

WaveStar Data

Introduction

$WaveStar_{intro} := \text{READExcel}(\text{"Report for EnergiNet - 2012-02.xlsx"}, \text{"General info!B3:D28"}, \text{" "})$

$WaveStar_{intro} =$

"This spreadsheet is an attachment to the monthly report to EnergiNet.DK, Project number: ForskV
"It consists of seven sheets:"
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$WaveStar_{intro1} := \text{concat}(WaveStar_{intro_{0,0}}, WaveStar_{intro_{1,0}})$

$col_{intro} := \text{cols}(WaveStar_{intro}) - 1 = 2$ $row_{intro} := \text{rows}(WaveStar_{intro}) - 1 = 25$

$WaveStar_{intro2} := \text{submatrix}(WaveStar_{intro}, 2, row_{intro}, 1, 2)$

Inputs $excel_{"A1"} := WaveStar_{intro1}$ $excel_{"A3"} := WaveStar_{intro2}$

This spreadsheet is an attachment to the monthly report to EnergiNet.DK, Project number: ForskVe10305It consists of seven sheets:

General info:	Description of the purpose of this document and information about the report data shown in the succeeding s
Raw data:	A database table with 10-minutes values exists on the machine. The table displayed here is a subset of this table including all records for the month in question. Only the columns being relevant for this report are included.
Valid data:	A table displaying only data for the month in question that fulfils the criterias for being valid. This table is a subset of the "Raw data" table. Criterias for being valid: Wave data must exist and be without errors The significant wave height must be above 0.5 m Both floats have been in automatic operation during the 10 minute period

	<p>Both floats have been in automatic operation during the 10 minute period</p> <p>Three versions of the table exist. One for float 1 only, one for float 2 only, and one for float 1 & 2.</p>
Diagrams:	<p>Three diagrams show the harvested and the electrical energy for each valid 10 minutes production period. One diagram for each float and one for the two floats together.</p> <p>The diagrams also show the curve for expected harvested energy.</p> <p>A table sums up the production time with valid data and the time where the production has been above and below the expected limit.</p>
Energy production:	<p>Three tables and graphs show harvested hydraulic energy and generated electrical energy per month. One table and graph for each float and one for the two floats together.</p> <p>The generated energy is measured as the energy delivered by the float generator(s) to the converter panel.</p> <p>The tables also show:</p> <ul style="list-style-type: none"> The percentage of the total time in which the float(s) have been operational (i.e. in automatic mode without error) How the operational time is spent in four different modes of operation ("Transitions" are heating of hydraulic oil and lifting and lowering the floats)

Description of table data

$WaveStar_{data1} := \text{READExcel}(\text{"Report for EnergiNet - 2012-02.xlsx"}, \text{"General info!B31:C36"}, \text{""})$

WaveStar_{data1} = $\left[\begin{array}{l} \text{"Here follows a description of the data, that is included in the report."} \\ \text{""} \\ \text{""} \\ \text{""} \\ \text{""} \\ \text{""} \end{array} \right.$ "Data values are
"The water surface elevation a

row_{data1} := rows (WaveStar_{data1}) - 1 = 5 col_{data1} := cols (WaveStar_{data1}) - 1 = 1

WaveStar_{data1.text} := concat (WaveStar_{data1,1,1}, WaveStar_{data1,2,1}, WaveStar_{data1,3,1})

WaveStar_{data2} := READEXCEL ("Report for EnergiNet - 2012-02.xlsx", "General info!C38:G56", "")

WaveStar_{data3} := READEXCEL ("Report for EnergiNet - 2012-02.xlsx", "General info!C58:C58", "")

WaveStar_{data4} := READEXCEL ("Report for EnergiNet - 2012-02.xlsx", "General info!C60:G67", "")

Inputs

excel_{"A1"} := WaveStar_{data1,0,0} excel_{"A3"} := submatrix (WaveStar_{data1}, 2, row_{data1}, 1, col_{data1})

excel_{"A8"} := WaveStar_{data2} excel_{"A29"} := WaveStar_{data3} excel_{"A31"} := WaveStar_{data4}

	Power at converter	P_G101_Converter	kW	Generated electrical power delivered from the float generator to the frequency converter. The value is read from the converter
Float 2	Validity of data from float	DataValid_G102	%	Percentage of report period with float in automatic mode. (Manual mode is considered used for tests only)
	Time with production	ProdTime_G102	%	Percentage of report period with float in production mode
	Power at cylinder	P_G102_Cylinder	kW	Hydraulic power leaving the cylinder going into the PTO. Calculated value based on measurements of piston velocity and pressures in cylinder
	Power at converter	P_G102_Converter	kW	Generated electrical power delivered from the float generator to the frequency converter. The value is read from the converter

The following data are derived from data in the database.

Group	Signal	Column name	Unit	Comments
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Group	Signal	Column name	Unit	Comments
Calculated values	Sum of harvested hydraulic power from the two floats	P_Cylinder_TwoFloats	kW	Calculated as P_G101_Cylinder + P_G102_Cylinder
	Sum of generated electrical power from the two floats	P_Converter_TwoFloats	kW	Calculated as P_G101_Converter + P_G102_Converter
	Hydraulic energy harvested by float 1 in the 10 minutes period	Float1_kWh	kWh	Calculated as one sixth of the mean energy (P_G101_Cylinder / 6)
	Hydraulic energy harvested by float 2 in the 10 minutes period	Float2_kWh	kWh	Calculated as one sixth of the mean energy (P_G102_Cylinder / 6)
	Hydraulic energy harvested by float 1 and 2 in the 10 minutes	TwoFloats_kWh	kWh	Calculated as one sixth of the mean energy ((P_G101_Cylinder + P_G102_Cylinder) / 6)
	Expected energy production as defined in the conditions for	ForskVE_limit	kWh	Calculated as $1.25 * (H_s \text{ raised to the power of } 2.08)$
	The harvested energy is at or above the expected energy	AboveCurve	-	True if TwoFloats_kWh >= ForskVE_limit