



City of Reedsburg
134 South Locust Street, P.O. Box 490
Reedsburg, WI 53959
Ph. 608-524-6404 Fax. 608-524-8458
www.reedsburgwi.gov

Public Works Committee Agenda
March 18, 2020
Reedsburg City Hall, 134 S Locust Street
5:30 PM

NOTICE IS HEREBY GIVEN THAT A MAJORITY OF THE MEMBERS OF THE COMMON COUNCIL MAY ATTEND THIS MEETING TO GATHER INFORMATION ABOUT A SUBJECT OVER WHICH THE COMMON COUNCIL HAS DECISION-MAKING AUTHORITY. IF A QUORUM OF THE COMMON COUNCIL ATTENDS THIS MEETING, NO ACTION WILL BE TAKEN BY THE COMMON COUNCIL AT THIS MEETING.

CALL TO ORDER

APPROVAL OF MINUTES

I. APPROVE MINUTES FOR THE MEETING HELD ON FEBRUARY 19, 2020:

THE COMMITTEE WILL RECEIVE INFORMATION ON NON-AGENDA TOPICS BROUGHT BEFORE THE COMMITTEE BY MEMBERS OF THE PUBLIC. THE COMMITTEE WILL NOT DISCUSS THESE TOPICS, AND WILL NOT TAKE ACTION ON ANY OF THEM AT THIS MEETING

I. GENERAL BUSINESS:

- A. Consideration of curb, gutter and sidewalk bid.
- B. Consideration of aggregate bid.
- C. Consideration of asphalt pavement bid.
- D. Consideration of annual heavy equipment rental contract bid.
- E. Consideration of seal coat bid.
- F. Consideration of sidewalk repair resolution.
- G. Consideration of All Sky Energy Solar proposal.

II. ADJOURN:



The City of Reedsburg does not discriminate on the basis of disability in the admissions or access to, or treatment of or employment in, its programs or activities. Disability-related aids or services, including printed information in alternate formats, to enable persons with disabilities to participate in public meetings and programs are available by calling (608) 524-6404. To be able to meet the needs of a request for a different format contact the City Clerk-Treasurer at 134 S. Locust Street, Reedsburg, WI at least 48 hours prior to the commencement of the meeting so that any necessary arrangements can be made to accommodate each request.

Reedsburg, WI
February 19, 2020

The Public Works Committee for the City of Reedsburg convened for their regular meeting, on February 19, 2020 at 5:30 p.m. in the Reedsburg Center Conference Room with the following members present:

Members Present: Brandt Werner, Charlie Backeberg, Dave Knudsen, Calvin Craker and Jamison Sporadowski

Also Present: Steven Zibell

Motion by Backeberg seconded by Craker to approve the minutes from January 15, 2020 meetings.

Motion Carried

Zibell presented a quote from Mid-Sate equipment for an equipment trade in program. Zibell presented the quote to trade in our 1 year old Track skid-steer loader for a new 2020 model for \$3,500. Zibell stated this could be funded thru the general operating budget along with the stormwater accounts since the machine is used for clearing out detention ponds along with other miscellaneous projects. Motion by Knudsen seconded by Backeberg to proceed with the trade-in program.

No Action

Zibell gave an update on current projects status.

Motion Carried

Motion by Backeberg seconded by Craker to adjourn.

Motion Carried

Adjourned at 6:00 p.m.
Respectively Submitted,

Steven T. Zibell, Public Works Director/City Engineer
City of Reedsburg

CITY OF REEDSBURG BID OPENING

134 South Locust Street

Reedsburg, WI 53959

Project: 2020 C&G CONTRACT 'A', SIDEWALK CONTRACT 'B' 3/12/20

BIDDER	BID SECURITY	BASE BID	COMMENTS
T & M	Check	\$10,830.00	Contract B
Rennhack Construction	Bond	\$188,436.35	Contract A
		\$11,592.50	Contract B

CITY OF REEDSBURG BID OPENING

134 South Locust Street

Reedsburg, WI 53959

Project: 2020 CRUSHED AGGREGATE BASE COURSE 3/12/20

BIDDER	BID SECURITY	BASE BID	COMMENTS
Ray Zobel & Sons	Bond	\$115,317.50	\$9.65 ton
Bindl Bauer Lime and Stone	Check	\$115,915.00	\$9.70 ton

CITY OF REEDSBURG BID OPENING

134 South Locust Street

Reedsburg, WI 53959

Project: 2020 ASPHALT PAVEMENT 3/12/20

BIDDER	BID SECURITY	BASE BID	COMMENTS
Scott Const.	Bond	\$290,952.80	\$65.60 ton
D.L. Gasser	Bond	\$253,095.75	\$56.72 ton

CITY OF REEDSBURG BID OPENING

134 South Locust Street

Reedsburg, WI 53959

Project: 2020 ANNUAL RENTAL CONTRACT 3/12/20

BIDDER	BID SECURITY	BASE BID	COMMENTS
Ray Zobel & Sons	Bond	\$80 hr \$150 hr \$45 ton	Quad axle dump Backhoe Demo Material Disposal

CITY OF REEDSBURG BID OPENING

134 South Locust Street

Reedsburg, WI 53959

Project: 2020 SEAL COAT VARIOUS STREETS 3/12/20

BIDDER	BID SECURITY	BASE BID	COMMENTS
Scott Construction	Bond	\$62,799.50	\$3.05 square yard
Fahrner Asphalt	Bond	\$79,477.40	\$3.86 square yard

RESOLUTION
(Ordering the Repair and Installation of Sidewalks on Various Streets)

File No. 4403-20

WHEREAS, the Public Works Committee ordered the repair and installation of sidewalks on various streets and granted authority to the City Engineer to notify affected property owners, and

WHEREAS, the Common Council of the City of Reedsburg that the City Engineer, through the designated Sidewalk Inspector, be and is hereby authorized to cause to be repaired, installed, or replaced any defective or unsafe sidewalk with the City, commencing with the described area in 2020 in accordance with State Statute 66.615:

Area B: An area bounded by E. Main Street to the south, Laurel Street to the east, Eighth Street to the north and North Park Street to the west.

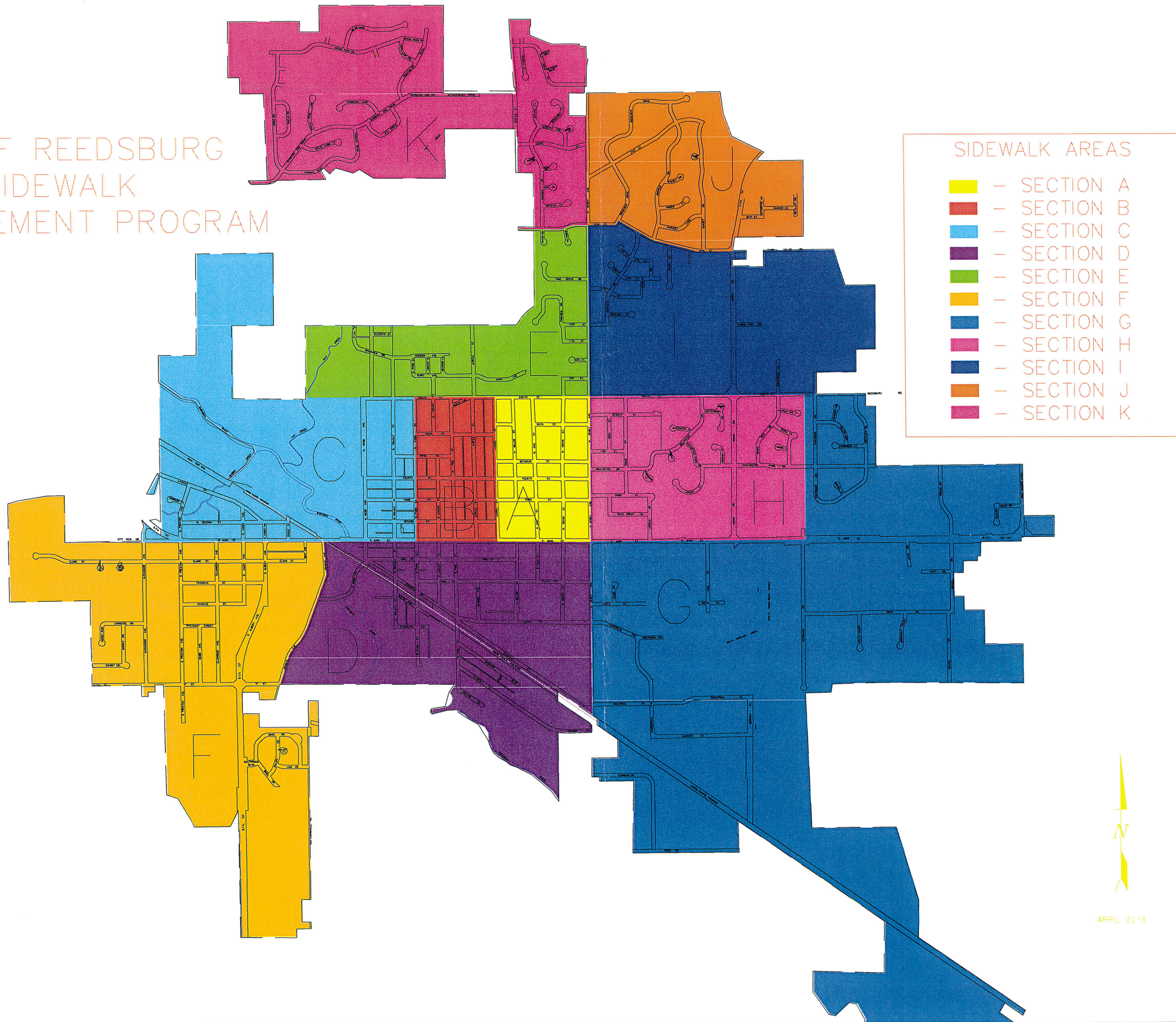
NOW THEREFORE BE IT RESOLVED that said Sidewalk Inspector shall notify the property owners with defective or unsafe sidewalks to repair or replace the sidewalk, in compliance with the requirements of the City Ordinance governing such construction within thirty (30) days from the date of notice, and that if not so repaired, installed, or replaced within the said thirty (30) days, the City of Reedsburg will cause such sidewalk to be repaired, installed, or replaced and charge the cost thereof to the abutting property owner, and such cost, unless previously paid, will be collected as a special tax against the abutting property.

Dated this 23rd day of March, 2020

David G. Estes, Mayor

Jacob Crosetto, Clerk/Treasurer

CITY OF REEDSBURG SIDEWALK REPLACEMENT PROGRAM



APRIL 2013



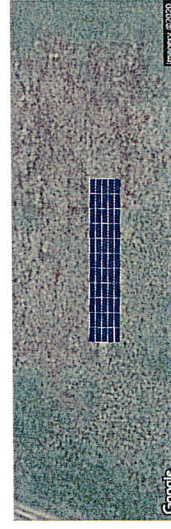
City of Reedsburg Public Works Solar Array

Keith Kahlow
SOLAR SALES REPRESENTATIVE
Tel: 608-516-5644
All Sky Energy
52810 County Hwy BD
Baraboo, WI 53913

Summary

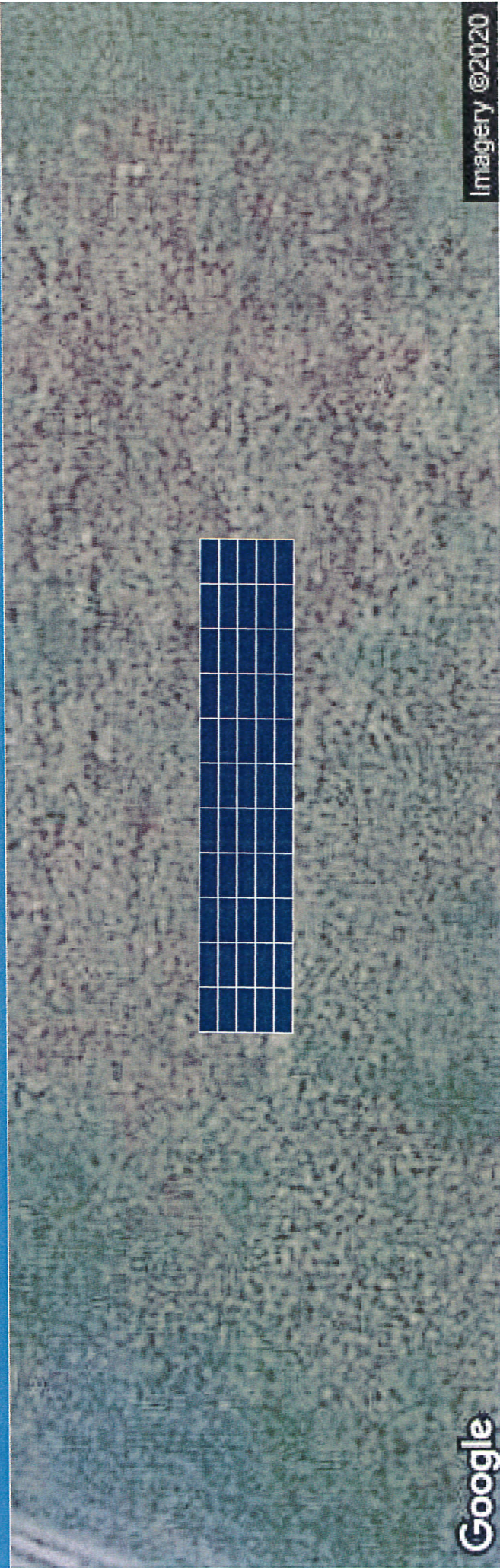
31,699

kWh Produced Annually





What is the solution?



55

Solar Panels
by Philadelphia Solar

1

Inverters
by Fronius

31,699

kWh Energy Produced

20.4

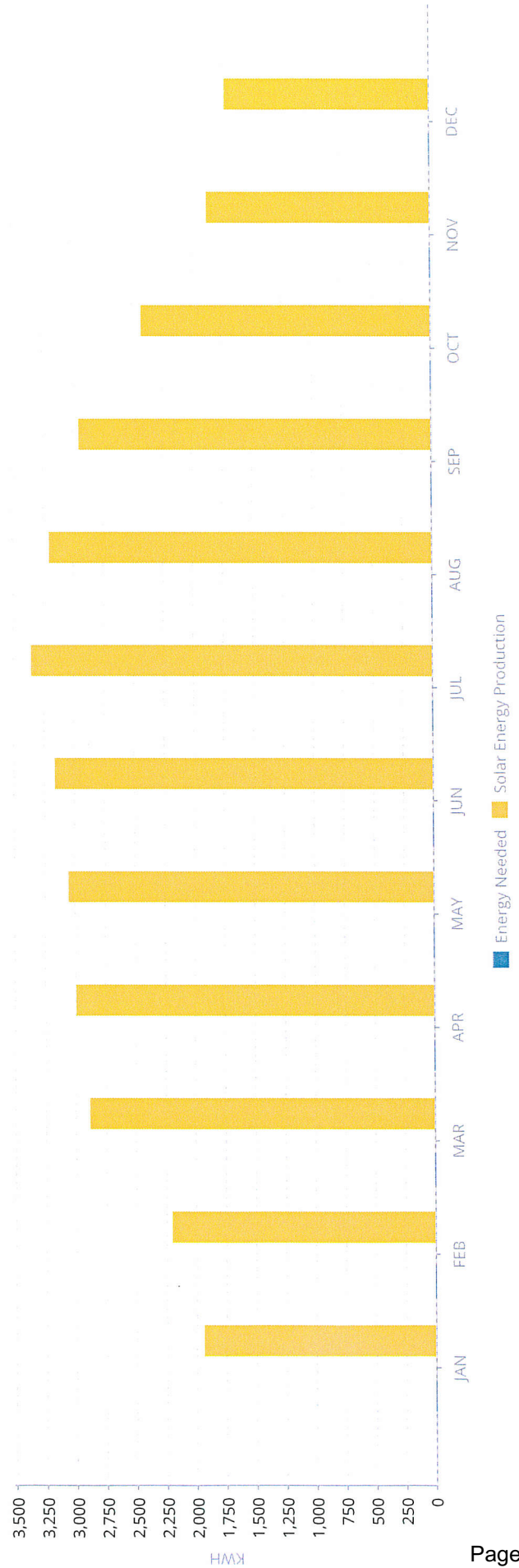
kW DC System



How much solar energy will be produced?

31,699
kWh Energy Produced
Annually by Solar

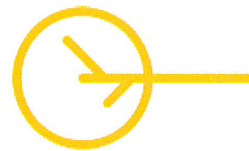
The rest will be provided
by the grid.





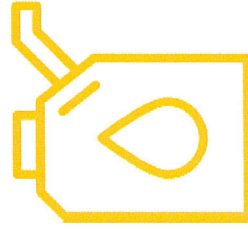
Beyond the Gold

Over a 20 year(s) period of using solar energy you will have saved:



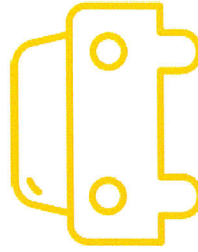
11,412

TREES



50,084

GALLONS OF GAS



950,970

MILES DRIVEN



Detail Sheet

System Details

ESTIMATED ANNUAL PRODUCTION	31,699 KWH
ESTIMATED SYSTEM SIZE	20.4 KW DC
AC/DC RATIO	1.0
ROOF SLOPE	0°
AZIMUTH	181
TOTAL MODULES	55
NUMBER OF INVERTERS	1
ROW SPACING	1"
COLUMN SPACING	0"
GROUND COVERAGE RATIO	0.97

Components Details

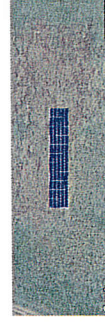
MODULE MANUFACTURER	Philadelphia Solar
MODULE MAKE	PS-M72-370
INVERTER MANUFACTURER	Fronius
INVERTER MAKE	Symo 20.0-3 (480V)
MOUNTING MANUFACTURER	IronRidge
MOUNTING MAKE	XR1000 Tilt-Up

Keith Kahlow

SOLAR SALES REPRESENTATIVE

March 03, 2020

DATE



Tel: 6085165644

All Sky Energy

52810 County Hwy, BD

Baraboo, WI 53913

ADDRESS

Reedsburg Public Works
134 S Locust St
Reedsburg, WI 53913

DATE
03/04/2020

TOTAL
\$42,735.00

DATE	ACTIVITY	QTY	RATE	AMOUNT
	Solar PV Installation:20.04 kw Solar PV System	1	21,368.00	21,368.00
	Panels & Inverters			
	Hardware	1	9,402.00	9,402.00
	Rails, Clamps & Connectors			
	BOS	1	7,265.00	7,265.00
	Balance of System			
	Labor	1	4,700.00	4,700.00

70% is due before start of job | 30% is due date of completion and is not contingent on the utilities. Completion date is subject to payment, delivery of parts and weather permitting.

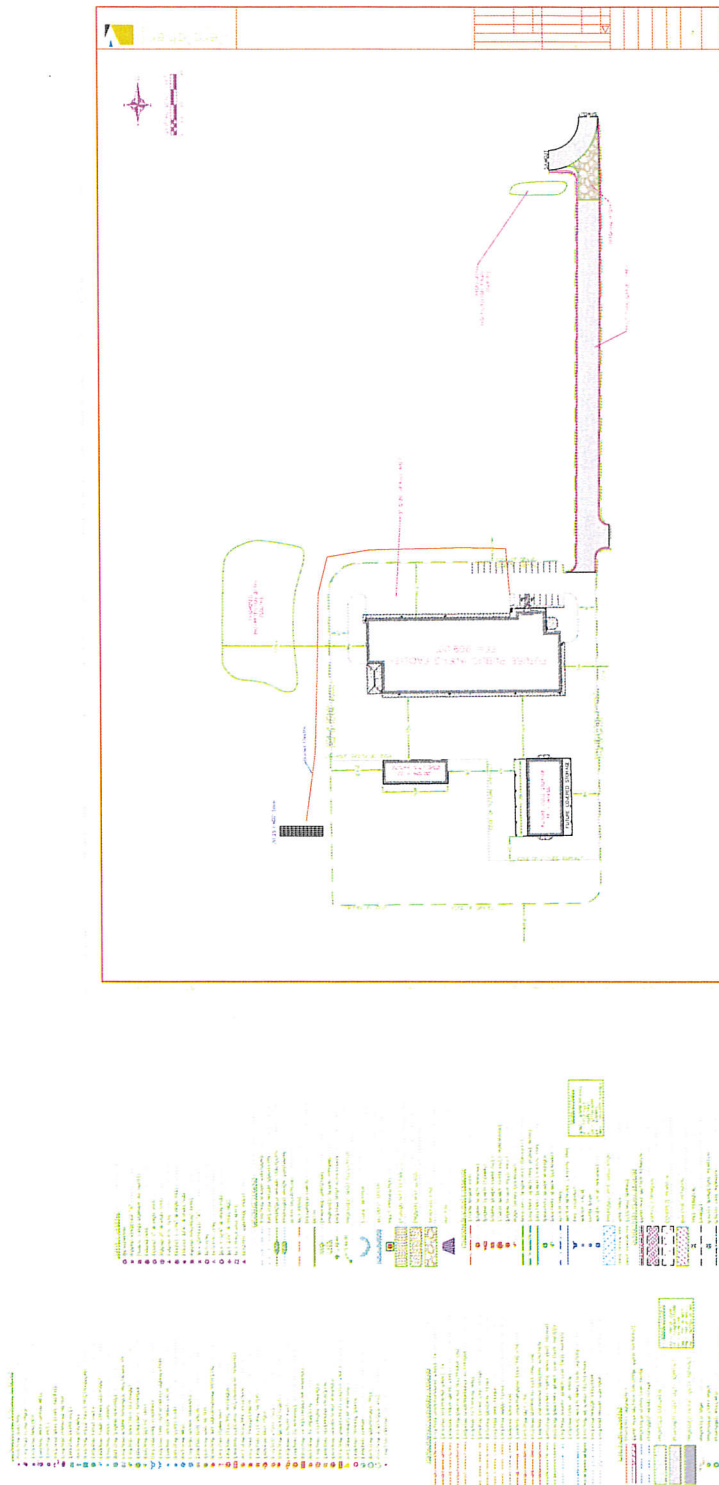
TOTAL

\$42,735.00

THANK YOU.

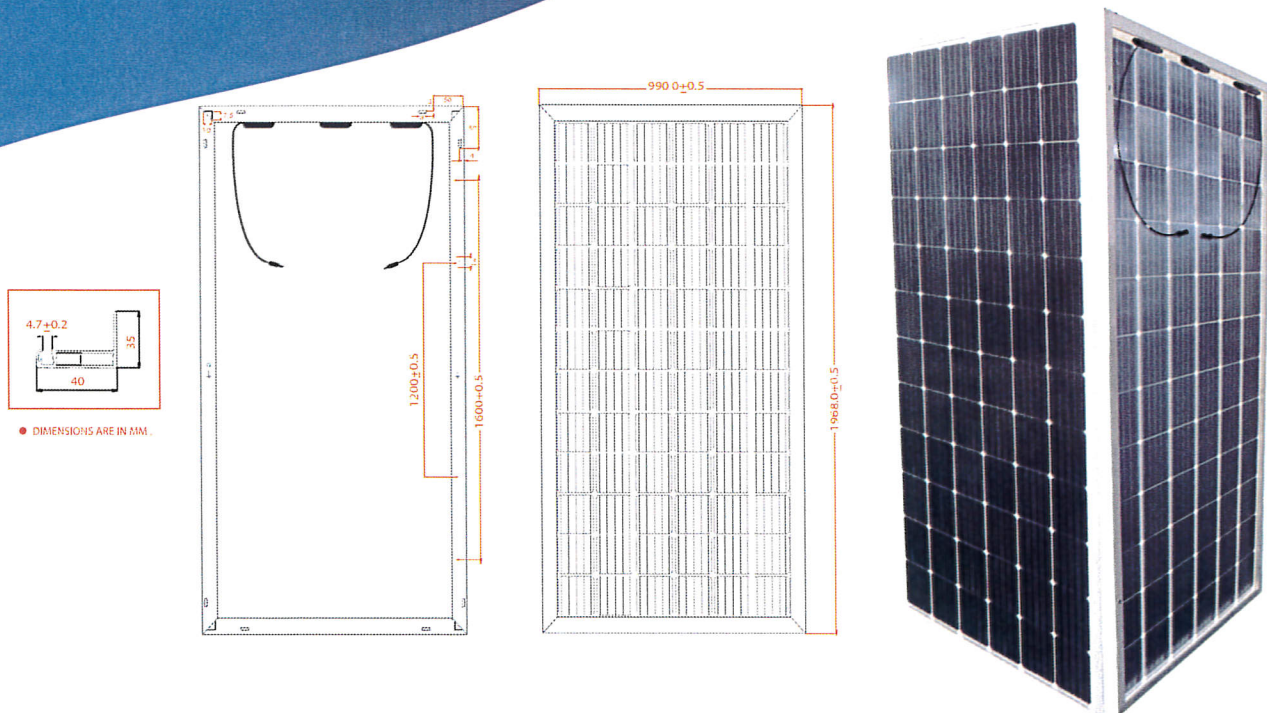
Accepted By

Accepted Date



PS-M72(BF) (360-380 W)

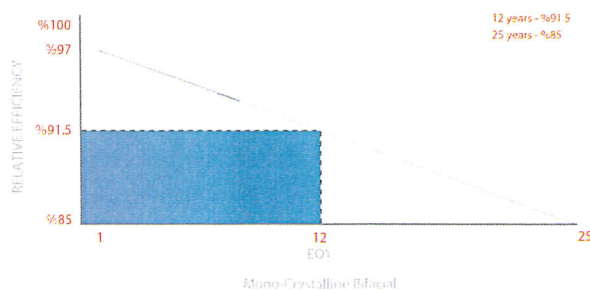
Mono PERC Bifacial-Crystalline Module



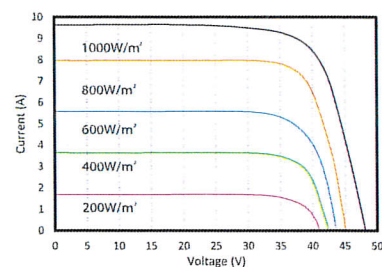
PS-M72 (BF) Dimensions

Philadelphia Solar's Mono-Crystalline Bifacial Modules with power up to 380 Wp are produced using the state-of-the-art (automated) robotic production lines. These modules are suitable to be used for most electrical power applications and have excellent durability to prevailing weather conditions.

LINEAR PERFORMANCE WARRANTY



IV - CURVE M72 (BF) - 370W



Certificates

- Bankability Report DNV GL



- Power measuring tolerance: $\pm 3\%$, other measurements tolerances: $\pm 5\%$
- Datasheet is subjected to changes without prior notice, always obtain the most recent version of the datasheet.
- Caution: For professional use only, the installation and handling of PV modules and cleaning modules require professional skills and should only be performed by qualified professionals, please read the Installation and Operation Manual before using the modules, also Cleaning Guidelines.

ELECTRICAL CHARACTERISTICS	360W	365W	370W	375W	380W
Characteristics (STC)	STC	STC	STC	STC	STC
Open Circuit Voltage - Voc (V)	48.04	48.12	48.36	48.63	48.90
Short Circuit Current - Isc (A)	9.55	9.62	9.70	9.78	9.87
Maximum Power Voltage - Vmpp (V)	39.95	40.25	40.60	40.85	41.05
Maximum Power Current - Impp (A)	9.02	9.07	9.12	9.18	9.26
Maximum Power - Pmax (W)	360	365	370	375	380
Module Efficiency - η (%)	18.5	18.7	19.0	19.2	19.5

Values at Standard Test Conditions STC (Air Mass AM1.5, Irradiance 1000W/m², Cell Temperature 25°C).

MATERIAL CHARACTERISTICS		PACKAGING	
Characteristics	Value	Physical Characteristics	Value
Cells per Module	72	Module Dimensions (mm)	1968 x 990 x 40
Cell Type	Grade A - Mono-Crystalline Silicon (PERC) Bifacial 156.75x156.75 ±0.25 mm	Module Weight (kg)	22
Front Surface	Anti-Reflective Coated Tempered 3.2mm Glass	Pallet Dimensions W.D.H (mm)	2010 x 1140 x 1130
Encapsulant	PID Free EVA	Modules per Pallet	27
Back Cover	Transparent Backsheet	Container Capacity	Value
Frame	Anodized Aluminum	20 Feet Container	270 Modules
Junction Box	IP68, 3 Bypass Diodes	40 Feet High-Cube Container	594 Modules
Cable and Connector	MC4 interconnection / Cable length can be customized		
Fire Classification	Spread of flame : A / Burning brand : C		

Electrical Characteristics with Different Rear Side Power Gain (Reference to 370 W front)					
Backside Power Gain	5%	10%	15%	20%	25%
Rated Maximum Power P max W	388.5	407.5	425.5	444.0	462.5
Open Circuit Voltage Voc	48.36	48.36	48.40	48.40	48.40
Short Circuit Current - ISC (A)	10.19	10.67	11.16	11.64	12.13
Maximum Power Voltage - Vmpp (V)	40.57	40.57	40.60	40.60	40.60
Maximum Power Current - Impp (A)	9.58	10.03	10.49	10.94	11.40
Module Efficiency - Em (%)	19.94	20.92	21.84	22.79	23.74

THERMAL CHARACTERISTICS		OPERATING CONDITIONS	
Characteristics	Value		
Voltage Temperature Coefficient (%/°C)	-0.30	Maximum Sytem Voltage - Vmax (V)	1000/1500
Current Temperature Coefficient (%/°C)	+0.05	Maximum Series Fuse (A)	20
Power Temperature Coefficient (%/°C)	-0.380	Operating Temperature Range (°C)	IEC: -40 to + 85 /UL: -40 to + 90
NOCT (°C)	42 ± 2	Bifaciality Ratio	75% ±5%

WARRANTY	
Product	12 Years
Power Output	12 Years; 91.5 % of Power Output 25 Years; 85 % of Power Output

FEATURE

-  Less degradation than standard modules
-  Positive power tolerance up to 5W extra output.
-  Excellent low light performance.
-  More power gain with same utilized area
-  Easy to handle, 25-35 % lighter weight than dual glass modules.
-  Diverse mounting solutions
-  PID resistant.

BENEFITS

- Outstanding technical support.
- Pre and after sales-service.
- 12 years warranty on material and workmanship .
- 25 years linear performance warranty.
- Marketing support to official distributors.
- Customized mounting solutions.

APPLICATIONS



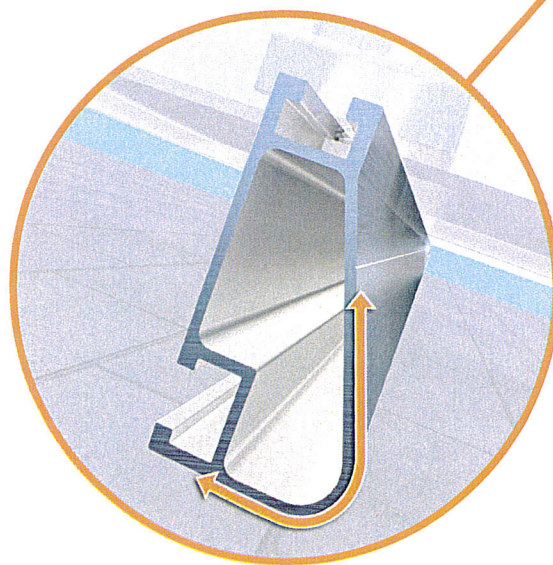
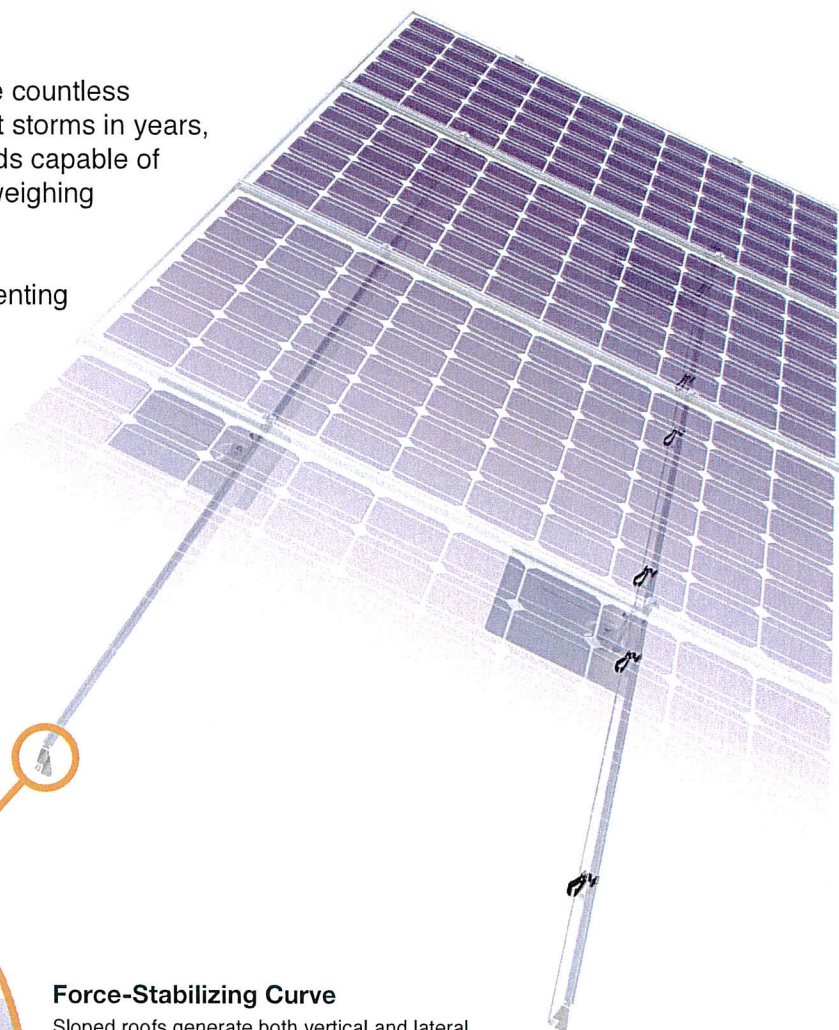


XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

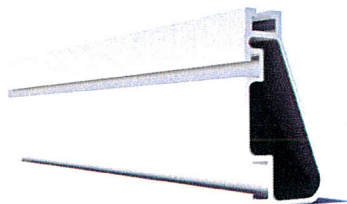
- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						



FRONIUS SYMO ADVANCED

Powering three-phase projects that last - now with integrated SunSpec PLC



/ PC Board Replacement



/ SnapInverter Mounting System



/ Integrated Data Communication



/ Design Flexibility



/ Smart Grid Ready



/ SunSpec Rapid Shutdown certified



Featuring ten models ranging from 10 kW to 24 kW, the Fronius Symo Advanced is the ideal inverter for commercial applications. The new Advanced versions combine the benefits of the Fronius Symo with additional value for states with Module Level Shutdown requirements including integrated PLC transmitter for SunSpec Rapid Shutdown communication standard, compliance with NEC pre-2014, 2014 and 2017, zero tilt mounting, light weight and field serviceability.

TECHNICAL DATA FRONIUS SYMO (208-240V VERSIONS)

INPUT DATA		SYMO 10.0-3 208-240	SYMO 12.0-3 208-240
Recommended PV power (kWp)		8.0 - 13.0	9.5 - 15.5
Max. usable input current (MPPT1/MPPT 2)			25.0 A / 16.5 A
Max. usable input current total (MPPT 1 + MPPT 2)			41.5 A
Max. array short circuit current			37.5 A / 24.8 A
Nominal input voltage	208 V	350 V	350 V
	240 V	370 V	370 V
	480 V	N/A	N/A
Operating voltage range			200-600 V
DC startup voltage			200 V
MPP Voltage range			300-500 V
Max. input voltage			600 V
Admissible conductor size DC		AWG 14-AWG 6 copper direct, AWG 6 aluminum direct, AWG 4-AWG 2 copper or aluminum with input combiner	
Integrated DC string fuse holders			NA
Max (Isc) input terminal rating			33A
Number of MPPT			2
OUTPUT DATA		SYMO 10.0-3 208-240	SYMO 12.0-3 208-240
Max. output power	208 V	9995 VA	11995 VA
	240 V	9995 VA	11995 VA
	480 V	NA	NA
Output configuration			208/240 V
Frequency range (adjustable)			45-65 Hz
Nominal operating frequency			60 Hz
Admissible conductor size AC			AWG 14-AWG 6
Total harmonic distortion		<1.5 %	<1.75 %
Power factor range			Adjustable 0.85 leading to 0.85 lagging
Max. continuous output current	208 V	27.7 A	33.3 A
	240 V	24.0 A	28.9 A
	480 V	NA	NA
OCPD/AC breaker size	208 V	35 A	45 A
	240 V	30 A	40 A
	480 V	NA	NA
Max. Efficiency		97.0 %	97.0 %
CEC Efficiency	208 V	96.5 %	96.5 %
	240 V	96.5 %	96.5 %
	480 V	NA	NA

TECHNICAL DATA FRONIUS SYMO (208-240V VERSIONS)

GENERAL DATA	STANDARD WITH ALL FRONIUS SYMO MODELS
Dimensions (width x height x depth)	20.1 x 28.5 x 8.9 inches
Protection Class	NEMA 4X
Night time consumption	< 1 W
Inverter topology	Transformerless
Cooling	Variable speed fan
Installation	Indoor and outdoor installation, tilt from 0 - 90 degrees*
Ambient operating temperature range	-40°F - + 140 °F (-40 - +60 °C)
Permitted humidity	0 - 100 % (non-condensing)
Elevation	2000 m (6562 ft) with a max. input voltage of 1000 V / 3400 m (11155 ft) with a max. input voltage of 850 V
DC connection terminals	6x DC+ and 6x DC- screw terminals for copper (solid / stranded / fine stranded) or aluminum (solid / stranded)
AC connection terminals	Screw terminals 14-6 AWG
Certificates and compliance with standards	UL 1741-2010 Second Edition (incl. UL1741 Supplement SA 2016-09 for California Rule 21 and Hawaiian Electric Code Rule 1411), UL1998 (for functions: AFCI, RCMU and isolation monitoring), IEEE 1547-2003, IEEE 1547a-2014, IEEE 1547.1-2003, ANSI/IEEE C62.41, FCC Part 15 A & B, NEC 2017 Article 690, C22. 2 No. 107.1-16, UL1699B Issue 2 -2013, CSA T11 M-07 Issue 1 -2013

GENERAL DATA	SYMO 10.0-3 208-240	SYMO 12.0-3 208-240
Weight	91.9 lbs.	

PROTECTIVE DEVICES	STANDARD WITH ALL FRONIUS SYMO MODELS
DC reverse polarity protection	Yes
Anti islanding	Internal; in accordance with UL 1741-2010, IEEE 1547-2003 and NEC
Over temperature protection	Output power derating /Active cooling
AFCI	Yes
Rapid shutdown compliant	Yes
Ground Fault Protection with Isolation Monitor	Yes
Interrupter	Yes
DC disconnect	Yes

INTERFACES	AVAILABLE WITH ALL FRONIUS SYMO MODELS
USB (A socket)	Datalogging and inverter update possible via USB
2x RS422 (RJ45 socket)	Fronius Solar Net, interface protocol
Power Line Communication (PLC)	Yes - SunSpec Rapid Shutdown communication standard
Compatible Module Level Electronic	Tigo TS4-F based on SunSpec PLC (pending testing)
AVAILABLE WITH THE FRONIUS DATAMANAGER 2.0 CARD (ONLY ONE CARD REQUIRED FOR UP TO 100 INVERTERS)	
Wi-Fi/Ethernet/Serial/ Datalogger and webserver	Wireless standard 802.11 b/g/n / Fronius Solarweb, SunSpec Modbus TCP, JSON / SunSpec Modbus RTU
6 inputs and 4 digital I/Os	Load management; signaling, multipurpose I/O

TECHNICAL DATA FRONIUS SYMO (480V VERSIONS)

INPUT DATA	SYMO 15.0-3 480	SYMO 20.0-3 480	SYMO 22.7-3 480	SYMO 24.0-3 480
Recommended PV power (kWp)	12.0 – 19.5	16.0 – 26.0	18.0 – 29.5	19.0 – 31.0
Max. usable input current (MPPT1/MPPT 2)	33.0 A / 25.0 A			
Max. usable input current total (MPPT 1 + MPPT 2)	51 A			
Max. array short circuit current (MPPT 1/MPPT 2)	49.5 A / 37.5 A			
Nominal input voltage	480 V	685 V	710 V	720 V
Operating voltage range	200-1000 V			
DC startup voltage	200 V			
MPP-voltage range	350-800 V	450-800 V	500-800 V	
Max. input voltage	1000 V			
Admissible conductor size DC	AWG 14 - AWG 6 copper direct, AWG 6 aluminum direct, AWG 4 - AWG 2 copper or aluminum with input combiner			
Integrated DC string fuse holders	NA		6- and 6+	
Max (Isc) input terminal rating	33A		15A	
Number of MPPT	2			

* Fronius Shade Cover required for installation angles less than 15 degrees

TECHNICAL DATA FRONIUS SYMO (480V VERSIONS)

OUTPUT DATA		SYMO 15.0-3 480	SYMO 20.0-3 480	SYMO 22.7-3 480	SYMO 24.0-3 480
Max. output power	480 V	14995 VA	19995 VA	22727 VA	23995 VA
Output configuration		480 V Delta +N**			
Frequency range (adjustable)		45-65 Hz			
Nominal operating frequency		60 Hz			
Admissible conductor size (AC)		AWG 14-AWG 6			
Total harmonic distortion		<1.5 %	<1.0 %	<1.25 %	<1.0 %
Power factor range		Adjustable 0.85 leading to 0.85 lagging			
Max. continuous output current	480 V	18.0 A	24.0 A	27.3 A	28.9 A
OCBD/AC breaker size	480 V	25 A	30 A	35 A	40 A
Max. Efficiency			98.0 %		
CEC Efficiency	480 V	97.0 %	97.5 %	97.5 %	97.5 %

GENERAL DATA	STANDARD WITH ALL FRONIUS SYMO MODELS				
Dimensions (width x height x depth)	20.1 x 28.5 x 8.9 inches				
Protection Class	NEMA 4X				
Night time consumption	< 1 W				
Inverter topology	Transformerless				
Cooling	Variable speed fan				
Installation	Indoor and outdoor installation, tilt from 0 - 90 degree*				
Ambient operating temperature range	-40°F - +140 °F (-40 - +60 °C)				
Permitted humidity	0 - 100 % (non-condensing)				
Elevation	2000 m (6562 ft) with a max. input voltage of 1000 V / 3400 m (11155 ft) with a max. input voltage of 850 V				
DC connection terminals	6x DC+ and 6x DC- screw terminals for copper (solid / stranded / fine stranded) or aluminum (solid / stranded)				
AC connection terminals	Screw terminals 14-6 AWG				
Certificates and compliance with standards	UL 1741-2010 Second Edition (incl. UL1741 Supplement SA 2016-09 for California Rule 21 and Hawaiian Electric Code Rule 14H), UL1998 (for functions: AFCI, RCMU and isolation monitoring), IEEE 1547-2003, IEEE 1547a-2014, IEEE 1547.1-2003, ANSI/IEEE C62.41, FCC Part 15 A & B, NEC 2017 Article 690, C22. 2 No. 107.1-16, UL1699B Issue 2 -2013, CSA T1L M-07 Issue 1 -2013				

GENERAL DATA	SYMO 15.0-3 480	SYMO 20.0-3 480	SYMO 22.7-3 480	SYMO 24.0-3 480
Weight	95.7 lbs.			

PROTECTIVE DEVICES	STANDARD WITH ALL FRONIUS SYMO MODELS			
DC reverse polarity protection	Yes			
Anti islanding	internal; in accordance with UL 1741-2010, IEEE 1547-2003 and NEC			
Over temperature protection	Output power derating/Active cooling			
AFCI	Yes			
Rapid shutdown compliant	Yes			
Ground Fault Protection with Isolation Monitor	Yes			
Interrupter	Yes			
DC disconnect	Yes			

INTERFACES	AVAILABLE WITH ALL FRONIUS SYMO MODELS			
USB (A socket)	Datalogging and inverter update possible via USB			
2x RS422 (RJ45 socket)	Fronius Solar Net, interface protocol			
Power Line Communication (PLC)	Yes – SunSpec Rapid Shutdown communication standard			
Compatible Module Level Electronic	Tigo TS4-F based on SunSpec PLC (pending testing)			

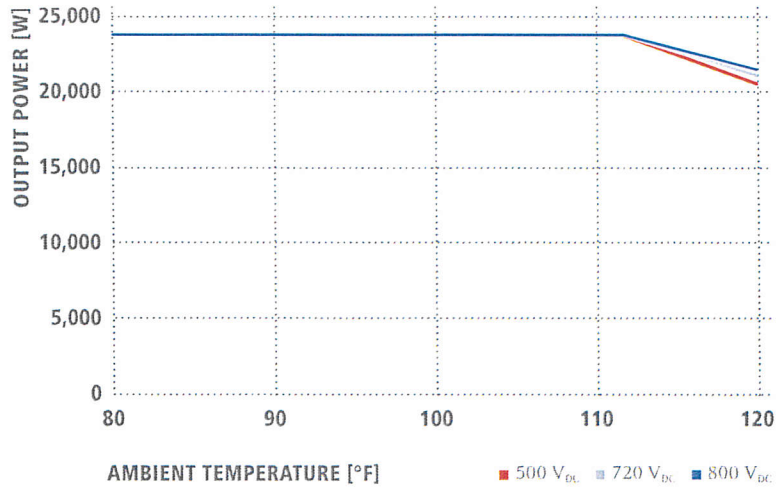
AVAILABLE WITH THE FRONIUS DATAMANAGER 2.0 CARD (ONLY ONE CARD REQUIRED FOR UP TO 100 INVERTERS)

Wi-Fi/Ethernet/Serial/ Datalogger and webserver	Wireless standard 802.11 b/g/n / Fronius Solar.web, SunSpec Modbus TCP, JSON / SunSpec Modbus RTU
6 inputs and 4 digital I/Os	Load management; signaling, multipurpose I/O

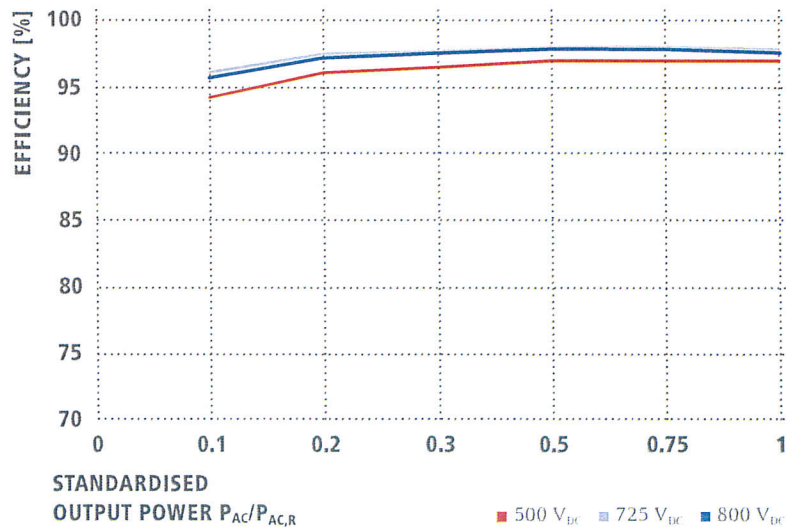
**+N for sensing purposes - no current carrying conductor.

* Fronius Shade Cover required for installation angles less than 15 degrees

FRONIUS SYMO 24.0-3 480 TEMPERATURE DERATING CURVE



FRONIUS SYMO 24.0-3 480 CEC EFFICIENCY CURVE



/ Perfect Welding / Solar Energy / Perfect Charging

THREE BUSINESS UNITS, ONE GOAL: TO SET THE STANDARD THROUGH TECHNOLOGICAL ADVANCEMENT.

What began in 1945 as a one-man operation now sets technological standards in the fields of welding technology, photovoltaics and battery charging. Today, the company has around 3,800 employees worldwide and 1,242 patents for product development show the innovative spirit within the company. Sustainable development means for us to implement environmentally relevant and social aspects equally with economic factors. Our goal has remained constant throughout: to be the innovation leader.

Further information about all Fronius products and our global sales partners and representatives can be found at www.fronius.com

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