Efficiency of Tigo TS4-R-O, TS4-R-L, TS4-O and TS4-L UHD Core
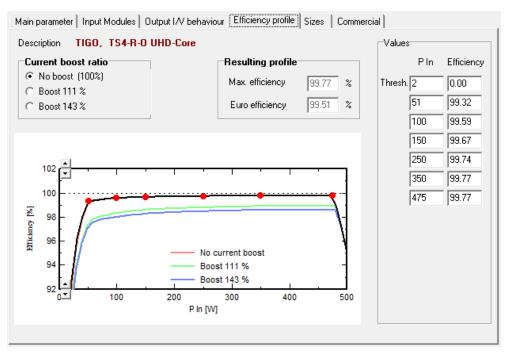
1   Introduction

The efficiency of the Tigo Optimizers depends on the amount of shading or module mismatch, respectively the grade of optimization.

Every PV system has a different setup and so there is also a different electrical efficiency that has to be compared with the Energy Gain from the optimization of the PV modules.

The Gain of Energy from optimization is higher than the losses from the electrical efficiency of the optimizers. These values are different in every PV system.

2   Electrical Efficiency of a Tigo Optimizer TS4 UHD Core

The Tigo optimization is normally inactive and only gets activated, when it is required. *Here below is confirmed that the efficiency is higher than 99%.*

Electrical Efficiency with Optimization

3   Average yearly efficiency of a PV System with Tigo Optimization

The report below shows the average efficiency of a PV system in Austria with full optimization on all panels. The average efficiency in this system is 99,1%.

PVSYST V6.75	Tigo Energy (United states)	24/05/19	Page 5/5

Grid-Connected System: Loss diagram

Project : **Fleischhof Oberland**

Simulation variant : **Südausrichtung**

Main system parameters		System type	**No 3D scene defined**		
Horizon		Average Height	13.0°		
PV Field Orientation		tilt	10°	azimuth	-30°
PV modules		Model	LX-300M/156-60+	Pnom	300 Wp
PV Array		Nb. of modules	650	Pnom total	**195 kWp**
Inverter		Model	Sunny Highpower Peak1	Pnom	75.0 kW ac
Inverter		Model	Sunny Tripower 60-10	Pnom	60.0 kW ac
Inverter pack		Nb. of units	3.0	Pnom total	**210 kW ac**
User's needs		Unlimited load (grid)			

Loss diagram over the whole year

1347 kWh/m² **Horizontal global irradiation**

+8.8% **Global incident in coll. plane**

-0.1% Global incident below threshold

-6.0% Far Shadings / Horizon

-3.5% IAM factor on global

1328 kWh/m² * 1057 m² coll. **Effective irradiance on collectors**

efficiency at STC = 18.43% PV conversion

258.8 MWh **Array nominal energy (at STC effic.)**

-1.1% PV loss due to irradiance level

-3.5% PV loss due to temperature

-0.9% Optimizer efficiency loss

+0.5% Module quality loss

0.0% Module array mismatch loss

-0.8% Ohmic wiring loss

243.9 MWh **Array virtual energy at MPP**

-1.7% Inverter Loss during operation (efficiency)

0.0% Inverter Loss over nominal inv. power

0.0% Inverter Loss due to max. input current

-1.0% Inverter Loss over nominal inv. voltage

0.0% Inverter Loss due to power threshold

-0.2% Inverter Loss due to voltage threshold

236.9 MWh **Available Energy at Inverter Output**

236.9 MWh **Energy injected into grid**

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