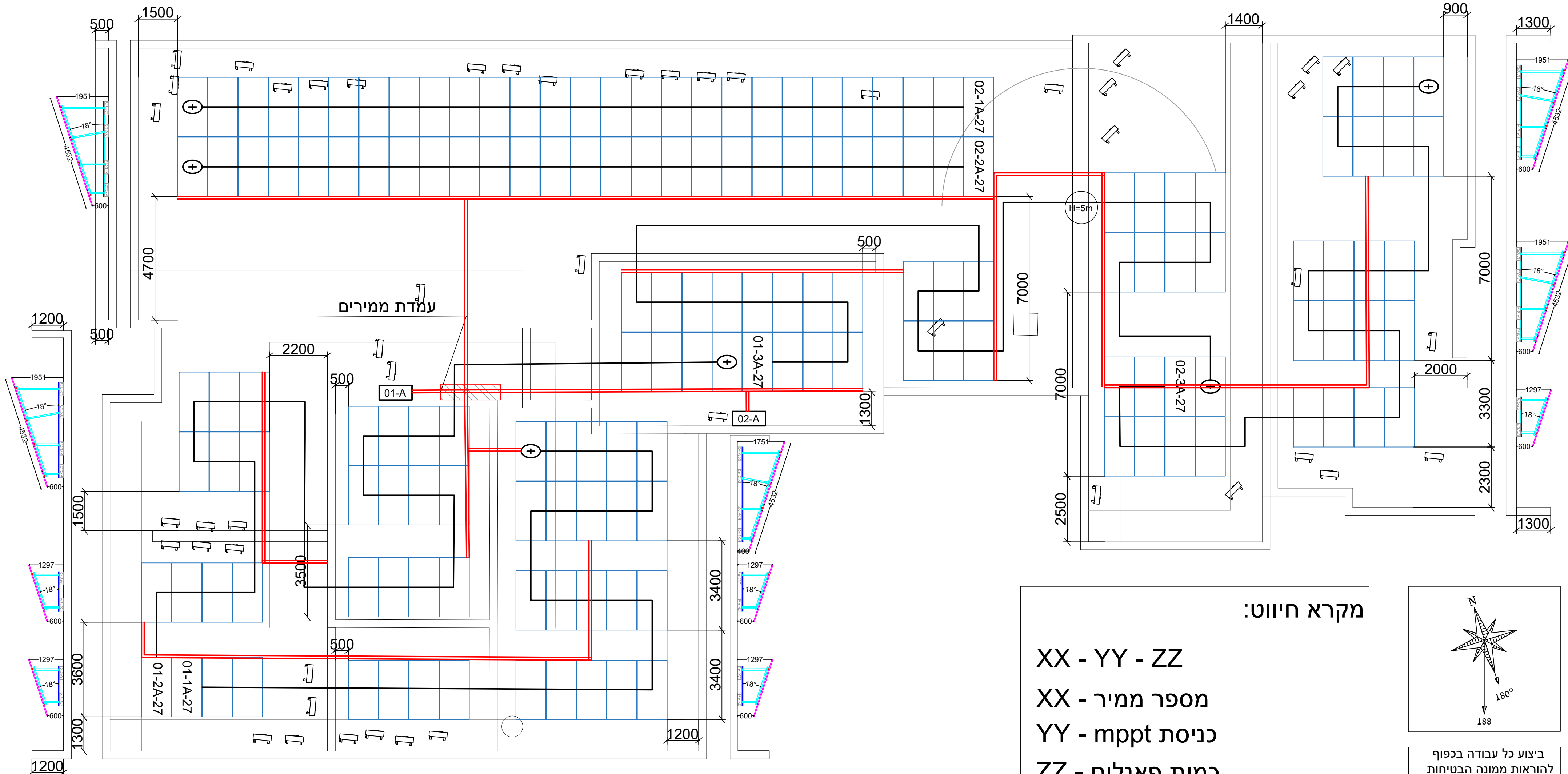


בית ספר קורצ'אק

מערכת סולארית מתח נמוך – 86.67kW



- Korchak- G001 – הצבת פאנלים
- Korchak - G002 – חיווט פאנלים
- Korchak - B001 – תכנית קונסטרקציה
- Korchak - E001 – חד קווי
- Korchak - E002 – תכנית הארקות
- Korchak- C001 – סימולציה PVSyst
- Korchak - C003 – חישוב הפסדי הולכה DC
- Korchak - C004 – חישוב הפסדי הולכה AC



מקרא חיווט:

XX - YY - ZZ

XX - מספר ממיר

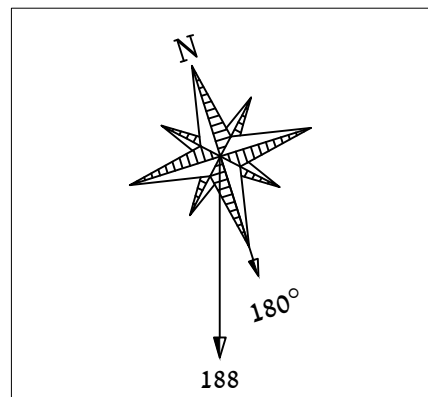
YY - mppt כניסת

ZZ - כמות פאנלים

⊕ — כיוון חיבור סטרינג

01-A קופסת איסוף סטרינג

== תעלת רשת DC

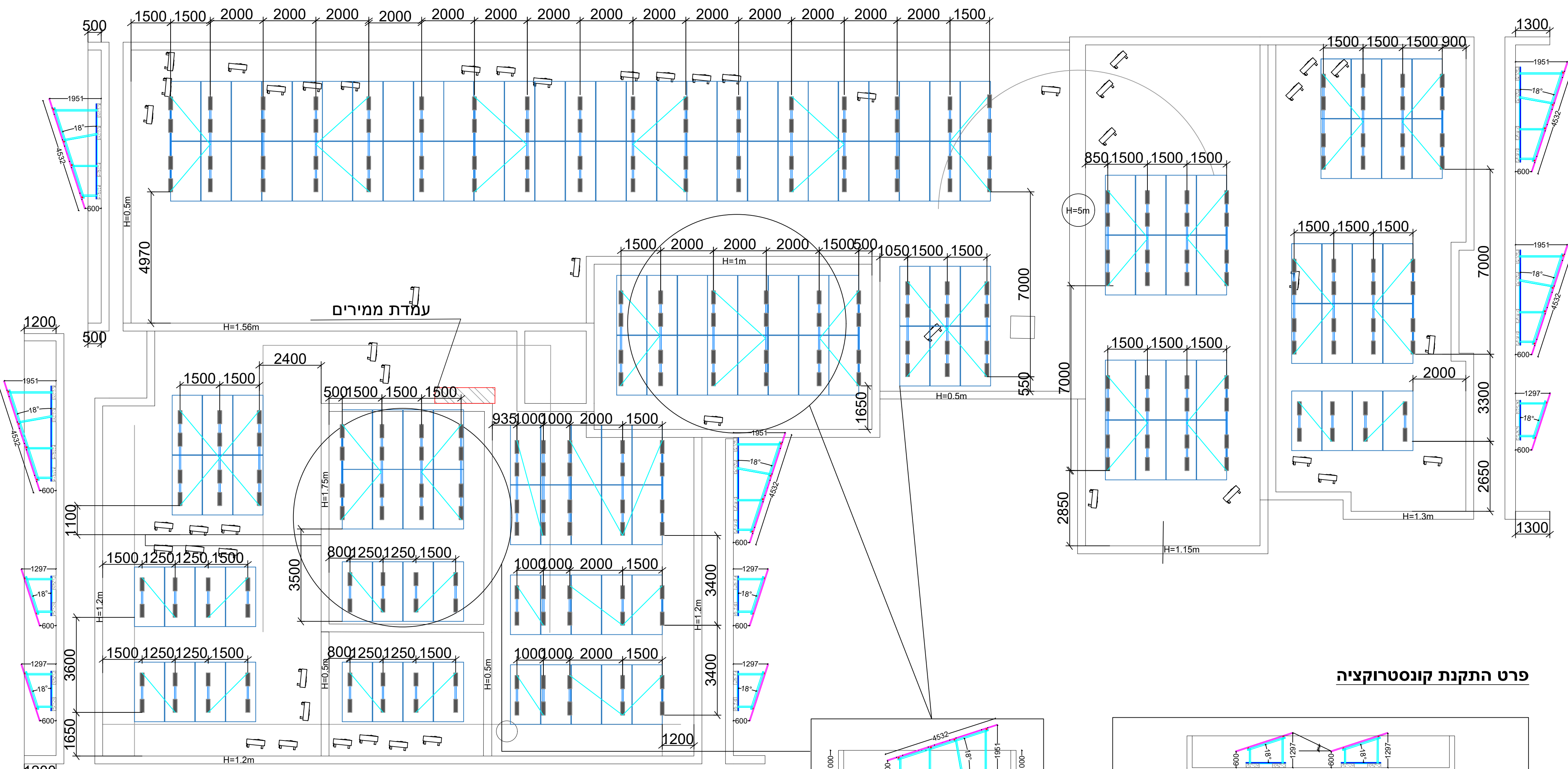


ביצוע כל עבודה בכפוף להוראות ממונה הבטיחות

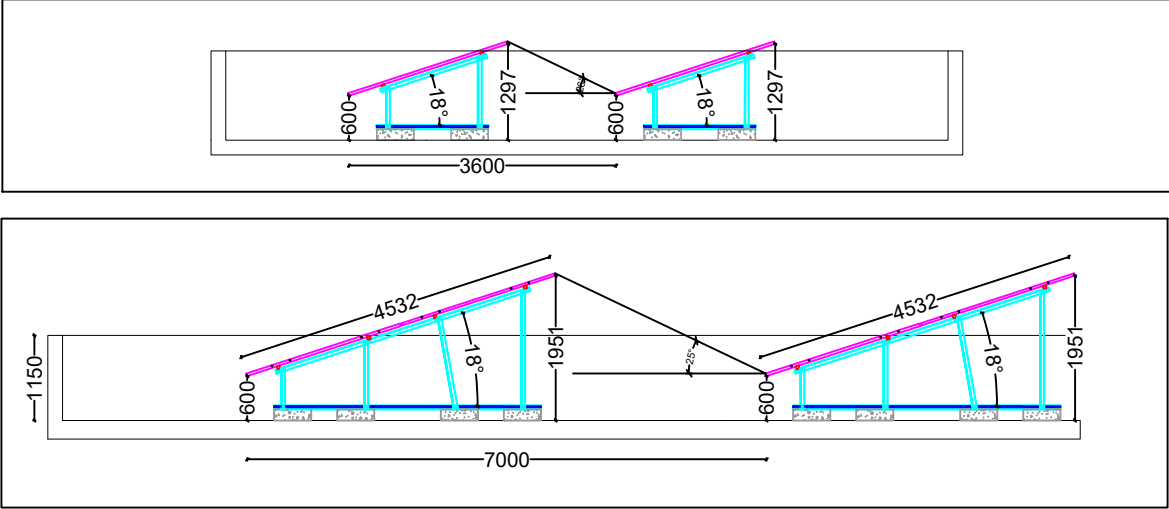
בית ספר קורצ'אק, רמת גן - חלוקה לסטרינגים/ממירים					הספק פאנל בודד (W)		535		
					מ"ס פאנלים כללי :		162		
					הספק כללי AC (KW) :		66.6		
					הספק כללי DC (KW) :		86.67		
					יחס AC/DC :		130.14%		
גג	ממיר	סוג ממיר (kW)	כניסת mppt	מ"ס סטרינגים	אופטימיזרים P1100	מ"ס פאנלים	הספק DC (kW)	הספק AC (kW)	AC/DC
בטון	1	SE 33.3kW	Primary	3		27	14	86.67	66.6
						27	14		
						27	14		
						27	14		
בטון	2	SE 33.3kW	Primary	3		27	14	86.67	66.6
						27	14		
						27	14		
סה"כ כמות:						162	84	86.67	130.14%

Title: תוכנית חיווט פאנלים		DRAWING NUMBER: Korchak - G002		REV	DATE	DRAWN	COMMENTS	Panels		Inverters		Quant
Client: שחר אנרגיה	Site location: רמת גן	DATE: 18/04/2021	Scale: ###	Part size: A2	Sheet: 1/1	####	####	Manuf: Chint	[2256x1133x35]	Manuf: SolarEdge		2
EnerCity שחר אנרגיה Solar Engineering אנרגיה חמה		Designer: Moshe Yadgarov	APPROVAL / STAMP					Model: 535W		Model A: 33.3kW		2
		Approved:						Quant: 162		Model B:		
		STATUS: לאישור						Tilt: 18 Deg		Model C:		
		REV: AO						Azimuth: 198 Deg		Model D:		
								T.Power: 86.67kW		T.Power: 66.6kVA		

Korchak -String Wiring

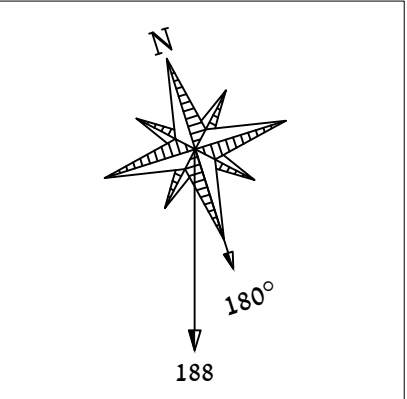


פרט התקנת קונסטרוקציה



יש לוודא מול קונסטרוקטור את תוכנית ההצבה, כמות האבנים וחוזק הקונסטרוקציה הנושאת לפני ביצוע ההתקנה

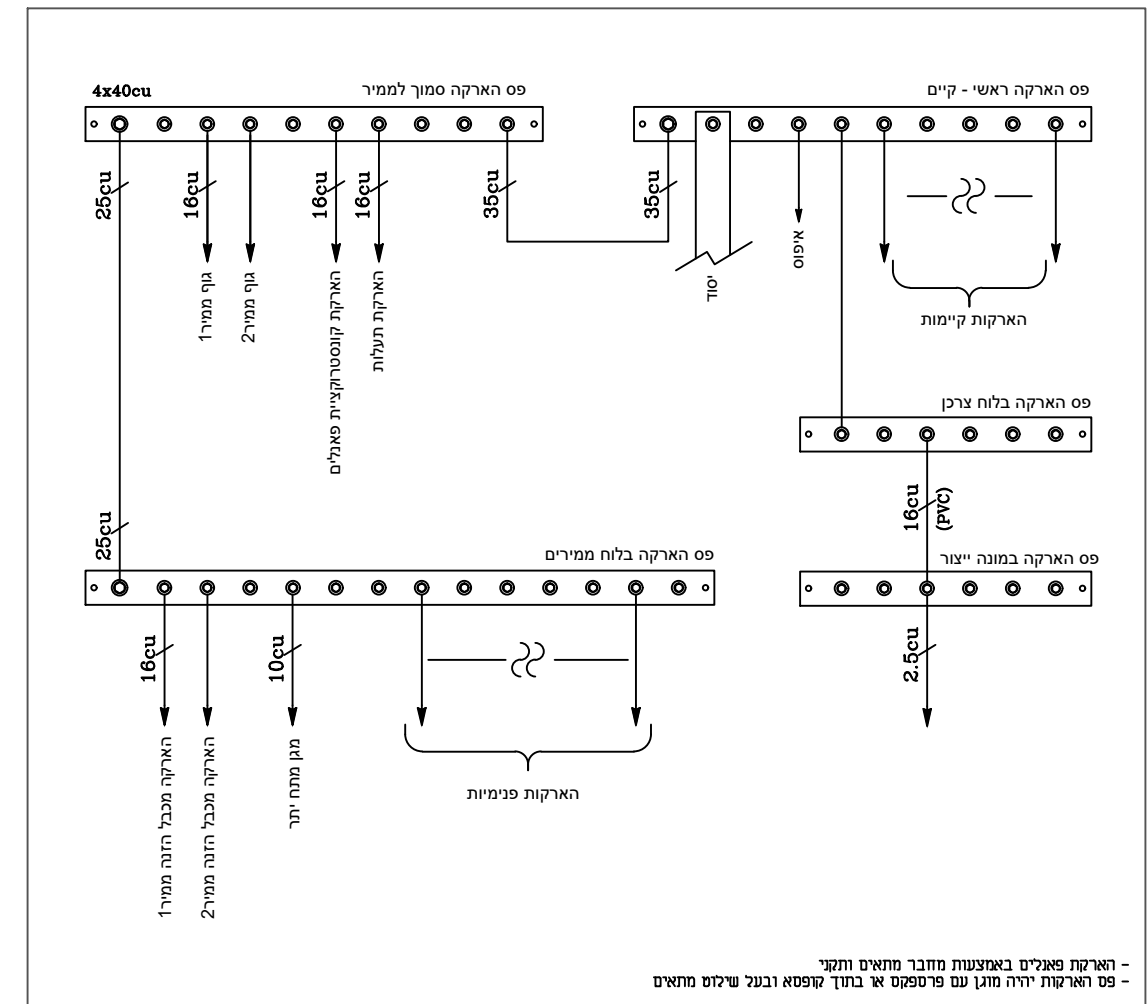
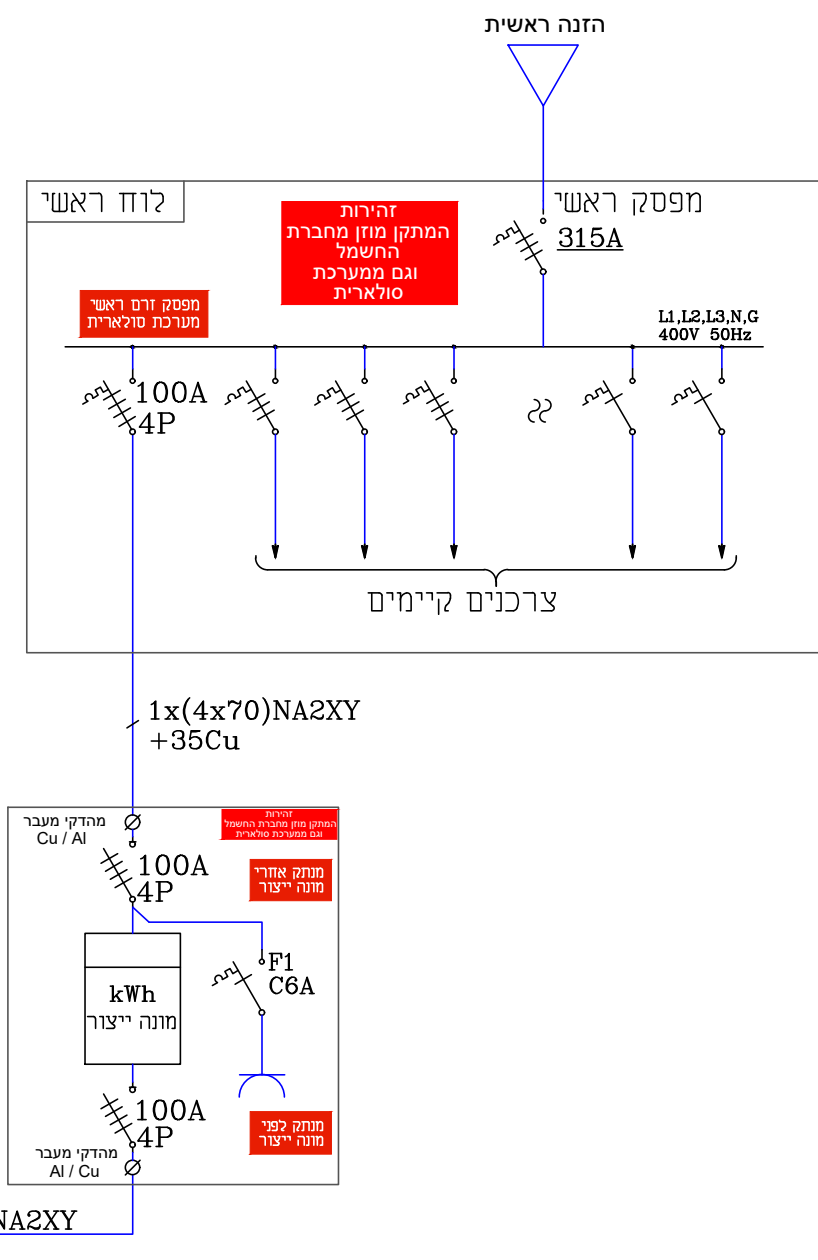
כתב כמויות - רגליים			
כמות	תיאור	פרט	
26	רגל בודדת 560 18 מעלות	פאנל בודד גובה 600	
4	רגל בודדת 160 18 מעלות	פאנל בודד גובה 200	
30	רגל קדמית 560 18 מעלות	פאנל כפול גובה 600	
50	רגל קדמית 160 18 מעלות	פאנל כפול גובה 200	
65	אורך 2.7 מ	דאגל	
276	42 ק"ג	אבנים	



ביצוע כל עבודה בכפוף
להוראות ממנה הבטיחות

Title: תוכנית קונסטרוקציה		DRAWING NUMBER: Korchak - B001		REV		DATE	DRAWN	COMMENTS	Panels		Inverters		Quant
Client: שחר אנרגיה	Site location: רמת גן	DATE: 18/04/2021	Scale: ###	Part size: A2	Sheet: 1/1	####	####	####	Manuf: Chint [2256x1133x35]	Manuf: SolarEdge			2
Designer: Moshe Yadgarov		APPROVAL / STAMP							Model: 535W	Model A: 33.3kW			2
Approved:									Quant: 162	Model B:			
STATUS: לאישור									Tilt: 18 Deg	Model C:			
									Azimuth: 198 Deg	Model D:			
									T.Power: 86.67kW	T.Power: 66.6kVA			

Korchak -Construction



Notes:

1. Elec. panel should be compatible with IL elec. norm 61439
2. Cables, cores, ducts and modules should be marked with proper marking
3. Live elec. contacts must be insulated

Korchak -Single Line

בית ספר קורצ'אק, רמת גן - חלוקה לסטרינגים/ממירים						535	הספק פאנל בודד (W)		
						162	מ"ס פאנלים כללי :		
						66.6	הספק כללי AC (kW) :		
						86.67	הספק כללי DC (kW) :		
						130.14%	יחס AC/DC :		
AC/DC	(kW) AC	הספק DC (kW)	מ"ס פאנלים	אופטימיזרים P1100	מ"ס סטרינגים	כניסת mppt	סוג ממיר (kW)	ממיר	גג
130.14%	66.6	86.67	27	14	3	Primary	SE 33.3kW	1	בטון
			27	14					
			27	14					
			27	14	3	Primary	SE 33.3kW	2	בטון
			27	14					
			27	14					
130.14%	66.6	86.67	162	84					ה"כ כמות:

Title: תכנית חד קווי		DRAWING NUMBER: Korchak - E001				REV				DATE				DRAWN				COMMENTS				Panels				Inverters				Quant'	
Client: שחר אנרגיה		Site location: רמת גן		DATE: 18/04/2021		Scale: ####		Print size: A2		Sheet : 1/1										Manuf': Chint [2256x1133x35]		Manuf': SolarEdge		2							
				Designer: Moshe Yadgarov																Model: 535W		Model A: 33.3kW		2							
				Approved:																Quant': 162		Model B:									
				STATUS:		REV:														Tilt: 18 Deg		Model C:									
				לאישור		A O														Azimuth: 198 Deg		Model D:									
																				T.Power: 86.67kW		T.Power: 66.6kVA									

PVsyst - Simulation report

Grid-Connected System

Project: SHR Ramat Gan_Korchak

Variant: New simulation variant

Sheds on a building

System power: 89.9 kWp

Ramat Gan - Israel

Author

Green Panel (Israel)



Project: SHR Ramat Gan_Korchak

Variant: New simulation variant

PVsyst V7.1.8

VCO, Simulation date:
21/04/21 09:49
with v7.1.8

Project summary

Geographical Site

Ramat Gan

Israel

Situation

Latitude 32.08 °N

Longitude 34.81 °E

Altitude 46 m

Time zone UTC+2

Project settings

Albedo 0.20

Meteo data

Ramat Gan

Meteonorm 7.3 (1990-2004), Sat=100% - Synthetic

System summary

Grid-Connected System

PV Field Orientation

Fixed plane

Tilt/Azimuth 18 / 18 °

Sheds on a building

Near Shadings

According to strings

Electrical effect 100 %

User's needs

Unlimited load (grid)

System information

PV Array

Nb. of modules

168 units

Pnom total

89.9 kWp

Inverters

Nb. of units

2 units

Pnom total

66.6 kWac

Pnom ratio

1.350

Results summary

Produced Energy 150.2 MWh/year

Specific production 1671 kWh/kWp/year

Perf. Ratio PR

76.28 %

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Near shading definition - Iso-shadings diagram	6
Main results	7
Loss diagram	8
Special graphs	9

**PVsyst V7.1.8**

VC0, Simulation date:
21/04/21 09:49
with v7.1.8

General parameters**Grid-Connected System****PV Field Orientation****Orientation**

Fixed plane
Tilt/Azimuth 18 / 18 °

Horizon

Free Horizon

Sheds on a building**Sheds configuration**

Nb. of sheds 17 units

Sizes

Sheds spacing 5.39 m
Collector width 4.05 m
Ground Cov. Ratio (GCR) 75.1 %

Shading limit angle

Limit profile angle 39.1 °

Near Shadings

According to strings
Electrical effect 100 %

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

User's needs

Unlimited load (grid)

PV Array Characteristics**PV module**

Manufacturer Longi Solar
Model LR5-72 HPH 535 M

(Original PVsyst database)

Unit Nom. Power 535 Wp
Number of PV modules 168 units
Nominal (STC) 89.9 kWp

Array #1 - PV Array

Number of PV modules 84 units
Nominal (STC) 44.9 kWp
Optimizer Array 3 Strings x 14 In series

At operating cond. (50°C)

Pmpp 41.1 kWp
Output of optimizers
Voper 750 V
I at Poper 55 A

SolarEdge Power Optimizer

Model P1100 Worldwide
Unit Nom. Power 1100 W
Modules 1 String x 2 in series

Array #2 - Sub-array #2

Number of PV modules 84 units
Nominal (STC) 44.9 kWp
Optimizer Array 3 Strings x 14 In series

At operating cond. (50°C)

Pmpp 41.1 kWp
Output of optimizers
Voper 750 V
I at Poper 55 A

SolarEdge Power Optimizer

Model P1100 Worldwide
Unit Nom. Power 1100 W
Modules 1 String x 2 in series

Inverter

Manufacturer SolarEdge
Model SE33.3K-EU-APAC/AUS (400V)

(Original PVsyst database)

Unit Nom. Power 33.3 kWac
Number of inverters 2 units
Total power 66.6 kWac

Number of inverters 1 Unit
Total power 33.3 kWac

Operating voltage 750 V
Pnom ratio (DC:AC) 1.27

Number of inverters 1 Unit
Total power 33.3 kWac

Operating voltage 750 V
Pnom ratio (DC:AC) 1.27



PVsyst V7.1.8

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with v7.1.8

PV Array Characteristics

Total PV power

Nominal (STC)	90 kWp
Total	168 modules
Module area	429 m ²
Cell area	389 m ²

Total inverter power

Total power	67 kWac
Nb. of inverters	2 units
Pnom ratio	1.35

**PVsyst V7.1.8**

VC0, Simulation date:
21/04/21 09:49
with v7.1.8

Array losses**Array Soiling Losses**

Loss Fraction 3.0 %

LID - Light Induced Degradation

Loss Fraction 2.0 %

Strings Mismatch loss

Loss Fraction 0.1 %

Thermal Loss factor

Module temperature according to irradiance

Uc (const) 25.0 W/m²K

Uv (wind) 0.0 W/m²K/m/s

Module Quality Loss

Loss Fraction 0.0 %

IAM loss factor

ASHRAE Param: IAM = 1 - bo(1/cosi -1)

bo Param. 0.05

DC wiring losses

Global array res. 187 mΩ

Global wiring resistance 94 mΩ

Loss Fraction 1.5 % at STC

Module mismatch losses

Loss Fraction (Fixed voltage) 0.0 %

System losses**Unavailability of the system**

Time fraction 2.0 %

7.3 days,
3 periods

AC wiring losses**Inv. output line up to injection point**

Inverter voltage 400 Vac tri

Loss Fraction 1.7 % at STC

Inverter: SE33.3K-EU-APAC/AUS (400V)

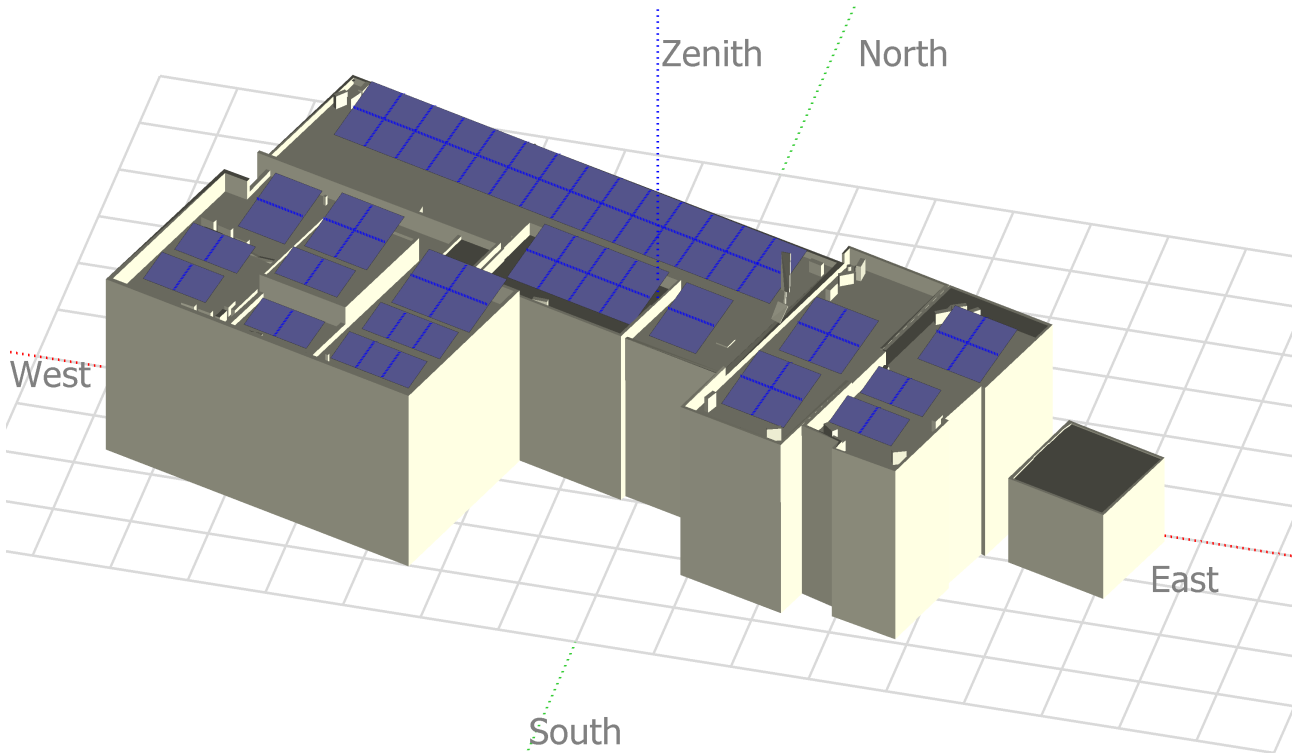
Wire section (2 Inv.) Copper 2 x 3 x 50 mm²

Average wires length 168 m

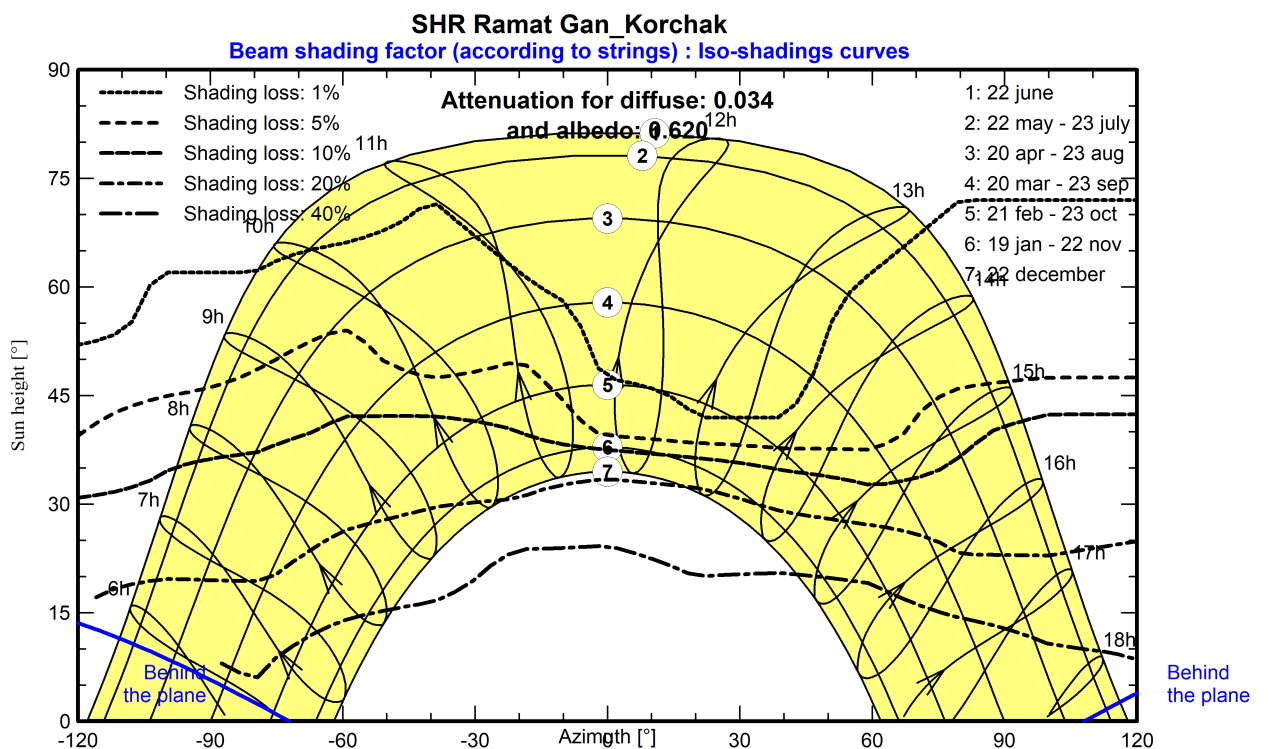


Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram





PVsyst V7.1.8

VC0, Simulation date:
21/04/21 09:49
with v7.1.8

Main results

System Production

Produced Energy 150.2 MWh/year

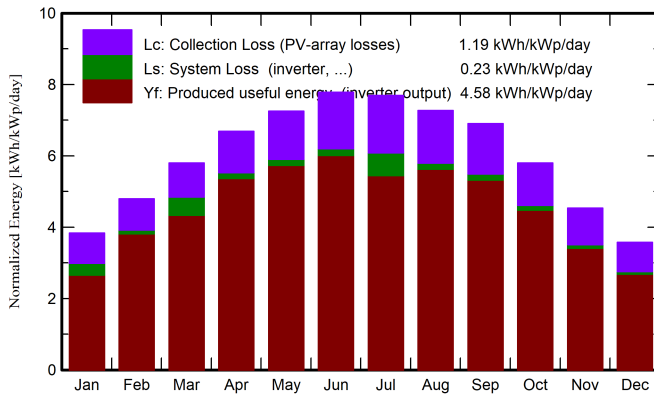
Specific production

1671 kWh/kWp/year

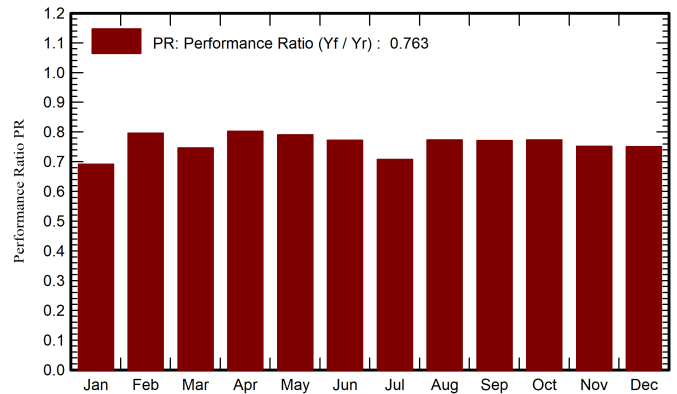
Performance Ratio PR

76.28 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	MWh	MWh	ratio
January	92.1	38.65	12.89	119.0	108.7	8.34	7.40	0.692
February	110.6	46.40	13.53	134.3	124.3	9.88	9.60	0.796
March	159.8	62.31	16.27	179.9	168.2	13.50	12.08	0.747
April	190.0	71.96	19.23	200.6	187.8	14.91	14.47	0.802
May	226.6	76.41	22.47	224.8	210.7	16.47	15.98	0.791
June	241.9	59.07	25.29	233.5	219.2	16.72	16.22	0.773
July	243.9	61.59	28.17	238.4	223.7	16.96	15.18	0.708
August	218.1	66.52	28.42	225.5	211.5	16.17	15.69	0.774
September	186.5	47.52	26.35	207.2	194.3	14.81	14.37	0.771
October	149.4	46.27	23.76	179.8	167.3	12.87	12.50	0.773
November	105.1	34.92	18.84	136.1	125.5	9.46	9.20	0.752
December	84.7	38.69	15.00	110.8	100.9	7.67	7.47	0.751
Year	2008.7	650.32	20.90	2190.1	2042.0	157.77	150.16	0.763

Legends

GlobHor Global horizontal irradiation

DiffHor Horizontal diffuse irradiation

T_Amb Ambient Temperature

GlobInc Global incident in coll. plane

GlobEff Effective Global, corr. for IAM and shadings

EArray Effective energy at the output of the array

E_Grid Energy injected into grid

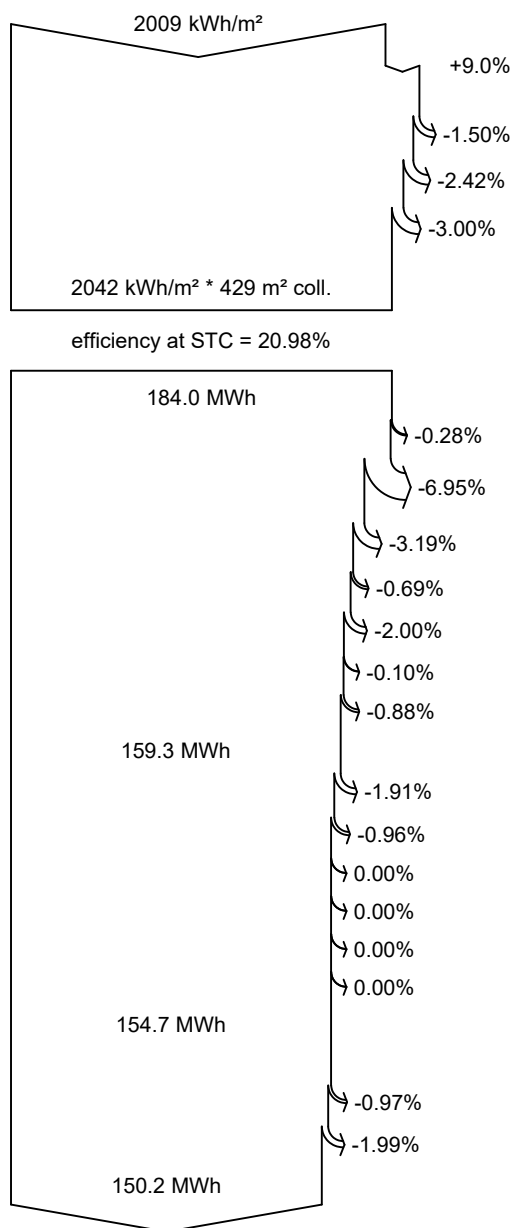
PR Performance Ratio



PVsyst V7.1.8

VC0, Simulation date:
21/04/21 09:49
with v7.1.8

Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Near Shadings: irradiance loss

IAM factor on global

Soiling loss factor

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC eff.)

PV loss due to irradiance level

PV loss due to temperature

Shadings: Electrical Loss acc. to strings

Optimizer efficiency loss

LID - Light induced degradation

Mismatch loss, modules and strings

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Available Energy at Inverter Output

AC ohmic loss

System unavailability

Energy injected into grid



PVsyst V7.1.8

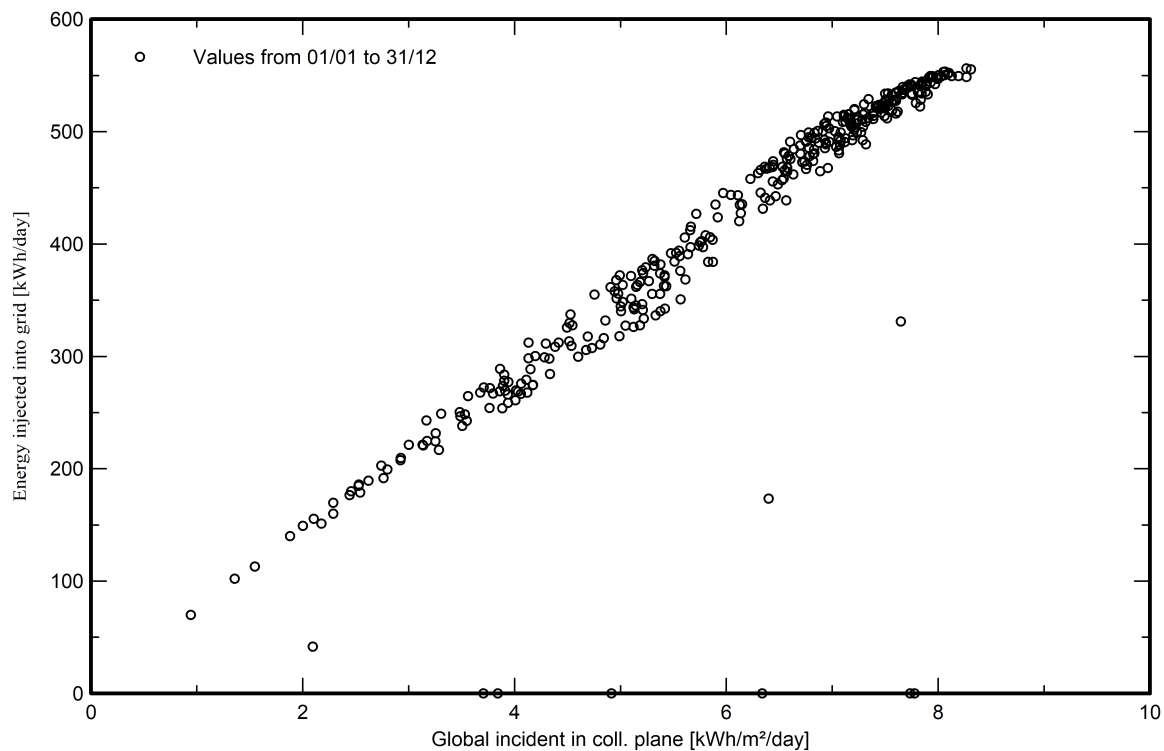
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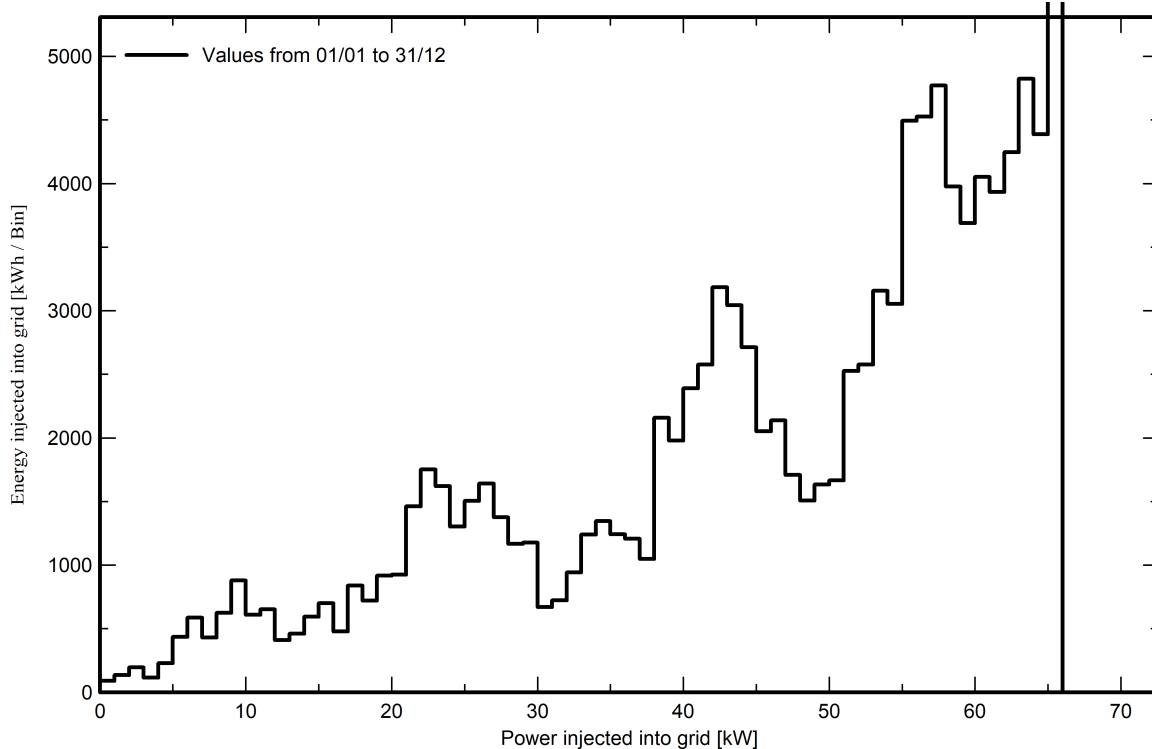
with v7.1.8

Special graphs

Daily Input/Output diagram



System Output Power Distribution



DC CABLE CALCULATION & POWER LOSSES

DATA		Cable Calculation										Production Losses	
Module Type	535	mm^2	Copper			Aluminum						Grid Load	100%
Imp [A]	12.72		4	6	16	25	35	50	95	120	240	Power Losses	0.55%
Vmp [V]	41.26												
Module amount	162	Length										Power Losses	473W
Total Power [kWp]	86,670												

Inverter	Module No'	Module No' Inv/String	Parallel Strings	Power [W]	Current [A]	Max Current Carrying Capacity [A]	Resistance [Ω/1000m]	No' Cable Sets	Cross section [mm^2]	Cable Lengh [M]	Voltage Drop [V]	Power losses [W]	ΔP %	
inv 1	81	81	3	43335	38.16	64.50	3.59	2	6	5	0.7	26	0.06%	DCCB / DCB to INV Losses
ST-1	27	27	1	14445	12.72	36.75	3.59	1	6	63	6	73	0.51%	String Losses
ST-2	27	27	1	14445	12.72	36.75	3.59	1	6	70	6	81	0.56%	
ST-3	27	27	1	14445	12.72	36.75	3.59	1	6	100	9	116	0.80%	
												297	0.68%	Total losses
inv 3	81	81	3	43335	38.16	64.50	3.59	2	6	7	1.0	37	0.08%	DCCB / DCB to INV Losses
ST-1	27	27	1	14445	12.72	36.75	3.59	1	6	60	5	70	0.48%	String Losses
ST-2	27	27	1	14445	12.72	36.75	3.59	1	6	60	5	70	0.48%	
ST-3	27	27	1	14445	12.72	36.75	3.59	1	6	65	6	76	0.52%	
												176	0.41%	Total losses
												473	0.55%	TOTAL

86,670

TOTAL

DATA				AC CABLE CALCULATION & POWER LOSSES															Production Losses							
Module Type	535	Voltage [V]	400																Avg' Voltage Drop		0.68%					
Imp [A]	12.72	Load [%]	100%																Max Voltage Drop		0.68%					
Vmp [V]	41.26	Cos Ph	1																Power Losses		0.77%					
Module amount	162	Total Power [kVA]	66.60																		383.91W					
Total Power [kWp]	86,670																									
FROM	TO	Module amount DC	DC Power [kW]	AC Power [kVA]	MAX AC Current [A]	Cable Length [m]	Cable Type		Cross Section [mm^2]	No' Cable sets	Installation type	K1	K2	K3	K4	Max Current Carrying Capacity [A]	R (at cable temp.) [Ω/Km]	Z (impedance) [Ω/Km]	ΔU Cable [V]	Power Losses [W]	ΔU Cable [%]	ΔU AC Line [%]	Power Losses [%]			
INV 1	P0	81	43.3	50.00	72.17	4	4x25 NA2XY	Copper	25	1	Air	0.95	1	1	1	89.3	0.770	0.775	0.39	48.1	0.10%	0.68%	0.06%			
INV 2	P0	81	43.3	50.00	72.17	4	4x25 NA2XY	Copper	25	1	Air	0.95	1	1	1	89.3	0.770	0.775	0.39	48.1	0.10%	0.68%	0.06%			
LVP	IEC Meter	162	86.7	50.00	72.17	40	4x70 NA2XY	Aluminum	70	1	Air	0.95	1	1	1	121.6	0.460	0.468	2.34	287.7	0.58%	0.58%	0.18%			
AC [kVA]		50.00																			383.9		Toatl Losses		0.77%	