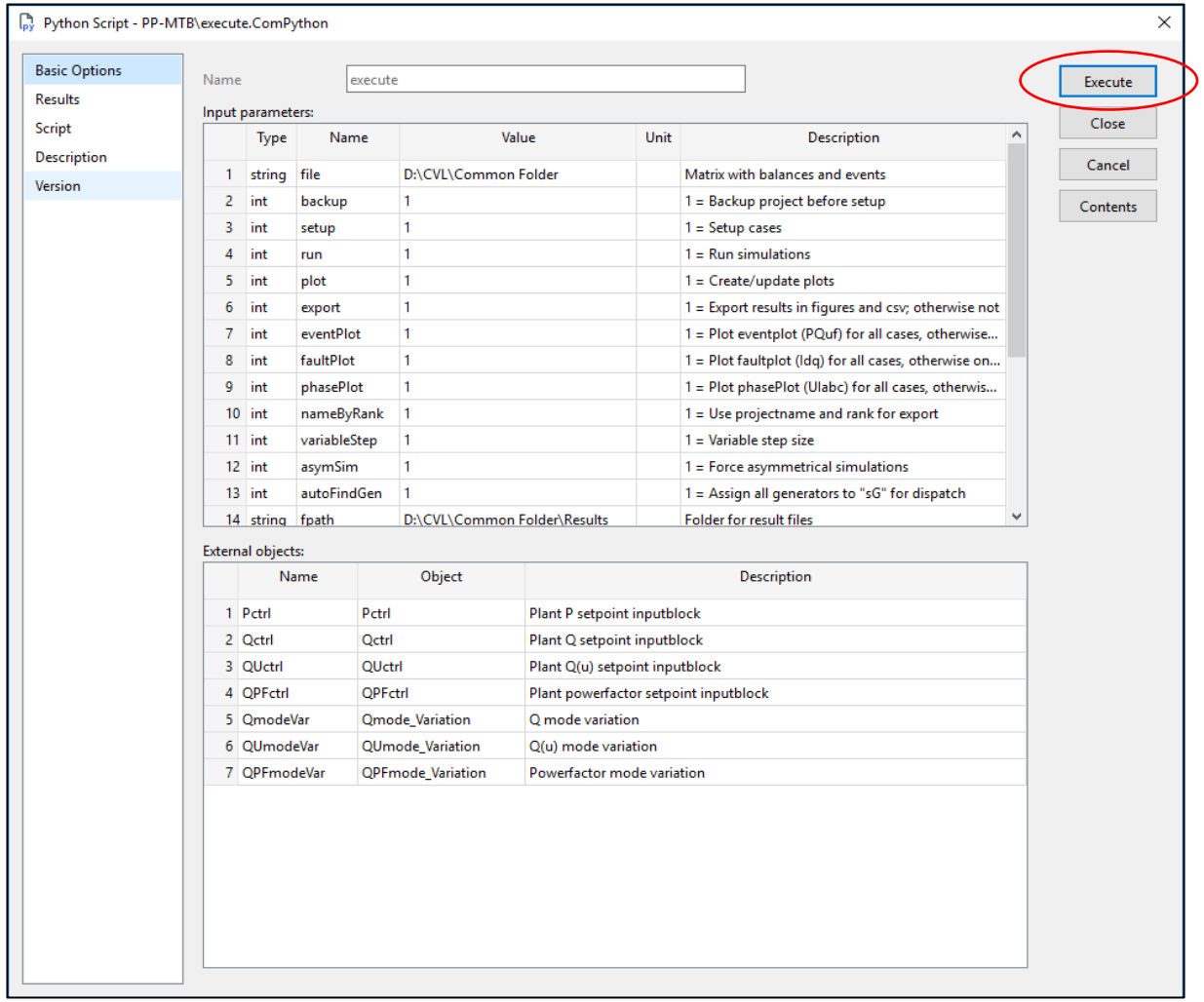


Scaling of P-, Q-, QU- and QPF-setpoint

NOTE: Any logic previously connected to the setpoint signals must also be Out of Service

3. SCRIPT EXECUTION

3.1 Pressing Execute, the script does both simulation and plotting of results automatically.



4. SCRIPT EXECUTION FINISHED

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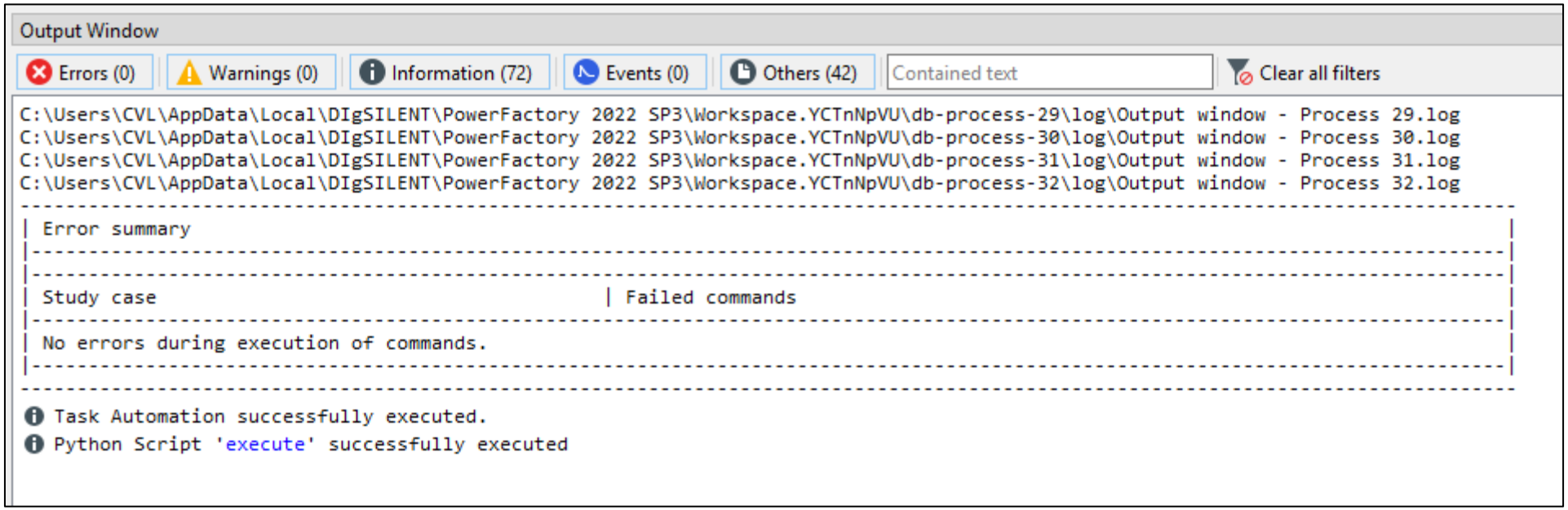
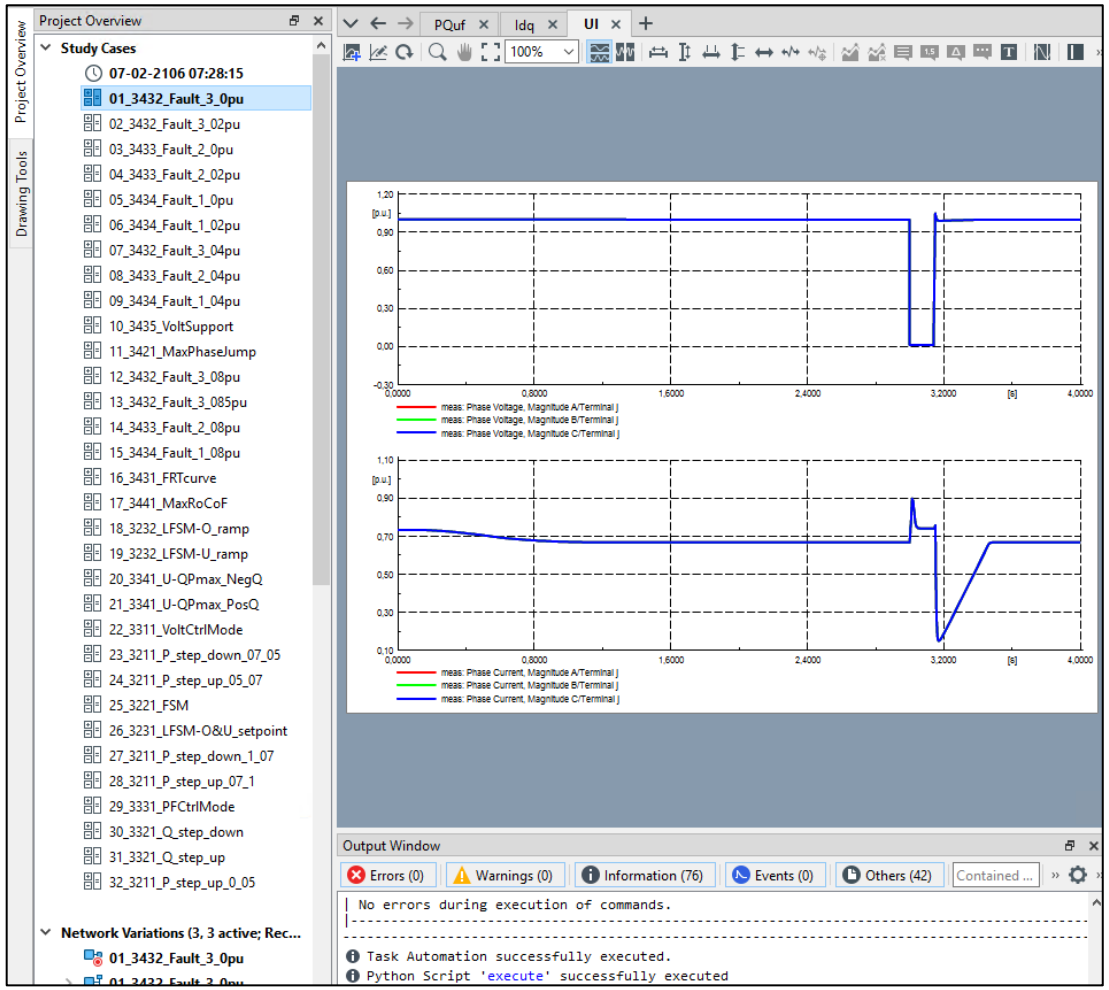
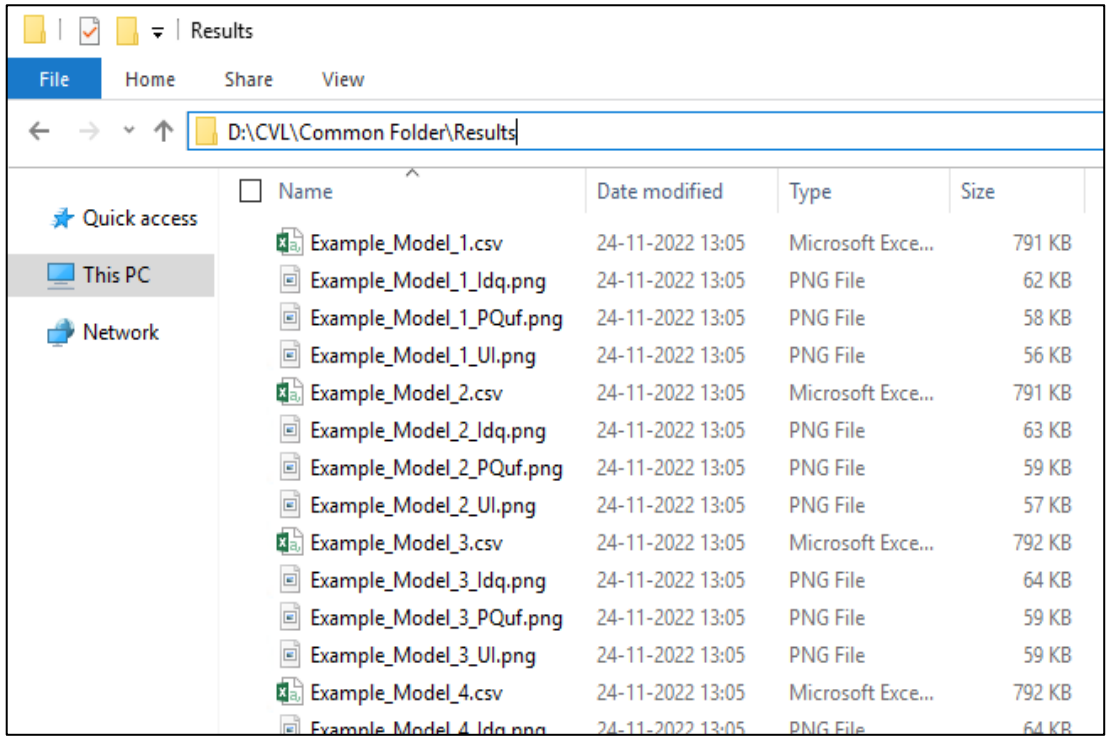
4.1 When the script is finished the output window should look like the snapshot below, with the text ”Python Script ‘execute’ succesfully executed” at the bottom



4. SCRIPT EXECUTION FINISHED

4.2 Viewing results and outputs from the simulations





All results from the simulations are exported to the Results folder as seen above, each with a unique ID to match the study case, for a total of 32 if all cases are run.

All simulations can also be reviewed in PowerFactory through the 32 study cases created by the test bench.