

# REPORT/RAPOR

Register Nr/Kayıt No

21-GR-0160

Date/Tarih

09.07.2021



Türkiye

**Güven verir.  
Değer katar.**

Customer/Müşteri  
**ARGESİM MAKİNA GIDA SAN. TİC. LTD. ŞTİ.**

Title/Başlık  
SEVEN Solar Irradiance Sensor  
Conformity Assessment

Report/Rapor No  
21-IS-0319-34-T-01\_eng



Report Nr  
Rapor No. 21-IS-0319-34-T-01\_eng Rev. 00

Offer Nr / Teklif No  
21-IS-0319-34-T

TGK Order Nr / Sipariş No  
712923035

Register Nr / Kayıt No  
21 - GR - 0160

Report Title/Rapor Başlığı

### SEVEN Solar Irradiance Sensor

Subject/Konu

### Conformity Assessment

Client/Müşteri : ARGESİM MAKİNA GIDA SAN. TİC. LTD. ŞTİ.

Client's P.O. No./Contract No.  
Müşteri Sip. No./ Sözleşme No : 21-IS-0319-34-T

Client's Address/Müşterinin Adresi : Pınarçay OSB Mahallesi Organize San. Bölgesi Çorum/ TÜRKİYE

Prepared by/ Hazırlayan : Niyazi ALTUN

Approved by/Onaylayan : Mustafa ÖRMECİ

Department/Unit/Bölüm/Birim : Industry Service Division

Date of Report Issued/Raporun Yayın Tarihi : 09.07.2021

Revision Revizyon	Date of Revision Revizyon Tarihi	Done by Yapan	Related Section İlgili Kısım	Reason Nedeni
00	-	-	-	-

TÜV SÜD TEKNİK GÜVENLİK VE KALİTE DENETİM  
Report/Rapor



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## 1. General Information / Genel Bilgi

TÜV SÜD authorized inspector visited the company of ARGESİM MAKİNA GIDA SAN. TİC. LTD. ŞTİ at Pınarçay OSB Mahallesi Organize San. Bölgesi Çorum/ TÜRKİYE address in order to conformity assesment (check) of the SEVEN Solar Irradiance Sensor Conformity Assessment on 30.06.2021 and then this report has been issued.

Seven Sensor Solutions is the trade mark of ARGESİM MAKİNA GIDA SAN. TİC. LTD. ŞTİ.  
SEVEN Sensor Solutions is manufacturer of weather stations, containing irradiance sensor, pyranometer, wind speed and direction sensors, ambient and module temperature sensors, and relative humidity sensor, which provide meteorological parameters related to climatic variabilities for PV Plants.

The Company specialized in supply, installation and commissioning of high-quality meteorological sensors and complete measuring & monitoring systems for solar PV plants.

Seven Sensor weather stations are compatible with many well know dataloggers.

This Irradiance Sensor is used to measure the radiation flux density of Solar PV Plants having an Analog Input Datalogger. Besides Irridiation Sensor, it includes also an Internal Module Temperature Sensor.

The Company Argesim Makina Gıda San. Tic. Ltd. Şti requested the Third party inspection service in order to conformitiy assesment from TÜV SÜD for 3S-IS-T-MB Type Seven Solar Irradiance Sensor acc. to their procedure.

The procedure was applied with the following restrictions:

- 1- 1 Pcs 3S-IS-T-MB Type Seven Solar Irradiance Sensor , Calibrated Fraunhofer ISE monocrystalline silicon type sensor and Calibrated Kipp&Zonen SMP11 Pyranometer Solar irradiance Sensor have been mounted to co-planer base plate. (for simultaneous measurement)
- 2- Base plate angle was 37°
- 3- The weather was clear, sunny, with the diffuse irradiance not greater than 20 % of the global irradiance.
- 4- There was no observable cloud formations.
- 5- Total irradiance (sun + sky + ground reflection) was not less than 800 W·m<sup>2</sup>, as measured by the primary reference cell.
- 6- Air mass was between AM1 and AM2.
- 7- Simultaneous readings of the output signal and temperature are recorder by data logger.



TGK IS 003

# TÜV SÜD TEKNİK GÜVENLİK VE KALİTE DENETİM

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The company used IEC 60904-2 Edition 3.0 2015-01 Photovoltaic devices – Part 2: Requirements for photovoltaic reference devices standard Chapter 12.1 and 12.2. for their test procedure as a reference. But the purpose of our test was not calibration. Our purpose was only comparison/verify of the their sensor (secondary reference devices) against a primary reference cell.

ARGESİM MAKİNA GIDA SAN. TİC. LTD. ŞTİ.

During the assessment / checks on 30.06.2021;

- 1- TÜV SÜD inspector has checked marking and serial numbers of test equipments.
- 2- The calibration certificates of equipments have been reviewed by TÜV SÜD inspector . Calibration certificates and calibration label on the equipment and the certificate were matching. Calibration certificates were valid.
- 3- TÜV SÜD inspector witnessed the test according to company procedure.
- 4- The test carried out between 12:45 to 13:00 duration was 15 minutes. The measurements has taken every 3 seconds.

Test Measuring equipments information were as below ;

- 1-3S-IS-T-MB Type Seven Solar Irradiance Sensor Serial No:21061
- 2-Fraunhofer ISE monocrystalline silicon type Irradiance sensor Serial No:086-2019
- 3-Kipp&Zonen SMP11 Pyranometer Solar irradiance Sensor Serial No:201850
- 4-Wind speed gauge -THISE CLİMA Serial No:12360744
- 5- PT100 Temperature Sensor Serial No:2020-2311

This report and test result are valid for tested product.

### Recomandation:

- 1- Test result reports / records should be kept for at least 10 years unless otherwise mentioned.
- 2- Test reference Equipments should be calibrated by accredited laboratory every year
- 3- This test could be carried out by company every year and results could be submit when request.

## 2. Product Image / Ürün Görseli

Please see below;



Approved by / Onaylayan  
Mustafa ÖRMECİ

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Rev.

00



Photo:1

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00

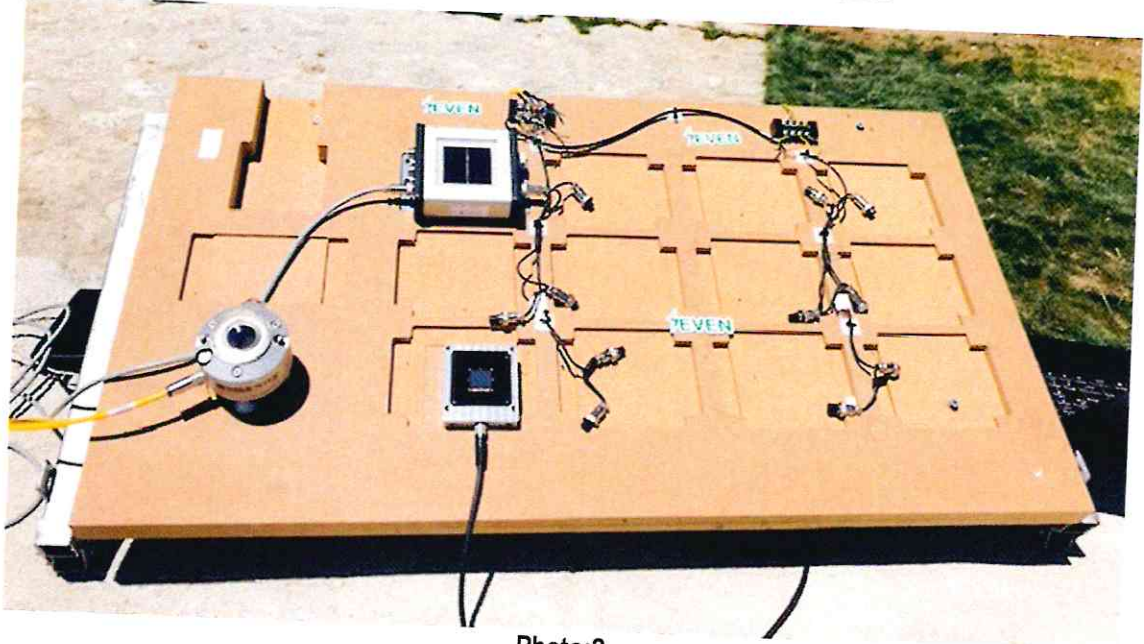


Photo:2



Photo:3



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Photo:4



Photo:5



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Photo:6



Photo:7

# TÜV SÜD TEKNİK GÜVENLİK VE KALİTE DENETİM

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Photo:8

TimeStamp	RECORD	Avg	Std	Temp	Avg	Fraunhofer	Avg	Fraunhofer	Int	Temp	Avg	Fraunhofer	Avg
2021-06-30 12:30:25	225	1012.967	54.09999	1016.66	52.20843								
2021-06-30 12:30:32	226	1018.133	54.09999	1018.799	52.22213								
2021-06-30 12:40:45	237	1019.773	54.2	1018.703	52.23994								
2021-06-30 12:40:48	238	1020.8	54.3	1020.949	52.25338								
2021-06-30 12:43:21	239	1019.133	54.3	1020.854	52.26903								
2021-06-30 12:43:34	240	1021.333	54.3	1020.728	52.28704								
2021-06-30 12:43:57	241	1024.3	54.33333	1019.521	52.29901								
2021-06-30 12:44:00	242	1022.333	54.4	1019.564	52.31117								
2021-06-30 12:44:03	243	1021.567	54.46666	1018.707	52.32031								
2021-06-30 12:44:06	244	1020.367	54.5	1018.504	52.32877								
2021-06-30 12:44:09	245	1020.2	54.5	1018.257	52.33784								
2021-06-30 12:44:12	246	1020.3	54.5	1018.33	52.35007								
2021-06-30 12:44:15	247	1021.1	54.56667	1016.735	52.35975								
2021-06-30 12:44:18	248	1020.3	54.59999	1018.113	52.37003								
2021-06-30 12:44:21	249	1019	54.59999	1017.936	52.38044								
2021-06-30 12:44:24	250	1018.667	54.59999	1015.942	52.39355								
2021-06-30 12:44:27	251	1016.867	54.7	1015.615	52.40201								
2021-06-30 12:44:30	252	1016.133	54.73333	1015.635	52.4131								
2021-06-30 12:44:33	253	1016.7	54.8	1015.209	52.41902								
2021-06-30 12:44:36	254	1016.267	54.8	1016.233	52.426								
2021-06-30 12:44:39	255	1017.6	54.8	1017.042	52.43178								
2021-06-30 12:44:42	256	1015.9	54.86666	1014.571	52.43185								
2021-06-30 12:44:45	257	1017.867	54.9	1014.211	52.43286								
2021-06-30 12:44:48	258	1014.567	54.9	1013.544	52.43151								
2021-06-30 12:44:51	259	1014.3	55	1012.717	52.42829								
2021-06-30 12:44:54	260	1013.8	55	1011.834	52.42876								
2021-06-30 12:44:57	261	1013.8	55	1013.028	52.42372								
2021-06-30 12:45:00	262	1014.867	55	1014.705	52.42043								
2021-06-30 12:45:03	263	1014.057	55.03333	1014.61	52.4172								
2021-06-30 12:45:06	264	1014.813	55.06667	1013.357	52.41935								
2021-06-30 12:45:09	265	1013.667	55.09999	1011.379	52.41579								
2021-06-30 12:45:12	266	1012.8	55.09999	1010.386	52.41666								
2021-06-30 12:45:15	267	1011.7	55.09999	1008.211	52.42258								
2021-06-30 12:45:18	268	1017.8	55.13333	1006.824	52.42688								
2021-06-30 12:45:21	269	1017.2	55.16667	1006.224	52.43319								
2021-06-30 12:45:24	270	1016.867	55.2	1005.217	52.43951								
2021-06-30 12:45:27	271	1016.2	55.2	1003.915	52.451								
2021-06-30 12:45:30	272	1015.9	55.26666	1001.159	52.46376								
2021-06-30 12:45:33	273	1015.133	55.3	999.3212	52.48158								
2021-06-30 12:45:36	274	1014.233	55.3	998.8159	52.49884								
2021-06-30 12:45:39	275	1013.667	55.3	1000.217	52.5108								
2021-06-30 12:45:42	276	1013.667	55.3	1001.225	52.52960								
2021-06-30 12:45:45	277	1013	55.33333	1003.457	52.5483								
2021-06-30 12:45:48	278	1014.867	55.36666	1004.643	52.56134								
2021-06-30 12:45:51	279	1015.567	55.4	1004.448	52.56134								

Photo:9



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3. **Technical Pictures- Manufacturing Drawings- External Dimensions / Teknik Resimler - İmalat Çizimleri - Dış Boyutlar**
4. **Label and Package Information / Etiket ve Paket Bilgisi**  
There are a serial number on products label which are shown on photos.
5. **Installation, Operating and Maintenance Instructions / Montaj, Kullanma ve Bakım Talimatı**  
3S-IS-T-MB Type Seven Solar Irradiance Sensor Technical Data
6. **Inspection and Test Reports (internal and external reports) / Muayene ve Deney Raporları (İç ve Dış Raporlar)**  
Please see attached documents.
7. **Quality & Test Plans / Kalite ve Test Planları**  
Argesim Test Procedure
8. **Annexes / Ekler**  
Please, see attached documents.
  - 1-Argesim Test Procedure
  - 2-3S-IS-T-MB Type Seven Solar Irradiance Sensor Technical Data
  - 3-3S-IS-T-MB Type Seven Solar Irradiance Serial No:21061 Calibration certificate issued by Argesim
  - 4- Fraunhofer ISE monocrystalline silicon type Solar Irradiance sensor Serial No:086-2019 Calibration certificate\_1
  - 5- Fraunhofer ISE monocrystalline silicon type Solar Irradiance sensor Serial No:086-2019 Calibration certificate\_2
  - 6-Kipp&Zonen SMP11 Pyranometer Solar irradiance Sensor Serial No:201850 Calibration certificate
  - 7-Kipp&Zonen SMP11 Pyranometer Solar irradiance Sensor Technical Data
  - 8-Wind speed gauge -THISE CLİMA Serial N0:12360744 Calibration certificate
  - 9-PT100 Temperature Sensor Calibration certificate
  - 10- Test\_Result\_1\_ Fraunhofer\_Seven SN21061\_NA210709
  - 11- Test\_Result\_1\_Kipp Zonen\_Seven SN21061\_NA210709
  - 12-Test result and notes (1 page)



# TÜV SÜD KALİBRASYON SERTİFİKA HİZMETİ

Hizmetin verileceği tarih: 01.06.2021

Hizmet Kapsamı: Kalibrasyon Sertifikası

Amaç: 3S-IS-T-MB ışınım sensörünün kalibreli bir ışınım sensörü ile karşılaştırılıp aynı sonuçların alındığına dair onaylı bir kuruluştan gelecek personelin gözetiminde yapılacak test sonucuna istinaden sertifika almaktır.

Hizmet Yetkilisi/Görevi: Niyazi ALTUN/NoBo 0036 Sertifikasyon Müdürü

## BU HİZMET KAPSAMINDA ARGESİM MAKİNA PERSONELLERİNİN SORUMLULUKLARI

- Yapılacak test ortamında her türlü güvenlik önleminin alınması
- Test için gerekli malzemelerin hepsinin çalışır temiz ve işlevsel durumda olması
- Yapılacak testte kullanılacak malzemelerin teknik dökümanlarının hazır halde bulunması
- Daha önce yapılan testlere ait dökümanların hazır halde bulundurulması.
- IEC 60904-2, IEC60904-10 ve IEC61724 standartlarının birer kopyasının hazır halde tutulması
- Test için kullanılacak 2 adet 3S-IS-T-MB ışınım sensörünün isim etiketlenmeleri ve seri numaralarının markalanması ve imalat tarihlerine istinaden döküman ve prosedürün hazırlanması.
- Kalibreli ışınım sensörünün (Fraunhofer) sertifikalarının hazır halde bulundurulması
- Kipp&Zonen SMP11 Piranometresinin teknik dökümanının hazır halde bulundurulması.
- Campbell CR6 Datalogger'a ait teknik dökümanın hazır halde bulundurulması
- Test düzeneğinin CAD çizimlerinin hazır halde bulundurulması.
- Yapılacak test ortamının google earth üzerinden yaklaşık koordinatlarının belirlenmesi.
- Campbell CR6 Datalogger üzerinde okunacak verilerle ilgili programla işleminin yapılması.
- 1 Haziran tarihinden önce bu testin gerçek koşullarda tekrarlanıp raporlanması.

## TESTİN YAPILIŞI

2 adet 3S-IS-T-MB Işınım Sensörü, Kalibreli Işınım Sensörü ve Kipp&Zonen SMP11 Piranometre test düzeneğine 37 derecelik açıyla yerleştirilecek. AM1 - AM2 aralığına denk gelecek şekilde gölgesiz ve bulut seviyesinin minimum düzeyde olduğu rüzgar hızının 2m/s' nin altında olduğu hava koşullarında test yapılacaktır. Veriler datalogger üzerinde kaydedilecek ve tüm veriler W/m<sup>2</sup> cinsinden olacaktır. Bütün veriler kaydedilecek doğruluğu teyit edilerek gözlemciye rapor halinde sunulacaktır. Veriler excel formatında rapor PDF formatında olacaktır.

Görev dağılımı 25.05.2021 tarihinde ilgili kişilere bildirilecektir.

Furkan POKER

ARGESİM MAKİNA

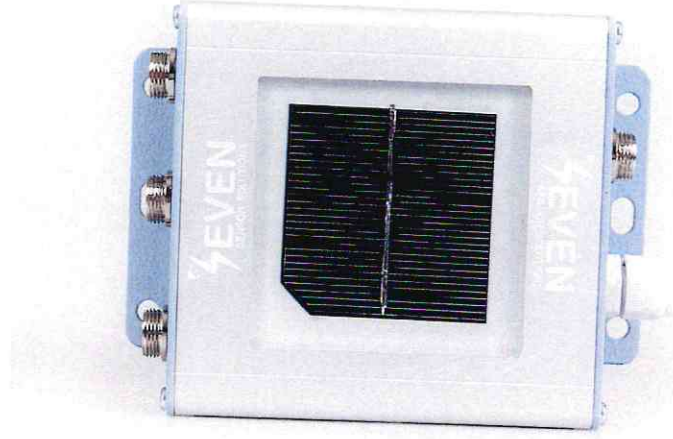
30.06.2021

Reviewed

Witnessed

TÜV SÜD

## Işınım Sensörü Kutusu Güneş Işınımının Ölçülmesi (3S-IS-T-MB)



### ÇALIŞMA YÖNTEMİ

Silikon referans hücre bir ışınım sensörü olarak kullanılabilir, çünkü kısa devre akımı ışınım ile orantılıdır. Sensörlerimiz, şönt bağlı bir monokristal referans hücre ile üretilmiştir. Şöntün düşük direnci nedeniyle hücre neredeyse kısa devrede çalışır.

Kısa devre akımının sıcaklık katsayısı küçük bir hata oluşturur.

Telafi, referans hücrenin arka tarafına takılan özel bir sıcaklık sensörü kullanılarak gerçekleştirilir. Hücrenin kısa devre akımının ölçüm sinyalleri ve sıcaklık sensörünün direnç değeri bir mikro denetleyici tarafından ölçülür.

Hesaplanan ışınım ve sıcaklık değerleri alıcı şartname protokolü ile bir RS485 portuna verilir. Elektronik devre, düşük güç tüketimi için optimize edilmiştir.

### MEKANİK YAPI

Referans hücre cam ve Tedlar arasında Etilen-Vinil-Asetat (EVA) içine yerleştirilmiştir. Kutunun üst kapağına kolay entegrasyonu, ölçüm kablosunun bağlantısı için kablo rakorlu ve vidasız terminalli UV ışınlarına dayanımlı malzemeden yapılmış olumsuz hava koşullarına dayanıklı bağlantı kutusu ile sensör yapısı standart bir PV panelininkiyle karşılaştırılabilir. Elektriksel bağlantısı 3m kablo ile yapılır.

30.06.2021  
 Reviewed  
 Witnessed



TÜM SENSÖRLER, AYNI TİPTE BİR REFERANS HÜCRE İLE SIMULE EDİLMİŞ GÜNEŞ IŞIĞINDA KALİBRE EDİLİR. BU REFERANS HÜCRE FREIBURG'DA FRAUNHOFER ISE TARAFINDAN KALİBRASYONU YAPILAN BİR REFERANS HÜCRE İLE PERİYODİK OLARAK KALİBRE EDİLMEKTEDİR.

## TEKNİK VERİ

### Genel Bilgi

Referans Hücre	Monokristal Silikon (52 mm x 52 mm)
Mevcut Şönt	Doğrudan hücrenin kutuplarına lehimlenmiş yüksek hassasiyetli şönt direnç
Çalışma Sıcaklığı	-30°C ila +70°C
Elektriksel Bağlantı	3 m PUR Kablo LIYC11Y, UV ve hava koşullarına dayanıklı
Güç Kaynağı	12 ila 30 VDC (20 VDC'de tipik olarak 30 mA)
Arayüz	RS485, 19200 Baud hızına kadar
Protokol	Sensör, açık kaynak kodlu Modbus RTU protokolüne sahiptir ve 2 telli RS485 veri yolu üzerinden bağlanır
Galvanik İzolasyon	Güç kaynağı ve RS485 veri yolu arasında 1000 V
Koruma Sınıfı	IP54

### Doğruluk

İşinim	10... 1500 W/m <sup>2</sup> , ISO 9060'a göre Dünya Meteoroloji Örgütü sınıf 1 Piranometresine (örn. CMP11) kıyasla aylık hesapların doğruluğu ±%5'ten daha iyidir
Sapma	Yılda 0.3%'ten çok daha küçük sapma

### Elektriksel Bağlantı

Giriş 1	3S-WS-PLS-P, Rüzgâr hızı sensörü, 5 pinli konektör
Giriş 2	3S-AT-18B20, Ortam sıcaklık sensörü, 2 pinli konektör
Giriş 3	3S-MT-18B20, Panel sıcaklık sensörü, 3 pinli konektör
Giriş 4	3S-WD-I, Rüzgar yönü sensörü, 4 pinli konektör
Giriş 5	RS485 Veri, 6 pinli konektör

### Diğer

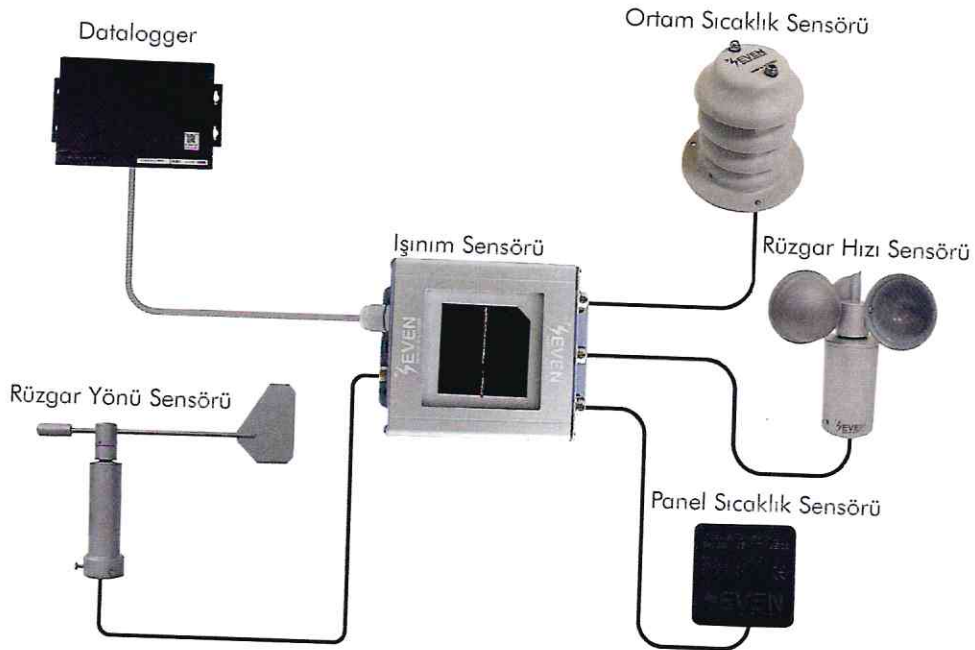
Kalibrasyon	AM 1,5 spektrumundaki doğal güneş ışığında her bir sensörün, kalibre edilmiş uygun bir referans hücre aracılığıyla ayrı ayrı kalibrasyonu
Bakım Hususları	Sensör yumuşak bir pamuklu bez, su ve hafif bir temizleme sıvısı kullanılarak temizlenebilir. Sensör kutusunun kullanıcı veya montaj personeli tarafından açılması gerekli değildir. Kutu açılırsa, kutunun mührünü artık garanti edemeyiz

### Modbus Teknik Özellikleri

Baud Rate	1200, 2400, 9600, 19200, 38400
Parite	No. even, odd
Durdurma Biti	1, 2 (sadece no parite)
Fabrika Ayarları	9600 Baud, 8N1, address: 1

30.06.2021  
 Reviewed  
 Witnessed

## HARİCİ BAĞLANABİLEN SENSÖRLER



## İLGİLİ ÜRÜNLER

3S-AT-18B20  
3S-MT-18B20  
3S-WS-PLS-P  
3S-WD-I

Ortam Sıcaklık Sensörü  
Panel Sıcaklık Sensörü  
Rüzgar Hızı Sensörü  
Rüzgar Yönü Sensörü

30.06.2024  
 Reviewed  
 Witnessed  
TUV

The Comparison Table for Seven Irradiance Sensor (Serial Number 21061 ) and Calibrated Cell of Fraunhofer are compared according to the registered values every 3 seconds.----- Test Date: 30.06.2021

Ambient Conditions			Measured Values From Calibrated Cell of Fraunhofer			Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
Registration Time	Ambient Temp (°C)	Wind Speed (m/s)	Irradiance Value (W/m <sup>2</sup> )	Internal cell temp.(°C)	Output Voltage (mV)	Irradiance Value (W/m <sup>2</sup> )	Internal cell temp.(°C)	Differences of Irradiance Values (W/m <sup>2</sup> )	Relative Deviation (%)
12:45:00	30,97	2,00	1014,71	52,42	49,59	1011,87	55,00		
12:45:03	30,93	2,27	1014,61	52,42	49,59	1014,07	55,03	2,84	0,3%
12:45:06	30,98	2,53	1013,36	52,42	49,53	1014,83	55,07	0,54	0,1%
12:45:09	30,92	2,27	1011,38	52,42	49,43	1013,67	55,10	-1,48	-0,1%
12:45:12	30,92	2,00	1010,39	52,42	49,38	1012,60	55,10	-2,29	-0,2%
12:45:15	31,08	1,60	1008,21	52,42	49,27	1011,10	55,10	-2,21	-0,2%
12:45:18	31,13	1,33	1006,82	52,43	49,21	1007,80	55,13	-2,89	-0,3%
12:45:21	31,18	1,33	1006,72	52,43	49,18	1007,20	55,17	-0,38	-0,1%
12:45:24	31,32	1,20	1005,72	52,44	49,13	1007,67	55,20	-0,98	-0,1%
12:45:27	31,34	0,00	1003,52	52,45	49,07	1004,70	55,20	-1,45	-0,2%
12:45:30	31,33	0,00	1001,16	52,46	48,93	1002,90	55,27	-1,74	-0,2%
12:45:33	31,41	0,00	999,32	52,48	48,84	1001,13	55,30	-1,81	-0,2%
12:45:36	31,52	0,00	998,82	52,50	48,82	1000,23	55,30	-1,42	-0,1%
12:45:39	31,65	0,00	1000,22	52,51	48,89	1000,67	55,30	-0,45	0,0%
12:45:42	31,72	0,40	1001,23	52,53	48,94	1001,67	55,30	-0,44	0,0%
12:45:45	31,70	0,40	1003,46	52,55	49,05	1003,00	55,33	0,46	0,0%
12:45:48	31,75	1,47	1004,64	52,56	49,10	1004,67	55,37	-0,02	0,0%
12:45:51	31,71	1,73	1004,48	52,58	49,10	1005,37	55,40	-1,49	-0,1%
12:45:54	31,78	1,87	1004,05	52,59	49,08	1006,70	55,40	-2,65	-0,3%
12:45:57	31,83	1,87	1003,53	52,61	49,05	1004,43	55,47	-0,90	-0,1%
12:46:00	31,95	1,87	1003,46	52,61	49,05	1004,70	55,50	-0,24	0,0%
12:46:03	31,90	1,47	1002,76	52,62	49,01	1004,30	55,50	-1,54	-0,2%
12:46:06	31,88	1,20	1000,14	52,64	48,99	1002,03	55,50	-0,31	0,0%
12:46:09	31,94	1,33	1000,35	52,65	48,97	1004,13	55,50	-2,30	-0,2%
12:46:12	31,92	1,33	1001,83	52,66	48,97	1003,37	55,50	-1,42	-0,1%
12:46:15	31,96	1,60	1003,01	52,67	49,03	1002,93	55,50	0,08	0,0%
12:46:18	31,84	1,87	1005,25	52,68	49,14	1004,70	55,60	0,55	0,1%
12:46:21	31,79	1,60	1006,95	52,70	49,32	1009,43	55,60	-0,49	0,0%
12:46:24	31,80	1,47	1008,83	52,72	49,30	1010,33	55,60	-1,71	-0,2%
12:46:27	31,82	1,87	1008,36	52,73	49,32	1010,73	55,60	-1,21	-0,1%
12:46:30	31,88	2,00	1009,69	52,75	49,36	1010,90	55,60	-1,21	-0,1%
12:46:33	31,97	1,87	1008,56	52,77	49,30	1011,63	55,60	-3,08	-0,3%
12:46:36	31,91	2,00	1010,64	52,78	49,40	1010,70	55,67	-0,06	0,0%
12:46:39	31,97	1,73	1009,92	52,79	49,37	1012,03	55,70	-2,12	-0,2%
12:46:42	31,93	2,00	1009,16	52,80	49,34	1011,30	55,70	-2,04	-0,2%
12:46:45	31,98	2,27	1008,87	52,82	49,32	1009,83	55,73	-0,86	-0,1%
12:46:48	31,99	2,27	1010,12	52,82	49,39	1008,03	55,73	1,89	0,1%
12:46:51	31,98	2,13	1009,56	52,83	49,35	1010,00	55,70	-0,44	0,0%
12:46:54	32,01	1,87	1009,37	52,84	49,34	1010,27	55,73	-0,90	-0,1%
12:46:57	31,97	1,87	1009,61	52,84	49,35	1009,93	55,80	-0,32	0,0%
12:47:00	32,02	1,47	1009,51	52,85	49,35	1011,13	55,80	-1,62	-0,2%
12:47:03	32,02	2,27	1007,10	52,85	49,23	1010,37	55,80	-3,27	-0,3%
12:47:06	31,95	2,27	1007,30	52,84	49,24	1008,30	55,80	-1,00	-0,1%
12:47:09	31,91	2,53	1006,74	52,83	49,21	1007,43	55,80	-0,70	-0,1%
12:47:12	31,94	2,00	1003,88	52,82	49,07	1006,80	55,80	-2,92	-0,3%
12:47:15	31,86	2,27	1003,64	52,81	49,06	1004,47	55,80	-0,82	-0,1%
12:47:18	31,93	2,27	1003,57	52,80	49,06	1003,70	55,80	-0,13	0,0%
12:47:21	31,91	2,00	1003,50	52,80	49,05	1005,77	55,80	-2,27	-0,2%
12:47:24	31,97	1,87	1007,42	52,79	49,25	1006,97	55,80	-0,68	-0,1%
12:47:27	32,04	1,87	1007,69	52,79	49,26	1008,43	55,83	0,46	0,0%
12:47:30	32,03	2,27	1008,20	52,79	49,28	1008,43	55,83	-0,75	-0,1%
12:47:33	32,10	2,00	1009,26	52,79	49,34	1009,33	55,87	-0,23	0,0%
12:47:36	32,15	1,47	1008,37	52,80	49,34	1011,23	55,87	-0,08	0,0%
12:47:39	32,22	0,93	1007,62	52,80	49,26	1011,37	55,90	-1,86	-0,2%
12:47:42	32,24	0,40	1007,26	52,81	49,24	1008,57	55,90	-3,75	-0,4%
12:47:45	32,18	1,20	1005,19	52,82	49,14	1006,47	55,90	-1,31	-0,1%
12:47:48	32,13	1,20	1001,07	52,83	48,94	1005,73	55,90	-1,28	-0,1%
12:47:51	32,13	1,33	1001,69	52,84	48,97	1001,63	55,93	-4,66	-0,5%
12:47:54	32,09	1,73	1004,92	52,85	49,12	1006,03	55,93	0,05	0,0%
12:47:57	32,11	1,47	1006,83	52,86	49,22	1007,53	56,00	-1,11	-0,1%
12:48:00	32,16	1,33	997,62	52,83	48,76	999,17	55,90	-0,70	-0,1%
12:48:03	32,20	2,00	992,93	52,88	48,53	993,83	55,90	-1,55	-0,2%
12:48:06	32,12	1,87	990,52	52,90	48,41	992,03	55,90	-0,30	-0,1%
12:48:09	32,01	2,00	992,40	52,92	48,50	991,93	55,93	-1,52	-0,2%
12:48:12	32,03	2,67	992,58	52,93	48,56	992,10	55,93	0,46	0,0%
12:48:15	32,03	2,67	995,32	52,94	48,65	993,97	55,96	-3,52	-0,4%
12:48:18	31,99	2,67	996,73	52,95	48,72	994,73	55,97	1,35	0,1%
12:48:21	31,95	2,13					2,00	0,2%	





The Comparison Table for Seven Irradiance Sensor (Serial Number 21061) and Calibrated Cell of Fraunhofer are compared according to the registered values every 3 seconds. — Test Date: 30.06.2021

Ambient Conditions			Measured Values From Calibrated Cell of Fraunhofer			Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
Registration Time	Ambient Temp. (°C)	Wind Speed (m/s)	Irradiance Value (W/m <sup>2</sup> )	Internal cell temp. (°C)	Output Voltage (mV)	Irradiance Value (W/m <sup>2</sup> )	Internal cell temp. (°C)	Differences of Irradiance Values (W/m <sup>2</sup> )	Relative Deviation (%)
12:48:27	32,03	1,73	998,23	52,56	48,79	997,97			
12:48:30	32,09	1,47	997,81	52,56	48,77	999,17	55,37	0,26	0,0%
12:48:33	32,14	1,33	996,72	52,57	48,72	996,90	55,30	-1,36	-0,1%
12:48:36	32,22	1,33	996,86	52,57	48,72	997,07	55,40	-2,18	-0,2%
12:48:39	32,21	1,47	996,38	52,57	48,70	997,80	55,40	-0,21	0,0%
12:48:42	32,26	1,60	995,39	52,58	48,65	996,47	55,40	-1,42	-0,1%
12:48:45	32,19	1,87	995,15	52,58	48,64	996,93	55,40	-1,07	-0,1%
12:48:48	32,25	2,27	995,63	52,58	48,66	997,53	55,43	-1,78	-0,2%
12:48:51	32,20	2,00	995,32	52,58	48,65	996,77	55,50	-1,90	-0,2%
12:48:54	32,24	1,73	994,90	52,58	48,63	996,73	55,50	-1,45	-0,1%
12:48:57	32,23	1,60	993,10	52,59	48,54	995,13	55,50	-1,83	-0,2%
12:49:00	32,22	1,47	996,08	52,59	48,69	996,17	55,50	-2,03	-0,2%
12:49:03	32,27	0,80	995,22	52,60	48,64	996,13	55,50	-0,09	0,0%
12:49:06	32,26	1,33	996,34	52,61	48,70	997,20	55,50	-0,02	-0,1%
12:49:09	32,24	1,87	998,84	52,62	48,82	998,37	55,50	-0,86	-0,1%
12:49:12	32,26	2,67	999,16	52,63	48,84	997,17	55,50	0,47	0,0%
12:49:15	32,17	2,40	1001,34	52,65	48,94	1001,00	55,57	1,99	0,2%
12:49:18	32,17	3,07	1002,33	52,66	48,99	1004,10	55,57	0,34	0,0%
12:49:21	32,18	3,07	1003,47	52,67	49,05	1004,87	55,57	-1,77	-0,2%
12:49:24	32,08	2,80	1006,37	52,68	49,19	1006,77	55,60	-1,39	-0,1%
12:49:27	32,15	2,53	1007,21	52,68	49,23	1007,93	55,60	-0,40	0,0%
12:49:30	32,14	2,27	1007,00	52,69	49,22	1007,83	55,60	-0,73	-0,1%
12:49:33	32,14	2,00	1006,71	52,69	49,21	1007,33	55,60	-0,83	-0,1%
12:49:36	32,15	1,73	1006,97	52,70	49,22	1007,63	55,60	-0,62	-0,1%
12:49:39	32,17	1,20	1007,85	52,70	49,26	1008,53	55,60	-0,66	-0,1%
12:49:42	32,21	0,40	1007,35	52,71	49,24	1007,93	55,60	-0,68	-0,1%
12:49:45	32,23	0,00	1007,46	52,71	49,25	1009,13	55,60	-0,58	-0,1%
12:49:48	32,25	0,00	1006,54	52,71	49,20	1008,23	55,60	-1,67	-0,2%
12:49:51	32,29	0,40	1004,39	52,71	49,12	1006,90	55,60	-1,69	-0,2%
12:49:54	32,31	0,80	1006,21	52,72	49,18	1008,40	55,63	-1,91	-0,2%
12:49:57	32,34	1,20	1001,59	52,72	48,96	1005,40	55,60	-2,19	-0,2%
12:50:00	32,33	2,00	1000,58	52,73	48,91	999,77	55,70	-3,81	-0,4%
12:50:03	32,33	2,00	1003,78	52,73	49,07	1002,27	55,70	0,81	0,1%
12:50:06	32,31	3,07	1003,99	52,74	49,08	1007,60	55,70	1,51	0,2%
12:50:09	32,32	3,87	1003,75	52,74	49,06	1005,33	55,70	-3,61	-0,4%
12:50:12	32,39	2,93	1002,05	52,75	48,98	1006,60	55,70	-1,79	-0,2%
12:50:15	32,48	1,73	1001,85	52,75	48,97	1005,50	55,73	-4,55	-0,5%
12:50:18	32,58	1,87	1005,41	52,75	49,15	1002,27	55,70	-0,42	0,0%
12:50:21	32,67	2,00	1006,83	52,76	49,22	1008,23	55,77	-0,09	0,0%
12:50:24	32,71	1,60	1010,99	52,77	49,42	1009,07	55,80	-2,11	-0,2%
12:50:27	32,74	1,33	1012,31	52,78	49,48	1013,37	55,80	1,82	0,2%
12:50:30	32,78	0,80	1014,54	52,79	49,59	1018,07	55,80	-1,06	-0,1%
12:50:33	32,81	1,20	1013,85	52,79	49,56	1014,40	55,80	-3,53	-0,3%
12:50:36	32,83	1,33	1017,44	52,80	49,74	1016,43	55,80	-0,55	-0,1%
12:50:39	32,80	1,60	1020,06	52,81	49,86	1018,80	55,80	1,01	0,1%
12:50:42	32,75	2,13	1020,67	52,83	49,89	1021,77	55,80	1,26	0,1%
12:50:45	32,69	2,40	1020,53	52,84	49,89	1021,03	55,80	-1,10	-0,1%
12:50:48	32,65	2,27	1019,53	52,85	49,84	1021,73	55,80	-0,50	0,0%
12:50:51	32,65	1,73	1017,69	52,86	49,75	1021,03	55,80	-2,20	-0,2%
12:50:54	32,69	1,60	1016,85	52,87	49,71	1020,97	55,87	-3,35	-0,3%
12:50:57	32,70	2,00	1016,86	52,88	49,71	1019,07	55,90	-4,12	-0,4%
12:51:00	32,73	1,60	1015,95	52,89	49,66	1018,23	55,90	-2,21	-0,2%
12:51:03	32,78	0,80	1014,04	52,89	49,57	1013,87	55,90	-2,98	-0,3%
12:51:06	32,80	1,33	1013,11	52,90	49,53	1016,67	55,97	0,17	0,0%
12:51:09	32,78	1,60	1012,57	52,90	49,50	1013,87	56,00	-3,56	-0,4%
12:51:12	32,73	2,13	1012,55	52,91	49,50	1014,33	56,00	-1,30	-0,1%
12:51:15	32,66	2,53	1009,43	52,92	49,35	1013,90	56,00	-1,79	-0,2%
12:51:18	32,62	2,53	1009,61	52,93	49,36	1010,30	56,00	-4,47	-0,4%
12:51:21	32,59	1,73	1009,26	52,94	49,37	1010,90	56,00	-0,69	-0,1%
12:51:24	32,60	1,60	1009,90	52,96	49,37	1011,33	56,00	-0,94	-0,1%
12:51:27	32,62	1,33	1011,89	52,98	49,47	1011,93	56,00	-1,43	-0,1%
12:51:30	32,60	2,13	1006,91	52,99	49,23	1011,47	56,07	-0,05	0,0%
12:51:33	32,58	2,27	1003,68	53,01	49,07	1008,80	56,07	-4,55	-0,5%
12:51:36	32,58	2,13	1000,60	53,02	48,91	1003,33	56,10	-5,12	-0,5%
12:51:39	32,59	1,60	999,58	53,03	48,87	1000,23	56,10	-2,99	-0,3%
12:51:42	32,62	1,60	998,49	53,03	48,67	1000,63	56,10	-0,65	-0,1%
12:51:45	32,63	1,87	998,15	53,04	48,80	996,77	56,10	-5,14	-0,5%
12:51:48	32,63	1,87	999,10	53,04	48,85	999,73	56,10	1,38	0,1%
12:51:51	32,63	1,60	1000,32	53,04	48,90	1002,07	56,20	-0,64	-0,1%
								-1,75	-0,2%



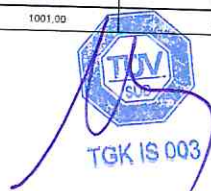
The Comparison Table for Seven Irradiance Sensor (Serial Number 21061 ) and Calibrated Cell of Fraunhofer are compared according to the registered values every 3 seconds.----- Test Date:30.06.2021

Ambient Conditions			Measured Values From Calibrated Cell of Fraunhofer			Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
Registration Time	Ambient Temp.(°C)	Wind Speed (m/s)	Irradiance Value (W/m <sup>2</sup> )	Internal cell temp.(°C)	Output Voltage (mV)	Irradiance Value (W/m <sup>2</sup> )	Internal cell temp.(°C)	Differences of Irradiance Values (W/m <sup>2</sup> )	Relative Deviation (%)
12:51:54	32,62	1,87	1001,46	53,04	48,96	1001,47	56,20		
12:51:57	32,61	2,00	997,68	53,05	48,78	1000,77	56,20	-0,01	0,0%
12:52:00	32,58	2,00	999,12	53,05	48,85	998,27	56,20	-3,09	-0,3%
12:52:03	32,55	2,00	999,33	53,05	48,86	999,60	56,20	0,85	0,1%
12:52:06	32,54	1,60	996,59	53,05	48,72	998,20	56,27	-0,27	0,0%
12:52:09	32,48	2,53	1008,87	53,06	49,32	1006,50	56,27	-1,61	-0,2%
12:52:12	32,37	2,27	1017,27	52,86	49,73	1014,93	56,20	2,37	0,2%
12:52:15	32,38	2,00	1015,59	52,91	49,65	1016,73	56,20	2,33	0,2%
12:52:18	32,35	2,00	1015,32	52,94	49,64	1018,80	56,20	-1,14	-0,1%
12:52:21	32,32	2,13	1014,35	52,97	49,59	1016,70	56,23	-3,48	-0,3%
12:52:24	32,35	1,33	1004,75	52,99	49,12	1006,20	56,30	-2,35	-0,2%
12:52:27	32,38	1,20	1008,40	53,00	49,30	1007,37	56,30	-1,45	-0,1%
12:52:30	32,39	1,20	1013,77	53,02	49,56	1010,50	56,30	1,03	0,1%
12:52:42	31,88	2,40	1053,15	52,25	51,95	1063,40	55,27	3,27	0,3%
12:52:45	31,62	2,27	1037,03	52,06	50,67	1038,13	54,80	-0,25	0,0%
12:52:48	31,64	2,93	1037,39	52,07	50,69	1038,43	54,80	-1,11	-0,1%
12:52:51	31,61	3,60	1032,51	52,08	50,45	1034,13	54,80	-1,05	-0,1%
12:52:54	31,58	3,20	1029,04	52,07	50,28	1031,20	54,80	-1,63	-0,2%
12:52:57	31,56	3,07	1025,50	52,06	50,11	1028,53	54,80	-2,16	-0,2%
12:53:00	31,54	3,20	1026,61	52,04	50,07	1024,97	54,80	-3,03	-0,3%
12:53:03	31,54	2,53	1025,63	52,03	50,16	1026,90	54,80	-0,36	0,0%
12:53:06	31,53	2,93	1023,76	52,01	50,00	1026,90	54,80	-0,27	0,0%
12:53:09	31,49	3,47	1023,09	51,99	49,99	1023,37	54,80	-3,64	-0,4%
12:53:12	31,45	2,80	1026,02	51,98	50,13	1025,00	54,80	-0,28	0,0%
12:53:15	31,47	2,80	1026,32	51,97	50,15	1026,03	54,80	1,02	0,1%
12:53:18	31,49	2,67	1028,11	51,96	50,23	1027,93	54,80	0,28	0,0%
12:53:21	31,48	2,67	1029,38	51,96	50,30	1028,43	54,80	0,18	0,0%
12:53:24	31,49	2,53	1031,42	51,95	50,40	1031,03	54,80	0,95	0,1%
12:53:27	31,50	2,40	1034,50	51,96	50,55	1032,07	54,80	0,39	0,0%
12:53:30	31,48	2,93	1038,15	51,96	50,73	1036,83	54,80	2,44	0,2%
12:53:33	31,47	2,27	1042,09	51,95	50,92	1040,23	54,80	1,32	0,1%
12:53:36	31,50	2,40	1044,78	51,95	51,05	1042,83	54,80	1,85	0,2%
12:53:39	31,55	2,27	1042,29	51,95	50,92	1044,80	54,83	-1,94	-0,2%
12:53:42	31,62	2,00	1042,20	51,94	50,92	1043,27	54,83	-2,51	-0,2%
12:53:45	31,66	2,27	1041,38	51,95	50,88	1043,83	54,87	-1,07	-0,1%
12:53:48	31,70	2,13	1041,78	51,95	50,90	1043,43	54,80	-1,46	-0,1%
12:53:51	31,69	2,53	1037,52	51,95	50,69	1042,13	54,80	-4,62	-0,4%
12:53:54	31,70	2,00	1035,09	51,96	50,58	1037,93	54,90	-2,84	-0,3%
12:53:57	31,74	1,73	1033,57	51,96	50,50	1036,50	54,90	-2,93	-0,3%
12:54:00	31,76	1,73	1031,55	51,97	50,40	1035,03	54,93	-3,49	-0,3%
12:54:03	31,81	1,60	1032,06	51,98	50,43	1032,63	54,97	-0,57	-0,1%
12:54:06	31,84	2,00	1029,55	51,98	50,31	1032,47	55,00	-2,92	-0,3%
12:54:09	31,77	2,53	1026,50	51,97	50,16	1029,80	55,00	-3,30	-0,3%
12:54:12	31,71	2,53	1028,90	51,96	50,27	1028,03	55,00	0,87	0,1%
12:54:15	31,69	2,27	1028,80	51,96	50,32	1029,63	55,00	0,16	0,0%
12:54:18	31,71	1,73	1031,88	51,96	50,42	1032,77	55,00	-0,88	-0,1%
12:54:21	31,71	1,87	1030,44	51,96	50,35	1033,33	55,00	-2,90	-0,3%
12:54:24	31,72	1,73	1030,28	51,96	50,34	1031,70	55,00	-1,42	-0,1%
12:54:27	31,73	2,00	1030,73	51,97	50,34	1032,43	55,00	-2,20	-0,2%
12:54:30	31,76	2,13	1021,24	51,98	49,90	1023,83	55,10	-2,59	-0,3%
12:54:33	31,80	1,87	1019,67	51,99	49,82	1020,87	55,10	-1,20	-0,1%
12:54:36	31,83	1,73	1023,03	52,00	50,03	1020,13	55,10	3,80	0,4%
12:54:39	31,87	2,13	1025,42	52,01	50,30	1026,77	55,10	2,65	0,3%
12:54:42	31,90	2,27	1032,33	52,03	50,44	1031,27	55,10	-0,33	-0,1%
12:54:45	31,95	3,33	1034,73	52,04	50,56	1034,70	55,10	0,53	0,1%
12:54:48	32,00	3,07	1036,30	52,05	50,64	1036,67	55,13	-0,36	0,0%
12:54:51	32,05	2,27	1036,80	52,06	50,66	1038,43	55,20	-1,63	-0,2%
12:54:54	32,05	2,93	1034,25	52,07	50,54	1036,80	55,20	-2,55	-0,2%
12:54:57	32,00	3,60	1035,73	52,07	50,61	1038,47	55,20	-2,73	-0,3%
12:55:00	31,98	2,93	1034,28	52,06	50,54	1033,13	55,23	1,15	0,1%
12:55:03	31,96	2,53	1036,00	52,05	50,62	1036,80	55,27	-0,80	-0,1%
12:55:06	31,99	2,67	1035,34	52,04	50,59	1036,07	55,27	-0,73	-0,1%
12:55:09	31,97	3,33	1036,08	52,03	50,63	1036,93	55,27	-0,86	-0,1%
12:55:12	31,93	3,20	1037,10	52,03	50,68	1037,97	55,30	-0,87	-0,1%
12:55:15	31,93	2,93	1036,87	52,01	50,66	1038,83	55,30	-1,97	-0,2%
12:55:18	31,97	2,93	1039,05	52,00	50,77	1037,93	55,30	1,12	0,1%
12:55:21	31,99	2,67	1037,84	51,99	50,71	1040,93	55,30	-3,10	-0,3%
12:55:24	31,98	3,07	1040,15	51,97	50,82	1041,67	55,30	-1,52	-0,1%
12:55:27	31,95	3,07	1040,71	51,95	50,85	1041,07	55,30	-0,35	0,0%



The Comparison Table for Seven Irradiance Sensor (Serial Number 21061) and Calibrated Cell of Fraunhofer are compared according to the registered values every 3 seconds. — Test Date: 30.06.2021

Ambient Conditions		Measured Values From Calibrated Cell of Fraunhofer			Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation		
Registration Time	Ambient Temp.(°C)	Wind Speed (m/s)	Irradiance Value (W/m <sup>2</sup> )	Internal cell temp.(°C)	Output Voltage (mV)	Irradiance Value (W/m <sup>2</sup> )	Internal cell Temp.(°C)	Differences of Irradiance Values (W/m <sup>2</sup> )	Relative Deviation (%)
12:55:30	31,91	3,20	1039,06	51,93	50,77	1042,37	55,30		
12:55:33	31,85	3,20	1035,88	51,91	50,60	1039,27	55,30	-3,30	-0,3%
12:55:36	31,87	2,00	1032,04	51,89	50,42	1035,43	55,30	-3,39	-0,3%
12:55:39	31,88	2,80	1032,09	51,87	50,43	1032,47	55,30	-0,38	0,0%
12:55:42	31,88	2,53	1030,53	51,85	50,35	1032,60	55,30	-2,07	-0,2%
12:55:45	31,82	3,07	1009,58	51,78	49,32	1012,37	55,33	-2,79	-0,3%
12:55:48	31,74	3,07	1009,01	51,76	49,30	1009,70	55,33	-0,69	-0,1%
12:55:51	31,68	2,53	1017,93	51,73	49,49	1012,93	55,30	0,00	0,0%
12:55:54	31,68	2,00	1019,11	51,72	49,79	1016,17	55,37	2,84	0,3%
12:55:57	31,68	2,27	1023,65	51,70	50,01	1021,77	55,33	1,88	0,2%
12:56:00	31,72	2,13	1023,35	51,70	49,99	1024,47	55,33	-1,12	-0,1%
12:56:03	31,76	1,73	1023,90	51,69	50,02	1024,47	55,40	-0,57	-0,1%
12:56:06	31,83	1,60	1023,59	51,68	50,01	1023,73	55,40	-0,14	0,0%
12:56:09	31,88	1,73	1022,26	51,67	49,94	1022,67	55,40	-0,40	0,0%
12:56:12	31,90	2,00	1019,12	51,66	49,79	1021,80	55,40	-2,68	-0,3%
12:56:15	31,92	1,87	1020,38	51,66	49,85	1021,33	55,40	-1,56	-0,2%
12:56:18	31,93	2,13	1018,57	51,64	49,76	1020,60	55,40	-2,03	-0,2%
12:56:21	31,92	2,27	1017,55	51,61	49,71	1018,27	55,40	-0,72	-0,1%
12:56:24	31,90	2,40	1013,06	51,60	49,78	1018,80	55,40	0,26	0,0%
12:56:27	31,94	1,87	1015,47	51,58	49,80	1020,30	55,40	-0,83	-0,1%
12:56:30	31,99	2,00	1013,48	51,56	49,51	1017,03	55,40	-3,55	-0,4%
12:56:33	32,05	1,73	1013,47	51,54	49,51	1015,13	55,43	-1,67	-0,2%
12:56:36	32,07	2,27	1013,40	51,53	49,50	1015,27	55,40	-1,87	-0,2%
12:56:39	32,05	2,53	1013,77	51,53	49,52	1013,57	55,43	-0,19	0,0%
12:56:42	32,07	2,40	1018,81	51,52	49,82	1017,90	55,47	1,91	0,2%
12:56:45	32,11	1,73	1022,99	51,52	49,57	1022,33	55,50	0,66	0,1%
12:56:48	32,14	1,73	1022,16	51,52	49,93	1024,27	55,50	-2,11	-0,2%
12:56:51	32,22	1,20	1003,88	51,47	49,04	1007,80	55,50	1,08	0,1%
12:56:54	32,24	0,80	1008,50	51,46	49,76	1007,27	55,50	1,23	0,1%
12:56:57	32,23	1,60	1010,05	51,45	49,34	1010,37	55,50	-0,33	0,0%
12:57:00	32,23	1,73	1007,80	51,45	49,23	1010,70	55,50	-2,80	-0,3%
12:57:03	32,27	1,83	1005,56	51,46	49,12	1008,60	55,50	-2,94	-0,3%
12:57:06	32,27	1,47	1002,37	51,46	48,99	1004,90	55,50	-1,93	-0,2%
12:57:09	32,25	1,73	999,78	51,47	48,84	1001,80	55,50	-2,02	-0,2%
12:57:12	32,24	1,60	997,00	51,47	48,70	1000,17	55,50	-3,16	-0,3%
12:57:15	32,25	1,60	994,06	51,49	48,56	996,43	55,50	-2,37	-0,2%
12:57:18	32,28	1,33	992,25	51,49	48,47	993,93	55,50	-1,68	-0,2%
12:57:21	32,34	0,93	991,42	51,50	48,43	993,17	55,50	-1,74	-0,2%
12:57:24	32,37	1,33	989,66	51,51	48,34	990,67	55,50	-1,01	-0,1%
12:57:27	32,40	1,33	987,79	51,52	48,25	988,33	55,50	-0,54	-0,1%
12:57:30	32,44	1,33	983,70	51,52	48,05	985,93	55,57	-2,24	-0,2%
12:57:33	32,41	2,00	982,36	51,52	47,99	985,03	55,60	-2,67	-0,3%
12:57:36	32,36	2,40	983,24	51,52	48,03	983,57	55,60	-0,33	0,0%
12:57:39	32,35	1,87	984,70	51,51	48,10	983,50	55,60	1,20	0,1%
12:57:42	32,33	2,40	986,21	51,50	48,18	985,30	55,60	0,91	0,1%
12:57:45	32,31	2,93	982,19	51,49	47,98	985,73	55,60	-3,54	-0,4%
12:57:48	32,27	3,07	980,61	51,48	47,90	982,37	55,60	-1,75	-0,2%
12:57:51	32,29	2,00	980,47	51,47	47,89	982,37	55,60	-1,90	-0,2%
12:57:54	32,29	2,00	978,96	51,46	47,82	979,43	55,60	-0,47	0,0%
12:57:57	32,28	2,13	979,45	51,46	47,84	980,27	55,60	-0,81	-0,1%
12:58:00	32,28	2,40	977,73	51,45	47,76	979,37	55,60	-2,24	-0,2%
12:58:03	32,22	2,80	975,13	51,45	47,63	978,23	55,60	-3,10	-0,3%
12:58:06	32,20	2,80	976,29	51,45	47,69	976,73	55,60	-0,45	0,0%
12:58:09	32,19	2,13	978,65	51,45	47,80	976,70	55,60	1,95	0,2%
12:58:12	32,20	1,73	979,52	51,45	47,85	980,13	55,60	-0,61	-0,1%
12:58:15	32,23	1,60	983,76	51,46	48,03	983,37	55,60	-0,11	0,0%
12:58:18	32,22	2,27	988,66	51,46	48,29	986,97	55,60	1,69	0,2%
12:58:21	32,21	2,40	994,24	51,47	48,57	991,53	55,60	2,70	0,3%
12:58:24	32,22	3,33	995,30	51,48	48,62	994,93	55,60	0,37	0,0%
12:58:27	32,24	2,80	998,94	51,48	48,80	995,97	55,60	2,97	0,3%
12:58:30	32,25	2,27	1000,74	51,49	48,89	1000,53	55,60	0,21	0,0%
12:58:33	32,24	2,93	1000,60	51,50	48,88	1001,40	55,60	-0,80	-0,1%
12:58:36	32,22	3,33	1000,18	51,50	48,85	1003,50	55,60	-3,32	-0,3%
12:58:39	32,14	3,20	1002,53	51,50	48,97	1002,90	55,60	-0,37	0,0%
12:58:42	32,08	3,33	1001,95	51,51	48,94	1003,23	55,60	-1,28	-0,1%
12:58:45	32,01	3,47	1002,75	51,51	48,98	1002,60	55,60	0,15	0,0%
12:58:48	31,95	2,80	1002,02	51,50	48,85	1004,37	55,60	-2,34	-0,2%
12:58:51	31,94	2,80	1000,89	51,50	48,89	1003,37	55,60	-2,48	-0,2%
12:58:54	31,92	3,20	998,98	51,50	48,80	1001,00	55,60	-2,02	-0,2%



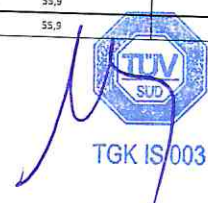
The Comparison Table for Seven Irradiance Sensor (Serial Number 21061 ) and Calibrated Cell of Fraunhofer are compared according to the registered values every 3 seconds.----- Test Date:30.06.2021

Ambient Conditions			Measured Values From Calibrated Cell of Fraunhofer			Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
Registration Time	Ambient Temp.(°C)	Wind Speed (m/s)	Irradiance Value (W/m2)	Internal cell temp.(°C)	Output Voltage (mV)	Irradiance Value (W/m2)	Internal cell temp.(°C)	Differences of Irradiance Values (W/m2)	Relative Deviation (%)
12:58:57	31.91	3,73	999,65	51,50	48,83	1001,60	55,60	-1,95	-0,2%
12:59:00	31,89	3,47	998,21	51,50	48,76	999,70	55,60	-1,49	-0,1%
12:59:03	31,88	2,93	996,66	51,50	48,69	999,23	55,60	-2,58	-0,3%
12:59:06	31,90	2,80	995,42	51,50	48,63	997,90	55,57	-2,48	-0,2%
12:59:09	31,90	3,20	993,19	51,49	48,52	995,70	55,57	-2,51	-0,3%
12:59:12	31,91	2,67	991,32	51,49	48,48	994,50	55,50	-2,05	-0,2%
12:59:15	31,95	2,53	991,71	51,49	48,44	992,27	55,50	-0,55	-0,1%
12:59:18	31,99	2,93	993,00	51,49	48,51	992,60	55,50	-0,40	0,0%
12:59:21	32,00	3,20	994,59	51,49	48,58	994,37	55,50	0,22	0,0%
12:59:24	32,01	2,80	995,05	51,50	48,61	995,27	55,50	-0,22	0,0%
12:59:27	31,96	2,80	995,42	51,50	48,63	996,00	55,50	-0,58	-0,1%
12:59:30	31,88	2,67	996,33	51,51	48,67	997,47	55,50	-1,13	-0,1%
12:59:33	31,82	2,27	996,07	51,51	48,66	997,58	55,43	-1,46	-0,1%
12:59:36	31,81	2,13	995,73	51,52	48,64	997,23	55,40	-1,50	-0,2%
12:59:39	31,85	2,00	996,11	51,52	48,66	997,07	55,40	-1,43	-0,1%
12:59:42	31,88	2,53	996,40	51,53	48,67	997,10	55,33	-1,09	-0,1%
12:59:45	31,90	2,53	997,01	51,54	48,70	998,10	55,37	-2,77	-0,3%
12:59:48	31,91	2,40	997,56	51,55	48,73	1000,33	55,30	-0,25	0,0%
12:59:51	31,91	2,40	997,75	51,56	48,74	998,00	55,30	-0,25	0,0%
12:59:54	31,91	2,27	997,92	51,57	48,75	1010,62	55,50	-1,06	-0,1%
12:59:57	31,90	2,27	1009,56	52,24	49,34	1010,62	55,50	-1,06	-0,1%
Ortalama Değeri	32,04	2,06	1009,56	52,24	49,34	1010,62	55,50	-1,06	-0,1%




The Comparison Table for Seven Irradiance Sensor ( Serial Number 21061) and SMP11 Pyranometer of Kipp&Zonen are compared according to the registered values every 3 seconds. —Test Date :30.06.2021

Registration Time	Ambient Conditions		Measured Values From SMP11 Pyranometer of Kipp&Zonen		Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
	Ambient Temp.(°C)	Wind Speed (m/s)	Irradiance Value (W/m2)	Internal temp.(°C)	Irradiance Value (W/m2)	Internal cell temp.(°C)	Differences of Irradiance Values(W/m2)	Relative Deviation (%)
12:45:00	31,0	2,0	1032,0	38,0	1011,9	55,0		
12:45:03	30,9	2,3	1033,7	38,0	1014,1	55,0	20,1	2,0%
12:45:06	31,0	2,5	1033,0	38,0	1014,8	55,1	19,6	1,9%
12:45:09	30,9	2,3	1032,0	38,0	1013,7	55,1	18,2	1,8%
12:45:12	30,9	2,0	1030,7	38,0	1012,6	55,1	18,3	1,8%
12:45:15	31,1	1,6	1029,3	38,0	1011,1	55,1	18,1	1,8%
12:45:18	31,1	1,3	1026,7	38,0	1007,8	55,1	18,2	1,8%
12:45:21	31,2	1,3	1025,0	38,0	1007,2	55,2	18,9	1,8%
12:45:24	31,3	1,2	1024,3	38,0	1007,7	55,2	17,8	1,7%
12:45:27	31,3	0,0	1022,7	38,1	1004,7	55,2	16,7	1,6%
12:45:30	31,3	0,0	1020,7	38,1	1002,9	55,3	18,0	1,8%
12:45:33	31,4	0,0	1019,0	38,1	1001,1	55,3	17,8	1,7%
12:45:36	31,5	0,0	1018,0	38,1	1000,2	55,3	17,9	1,8%
12:45:39	31,7	0,0	1018,3	38,1	1000,7	55,3	17,8	1,7%
12:45:42	31,7	0,4	1019,0	38,1	1001,7	55,3	17,7	1,7%
12:45:45	31,7	0,4	1021,0	38,1	1003,0	55,3	17,3	1,7%
12:45:48	31,7	1,5	1023,0	38,1	1004,7	55,4	18,0	1,8%
12:45:51	31,7	1,7	1024,0	38,1	1006,0	55,4	18,3	1,8%
12:45:54	31,8	1,9	1023,7	38,1	1006,7	55,4	18,0	1,8%
12:45:57	31,8	1,9	1022,3	38,1	1004,4	55,5	17,9	1,7%
12:46:00	32,0	1,9	1022,0	38,1	1003,7	55,5	17,9	1,8%
12:46:03	31,9	1,5	1021,0	38,1	1004,3	55,5	18,3	1,8%
12:46:06	31,9	1,2	1020,0	38,1	1002,7	55,5	16,7	1,6%
12:46:09	31,9	1,3	1019,7	38,1	1002,0	55,5	17,3	1,7%
12:46:12	31,9	1,3	1020,0	38,1	1004,1	55,5	17,6	1,7%
12:46:15	32,0	1,6	1020,0	38,1	1003,4	55,5	15,9	1,6%
12:46:18	31,8	1,9	1020,0	38,1	1002,9	55,5	16,6	1,6%
12:46:21	31,8	1,7	1023,0	38,1	1004,7	55,6	17,1	1,7%
12:46:24	31,8	1,6	1025,7	38,2	1009,4	55,6	18,3	1,8%
12:46:27	31,8	1,5	1026,7	38,2	1010,3	55,6	16,2	1,6%
12:46:30	31,8	1,9	1027,3	38,2	1010,7	55,6	16,3	1,6%
12:46:33	31,9	2,0	1027,7	38,2	1010,9	55,6	16,6	1,6%
12:46:36	32,0	1,9	1027,3	38,2	1011,6	55,6	16,8	1,6%
12:46:39	31,9	2,0	1027,7	38,2	1010,7	55,7	15,7	1,5%
12:46:42	32,0	1,7	1028,0	38,2	1012,0	55,7	17,0	1,7%
12:46:45	31,9	2,0	1028,3	38,2	1011,3	55,7	16,0	1,6%
12:46:48	32,0	2,3	1027,3	38,2	1009,8	55,7	17,0	1,7%
12:46:51	32,0	2,3	1027,0	38,2	1008,9	55,7	17,5	1,7%
12:46:54	32,0	2,1	1027,0	38,2	1010,0	55,7	18,1	1,8%
12:46:57	32,0	1,9	1027,0	38,2	1010,3	55,7	17,0	1,7%
12:47:00	32,0	1,9	1027,0	38,2	1009,9	55,8	16,7	1,6%
12:47:03	32,0	1,5	1027,0	38,2	1011,1	55,8	17,1	1,7%
12:47:06	32,0	2,3	1026,0	38,2	1010,4	55,8	15,9	1,5%
12:47:09	31,9	2,3	1024,7	38,2	1008,3	55,8	15,6	1,5%
12:47:12	31,9	2,5	1024,0	38,2	1007,4	55,8	16,4	1,6%
12:47:15	31,9	2,0	1021,3	38,2	1006,8	55,8	16,6	1,6%
12:47:18	31,9	2,3	1020,3	38,2	1004,5	55,8	14,5	1,4%
12:47:21	31,9	2,3	1020,3	38,2	1003,7	55,8	15,9	1,6%
12:47:24	31,9	2,0	1021,0	38,2	1005,8	55,8	16,6	1,6%
12:47:27	32,0	1,6	1021,0	38,2	1005,6	55,8	15,2	1,5%
12:47:30	32,0	1,9	1023,0	38,2	1007,0	55,8	15,4	1,5%
12:47:33	32,0	1,9	1025,0	38,2	1008,4	55,8	16,0	1,6%
12:47:36	32,0	2,3	1025,0	38,2	1008,4	55,8	16,6	1,6%
12:47:39	32,1	2,0	1025,0	38,2	1009,3	55,9	16,6	1,6%
12:47:42	32,2	1,5	1026,0	38,2	1011,2	55,9	15,7	1,5%
12:47:45	32,2	0,9	1025,3	38,2	1011,4	55,9	14,8	1,4%
12:47:48	32,2	0,4	1024,0	38,2	1008,6	55,9	14,0	1,4%
12:47:51	32,2	1,2	1022,3	38,2	1006,5	55,9	15,4	1,5%
12:47:54	32,1	1,2	1018,3	38,2	1005,7	55,9	15,0	1,5%
12:47:57	32,1	1,3	1018,0	38,2	1001,6	55,9	12,6	1,2%
12:48:00	32,1	1,7	1020,7	38,2	1006,0	55,9	14,6	1,4%



The Comparison Table for Seven Irradiance Sensor( Serial Number 21061) and SMP11 Pyranometer of Kipp&Zonen are compared according to the registered values every 3 seconds. —Test Date :30.06.2021

Ambient Conditions			Measured Values From SMP11 Pyranometer of Kipp&Zonen		Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
Registration Time	Ambient Temp.(°C)	Wind Speed (m/s)	Irradiance Value (W/m2)	Internal temp.(°C)	Irradiance Value (W/m2)	Internal cell temp.(°C)	Differences of Irradiance Values(W/m2)	Relative Deviation (%)
12:48:03	32,1	1,5	1022,7	38,2	1007,5	56,0		
12:48:06	32,2	1,3	1015,7	38,2	999,2	55,3	15,1	1,5%
12:48:09	32,2	2,0	1010,0	38,2	993,8	55,3	16,5	1,6%
12:48:12	32,1	1,9	1008,7	38,2	992,0	55,3	16,2	1,6%
12:48:15	32,0	2,0	1008,7	38,2	991,9	55,3	16,6	1,6%
12:48:18	32,0	2,7	1010,7	38,2	997,1	55,3	16,7	1,7%
12:48:21	32,0	2,7	1011,0	38,2	994,0	55,3	13,6	1,3%
12:48:24	32,0	2,1	1012,3	38,2	994,7	55,4	17,0	1,7%
12:48:27	32,0	1,7	1013,7	38,2	998,0	55,4	17,6	1,7%
12:48:30	32,1	1,5	1014,3	38,2	999,2	55,3	15,7	1,5%
12:48:33	32,1	1,3	1014,7	38,2	998,9	55,3	15,2	1,5%
12:48:36	32,2	1,3	1014,0	38,2	997,1	55,4	15,8	1,6%
12:48:39	32,2	1,5	1013,7	38,2	997,8	55,4	16,9	1,7%
12:48:42	32,3	1,6	1012,7	38,2	996,5	55,4	16,2	1,6%
12:48:45	32,2	1,9	1011,7	38,2	996,9	55,4	14,7	1,5%
12:48:48	32,2	2,3	1011,0	38,2	997,5	55,4	13,5	1,3%
12:48:51	32,2	2,0	1011,3	38,2	996,8	55,5	14,6	1,4%
12:48:54	32,2	1,7	1011,7	38,2	996,7	55,5	14,9	1,5%
12:48:57	32,2	1,6	1010,3	38,2	995,1	55,5	15,2	1,5%
12:49:00	32,2	1,5	1010,7	38,2	996,2	55,5	14,5	1,4%
12:49:03	32,3	0,8	1011,0	38,2	996,1	55,5	14,9	1,5%
12:49:06	32,3	1,3	1012,0	38,2	997,2	55,5	14,8	1,5%
12:49:09	32,2	1,9	1013,3	38,2	998,4	55,5	15,0	1,5%
12:49:12	32,3	2,7	1014,7	38,2	997,2	55,5	17,5	1,7%
12:49:15	32,2	2,4	1017,0	38,2	1001,0	55,6	16,0	1,6%
12:49:18	32,2	3,1	1019,3	38,2	1004,1	55,6	15,2	1,5%
12:49:21	32,2	3,1	1020,3	38,2	1004,9	55,6	15,5	1,5%
12:49:24	32,1	2,8	1021,7	38,2	1006,8	55,6	14,9	1,5%
12:49:27	32,2	2,5	1023,3	38,2	1007,9	55,6	15,4	1,5%
12:49:30	32,1	2,3	1023,0	38,2	1007,8	55,6	15,2	1,5%
12:49:33	32,1	2,0	1023,0	38,2	1007,3	55,6	15,7	1,5%
12:49:36	32,1	1,7	1023,3	38,2	1007,6	55,6	15,7	1,5%
12:49:39	32,2	1,2	1024,0	38,2	1008,5	55,6	15,5	1,5%
12:49:42	32,2	0,4	1024,0	38,2	1007,9	55,6	16,1	1,6%
12:49:45	32,2	0,0	1023,3	38,2	1009,1	55,6	14,2	1,4%
12:49:48	32,3	0,0	1023,3	38,2	1008,2	55,6	15,1	1,5%
12:49:51	32,3	0,4	1022,0	38,2	1006,9	55,6	15,1	1,5%
12:49:54	32,3	0,8	1023,0	38,2	1008,4	55,6	14,6	1,4%
12:49:57	32,3	1,2	1020,0	38,2	1005,4	55,6	14,6	1,4%
12:50:00	32,3	2,0	1015,7	38,2	999,8	55,7	15,9	1,6%
12:50:03	32,3	2,0	1020,7	38,2	1002,3	55,7	18,4	1,8%
12:50:06	32,3	3,1	1021,3	38,2	1007,6	55,7	13,7	1,3%
12:50:09	32,3	3,9	1021,0	38,2	1005,5	55,7	15,5	1,5%
12:50:12	32,4	2,9	1019,3	38,2	1006,6	55,7	12,7	1,2%
12:50:15	32,5	1,7	1018,0	38,2	1002,3	55,7	15,7	1,5%
12:50:18	32,6	1,9	1021,0	38,3	1005,5	55,7	15,5	1,5%
12:50:21	32,7	2,0	1023,3	38,2	1008,9	55,8	14,4	1,4%
12:50:24	32,7	1,6	1027,0	38,2	1009,1	55,8	17,9	1,7%
12:50:27	32,7	1,3	1028,7	38,2	1013,4	55,8	15,3	1,5%
12:50:30	32,8	0,8	1030,3	38,3	1018,1	55,8	12,3	1,2%
12:50:33	32,8	1,2	1032,7	38,2	1014,4	55,8	18,3	1,8%
12:50:36	32,8	1,3	1034,3	38,3	1016,4	55,8	17,9	1,7%
12:50:39	32,8	1,6	1036,3	38,3	1018,8	55,8	17,5	1,7%
12:50:42	32,8	2,1	1037,7	38,3	1021,8	55,8	15,9	1,5%
12:50:45	32,7	2,4	1039,7	38,3	1021,0	55,8	18,6	1,8%
12:50:48	32,7	2,3	1038,7	38,3	1021,7	55,8	16,8	1,6%
12:50:51	32,6	1,7	1036,7	38,3	1021,0	55,9	15,6	1,5%
12:50:54	32,7	1,6	1035,7	38,3	1019,1	55,9	14,7	1,4%
12:50:57	32,7	2,0	1035,0	38,3	1019,1	55,9	14,7	1,4%
12:51:00	32,7	1,6	1033,7	38,3	1018,9	55,9	14,7	1,4%


  
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The Comparison Table for Seven Irradiance Sensor( Serial Number 21061) and SMP11 Pyranometer of Klpp&Zonen are compared according to the registered values every 3 seconds.-----Test Date :30.06.2021

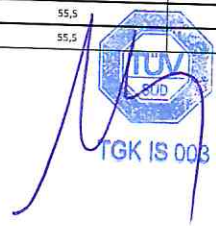
Ambient Conditions			Measured Values From SMP11 Pyranometer of Klpp&Zonen		Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
Registration Time	Ambient Temp.(°C)	Wind Speed (m/s)	Irradiance Value (W/m2)	Internal temp.(°C)	Irradiance Value (W/m2)	Internal cell temp.(°C)	Differences of Irradiance Values(W/m2)	Relative Deviation (%)
12:51:03	32,8	0,8	1031,3	38,3	1013,9			
12:51:06	32,8	1,3	1030,7	38,3	1016,7	55,9	17,5	1,7%
12:51:09	32,8	1,6	1029,7	38,3	1013,9		14,0	1,4%
12:51:12	32,7	2,1	1030,0	38,3	1014,3	56,0	15,8	1,5%
12:51:15	32,7	2,5	1028,3	38,3	1013,9	56,0	15,7	1,5%
12:51:18	32,6	2,5	1027,3	38,3	1010,3	56,0	14,4	1,4%
12:51:21	32,6	1,7	1027,0	38,3	1010,9	56,0	17,0	1,7%
12:51:24	32,6	1,6	1027,7	38,3	1011,3	56,0	16,1	1,6%
12:51:27	32,6	1,3	1028,0	38,3	1011,9	56,0	16,3	1,6%
12:51:30	32,6	2,1	1027,0	38,3	1011,5	56,1	15,5	1,5%
12:51:33	32,6	2,3	1022,7	38,3	1008,8	56,1	13,9	1,4%
12:51:36	32,6	2,1	1019,0	38,4	1003,3	56,1	15,7	1,5%
12:51:39	32,6	1,6	1018,0	38,4	1000,2	56,1	17,8	1,7%
12:51:42	32,6	1,6	1013,7	38,4	1000,6	56,1	13,0	1,3%
12:51:45	32,6	1,9	1014,0	38,4	996,8	56,1	17,2	1,7%
12:51:48	32,6	1,9	1016,0	38,4	999,7	56,1	16,3	1,6%
12:51:51	32,6	1,6	1017,0	38,4	1002,1	56,2	14,9	1,5%
12:51:54	32,6	1,9	1017,7	38,4	1001,5	56,2	16,2	1,6%
12:51:57	32,6	2,0	1015,7	38,4	1000,8	56,2	14,9	1,5%
12:52:00	32,6	2,0	1015,3	38,4	998,3	56,2	17,1	1,7%
12:52:03	32,5	2,0	1017,0	38,4	999,6	56,2	17,4	1,7%
12:52:06	32,5	1,6	1014,0	38,4	998,2	56,3	15,8	1,6%
12:52:09	32,5	2,5	1023,7	38,4	1006,5	56,3	17,2	1,7%
12:52:12	32,4	2,3	1033,3	38,4	1014,9	56,2	18,4	1,8%
12:52:15	32,4	2,0	1034,3	38,4	1016,7	56,2	17,6	1,7%
12:52:18	32,3	2,0	1043,3	38,4	1018,8	56,2	14,5	1,4%
12:52:21	32,3	2,1	1043,0	38,4	1016,7	56,2	16,3	1,6%
12:52:24	32,3	1,3	1027,3	38,4	1006,2	56,3	16,1	1,6%
12:52:27	32,4	1,2	1025,0	38,4	1007,4	56,3	17,6	1,7%
12:52:30	32,4	1,2	1028,3	38,4	1010,5	56,3	17,8	1,7%
12:52:42	31,9	2,4	1029,7	38,3	1063,4	55,3	16,3	1,5%
12:52:45	31,6	2,3	1054,3	38,2	1038,1	54,8	16,2	1,5%
12:52:48	31,6	2,9	1055,0	38,2	1038,4	54,8	16,6	1,6%
12:52:51	31,6	3,6	1051,3	38,1	1034,1	54,8	17,2	1,6%
12:52:54	31,6	3,2	1048,0	38,1	1031,2	54,8	16,8	1,6%
12:52:57	31,6	3,1	1044,3	38,1	1028,5	54,8	15,8	1,5%
12:53:00	31,5	3,2	1043,0	38,1	1025,0	54,8	18,0	1,7%
12:53:03	31,5	2,5	1043,7	38,1	1026,9	54,8	16,1	1,5%
12:53:06	31,5	2,9	1043,0	38,1	1026,9	54,8	18,6	1,8%
12:53:09	31,5	3,5	1042,0	38,1	1023,4	54,8	18,0	1,7%
12:53:12	31,5	2,8	1043,0	38,1	1025,0	54,8	17,6	1,7%
12:53:15	31,5	2,8	1043,7	38,1	1026,0	54,8	17,4	1,7%
12:53:18	31,5	2,7	1045,3	38,0	1027,9	54,8	18,2	1,7%
12:53:21	31,5	2,7	1046,7	38,0	1028,4	54,8	17,6	1,7%
12:53:24	31,5	2,5	1048,7	38,0	1031,0	54,8	17,6	1,7%
12:53:27	31,5	2,4	1051,7	38,0	1032,1	54,8	19,6	1,9%
12:53:30	31,5	2,9	1055,0	38,0	1036,8	54,8	18,2	1,7%
12:53:33	31,5	2,3	1058,0	38,0	1040,2	54,8	17,8	1,7%
12:53:36	31,5	2,4	1060,3	38,0	1047,8	54,8	17,5	1,7%
12:53:39	31,6	2,3	1061,0	38,0	1044,8	54,8	16,2	1,5%
12:53:42	31,6	2,0	1060,0	38,0	1043,3	54,8	16,7	1,6%
12:53:45	31,7	2,3	1059,0	38,0	1042,8	54,9	16,2	1,5%
12:53:48	31,7	2,1	1059,0	38,0	1043,4	54,9	15,6	1,5%
12:53:51	31,7	2,5	1056,7	38,0	1042,1	54,9	14,5	1,4%
12:53:54	31,7	2,0	1053,7	38,0	1037,9	54,9	15,7	1,5%
12:53:57	31,7	1,7	1051,7	38,0	1036,5	54,9	15,2	1,4%
12:54:00	31,8	1,7	1050,7	38,0	1035,0	54,9	15,6	1,5%



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The Comparison Table for Seven Irradiance Sensor (Serial Number 21061) and SMP11 Pyranometer of Kipp&Zonen are compared according to the registered values every 3 seconds. —Test Date :30.06.2021

Registration Time	Ambient Conditions		Measured Values From SMP11 Pyranometer of Kipp&Zonen		Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
	Ambient Temp.(°C)	Wind Speed (m/s)	Irradiance Value (W/m2)	Internal temp.(°C)	Irradiance Value (W/m2)	Internal cell temp.(°C)	Differences of Irradiance Values(W/m2)	Relative Deviation (%)
12:54:03	31,8	1,6	1049,3	38,0	1032,6	55,0	16,7	1,6%
12:54:06	31,8	2,0	1048,3	38,0	1032,5	55,0	15,9	1,5%
12:54:09	31,8	2,5	1044,3	38,0	1029,8	55,0	14,5	1,4%
12:54:12	31,7	2,5	1045,0	38,0	1028,0	55,0	17,0	1,6%
12:54:15	31,7	2,3	1047,7	38,0	1029,6	55,0	18,0	1,7%
12:54:18	31,7	1,7	1050,7	38,0	1032,8	55,0	17,9	1,7%
12:54:21	31,7	1,9	1049,3	38,0	1033,3	55,0	16,0	1,5%
12:54:24	31,7	1,7	1049,0	38,0	1031,7	55,0	17,3	1,6%
12:54:27	31,7	2,0	1045,0	38,0	1032,4	55,0	16,6	1,6%
12:54:30	31,8	2,1	1039,7	38,0	1023,8	55,1	15,8	1,5%
12:54:33	31,8	1,9	1038,7	38,0	1020,9	55,1	17,8	1,7%
12:54:36	31,8	1,7	1040,0	38,0	1020,1	55,1	19,9	1,9%
12:54:39	31,9	2,1	1046,3	38,0	1026,8	55,1	19,6	1,9%
12:54:42	31,9	2,3	1050,3	38,0	1033,3	55,1	17,1	1,6%
12:54:45	31,9	3,3	1052,3	38,0	1034,2	55,1	18,1	1,7%
12:54:48	32,0	3,1	1053,3	38,0	1036,7	55,1	16,7	1,6%
12:54:51	32,0	2,3	1055,3	38,0	1038,4	55,2	16,9	1,6%
12:54:54	32,0	2,9	1055,0	38,0	1036,8	55,2	18,2	1,7%
12:54:57	32,0	3,6	1054,0	38,0	1038,5	55,2	15,5	1,5%
12:55:00	32,0	2,9	1053,0	38,0	1033,1	55,2	19,9	1,9%
12:55:03	32,0	2,5	1053,0	38,0	1036,8	55,3	16,2	1,5%
12:55:06	32,0	2,7	1053,0	38,0	1036,1	55,3	16,9	1,6%
12:55:09	32,0	3,3	1053,3	38,0	1036,9	55,3	16,4	1,6%
12:55:12	31,9	3,2	1054,3	38,0	1038,0	55,3	16,4	1,6%
12:55:15	31,9	2,9	1055,3	38,0	1038,8	55,3	16,5	1,6%
12:55:18	32,0	2,9	1057,0	38,0	1037,9	55,3	19,1	1,8%
12:55:21	32,0	2,7	1058,0	38,0	1040,9	55,3	17,1	1,6%
12:55:24	32,0	3,1	1058,0	38,0	1041,7	55,3	16,3	1,5%
12:55:27	32,0	3,1	1058,7	38,0	1041,1	55,3	17,6	1,7%
12:55:30	31,9	3,2	1058,0	38,0	1042,4	55,3	15,6	1,5%
12:55:33	31,8	3,2	1055,0	38,0	1039,3	55,3	15,7	1,5%
12:55:36	31,9	2,0	1051,0	37,9	1035,4	55,3	15,6	1,5%
12:55:39	31,9	2,8	1050,0	37,9	1032,5	55,3	17,5	1,7%
12:55:42	31,9	2,5	1049,0	37,9	1032,6	55,3	16,4	1,6%
12:55:45	31,8	3,1	1028,7	37,9	1012,4	55,3	16,3	1,6%
12:55:48	31,7	3,1	1026,0	37,9	1009,7	55,3	16,3	1,6%
12:55:51	31,7	2,5	1029,7	37,9	1012,9	55,3	16,7	1,6%
12:55:54	31,7	2,0	1034,3	37,9	1016,2	55,4	18,2	1,8%
12:55:57	31,7	2,3	1039,7	37,9	1021,8	55,3	17,9	1,7%
12:56:00	31,7	2,1	1042,0	37,9	1024,5	55,3	17,5	1,7%
12:56:03	31,8	1,7	1041,0	37,9	1024,5	55,4	16,5	1,6%
12:56:06	31,8	1,6	1041,0	37,9	1023,7	55,4	17,3	1,7%
12:56:09	31,9	1,7	1040,0	37,9	1022,7	55,4	17,3	1,7%
12:56:12	31,9	2,0	1038,3	37,9	1021,8	55,4	16,5	1,6%
12:56:15	31,9	1,9	1037,7	37,8	1021,9	55,4	15,7	1,5%
12:56:18	31,9	2,1	1036,0	37,8	1020,6	55,4	15,4	1,5%
12:56:21	31,9	2,3	1034,7	37,8	1018,3	55,4	16,4	1,6%
12:56:24	31,9	2,4	1035,0	37,8	1018,8	55,4	16,2	1,6%
12:56:27	31,9	1,9	1036,0	37,8	1020,3	55,4	15,7	1,5%
12:56:30	32,0	2,0	1033,0	37,8	1017,0	55,4	16,0	1,5%
12:56:33	32,0	1,7	1032,0	37,8	1015,1	55,4	16,9	1,6%
12:56:36	32,1	2,3	1031,7	37,8	1015,3	55,4	16,4	1,6%
12:56:39	32,0	2,5	1031,3	37,8	1014,0	55,4	17,4	1,7%
12:56:42	32,1	2,4	1035,3	37,8	1017,9	55,5	17,4	1,7%
12:56:45	32,1	1,7	1030,3	37,8	1022,3	55,5	16,0	1,5%
12:56:48	32,1	1,7	1030,3	37,8	1024,3	55,5	15,1	1,4%
12:56:51	32,2	1,2	1018,7	37,7	1002,8	55,5	15,9	1,5%
12:56:54	32,2	0,8	1025,0	37,7	1007,3	55,5	17,7	1,7%
12:56:57	32,2	1,6	1026,7	37,7	1010,4	55,5	16,3	1,6%
12:57:00	32,2	1,7	1026,7	37,7	1010,7	55,5	16,0	1,6%





The Comparison Table for Seven Irradiance Sensor (Serial Number 21061) and SMP11 Pyranometer of Kipp&Zonen are compared according to the registered values every 3 seconds. — Test Date :30.06.2021

Ambient Conditions			Measured Values From SMP11 Pyranometer of Kipp&Zonen		Measured Values From Serial Number 21061 Seven Irradiance Sensor		Differences and Relative Deviation	
Registration Time	Ambient Temp.(°C)	Wind Speed (m/s)	Irradiance Value (W/m2)	Internal temp.(°C)	Irradiance Value (W/m2)	Internal cell temp.(°C)	Differences of Irradiance Values(W/m2)	Relative Deviation (%)
12:57:03	32,3	1,3	1024,3	37,7	1008,6	55,5	15,7	1,5%
12:57:06	32,3	1,5	1021,3	37,7	1004,9	55,5	16,4	1,6%
12:57:09	32,2	1,7	1019,0	37,7	1001,8	55,5	17,2	1,7%
12:57:12	32,2	1,6	1016,0	37,7	1000,2	55,5	15,8	1,6%
12:57:15	32,2	1,6	1013,3	37,7	996,4	55,5	16,9	1,7%
12:57:18	32,3	1,3	1011,0	37,7	993,3	55,5	17,1	1,7%
12:57:21	32,3	0,9	1009,7	37,7	993,2	55,5	16,5	1,6%
12:57:24	32,4	1,3	1008,7	37,7	990,7	55,5	18,0	1,8%
12:57:27	32,4	1,3	1005,3	37,7	988,3	55,5	17,0	1,7%
12:57:30	32,4	1,3	1003,0	37,7	985,9	55,6	17,1	1,7%
12:57:33	32,4	2,0	1001,0	37,7	985,0	55,6	16,0	1,6%
12:57:36	32,4	2,4	1000,0	37,7	983,6	55,6	16,4	1,6%
12:57:39	32,3	1,9	1001,0	37,7	983,5	55,6	17,5	1,7%
12:57:42	32,3	2,4	1002,0	37,7	985,3	55,6	16,7	1,7%
12:57:45	32,3	2,9	1000,7	37,7	985,7	55,6	14,9	1,5%
12:57:48	32,3	3,1	999,3	37,7	982,4	55,6	17,0	1,7%
12:57:51	32,3	2,0	998,0	37,7	982,4	55,6	15,6	1,6%
12:57:54	32,3	2,0	997,0	37,7	979,4	55,6	17,6	1,8%
12:57:57	32,3	2,1	997,0	37,7	980,3	55,6	16,7	1,7%
12:58:00	32,3	2,4	995,7	37,7	980,0	55,6	15,7	1,6%
12:58:03	32,2	2,8	994,0	37,7	978,2	55,6	15,8	1,6%
12:58:06	32,2	2,8	993,0	37,7	976,7	55,6	16,3	1,6%
12:58:09	32,2	2,1	994,0	37,7	976,7	55,6	17,3	1,7%
12:58:12	32,2	1,7	997,0	37,7	980,1	55,6	16,9	1,7%
12:58:15	32,2	1,6	1000,0	37,7	983,4	55,6	16,6	1,7%
12:58:18	32,2	2,3	1005,0	37,7	987,0	55,6	18,0	1,8%
12:58:21	32,2	2,4	1010,7	37,7	991,5	55,6	19,1	1,9%
12:58:24	32,2	3,3	1013,0	37,7	994,9	55,6	18,1	1,8%
12:58:27	32,2	2,8	1016,0	37,7	996,0	55,6	20,0	2,0%
12:58:30	32,2	2,3	1017,3	37,7	1000,5	55,6	16,8	1,6%
12:58:33	32,2	2,9	1018,7	37,7	1001,4	55,6	17,3	1,7%
12:58:36	32,2	3,3	1019,0	37,7	1003,5	55,6	15,5	1,5%
12:58:39	32,1	3,2	1019,7	37,7	1002,9	55,6	16,8	1,6%
12:58:42	32,1	3,3	1020,0	37,7	1003,2	55,6	16,8	1,6%
12:58:45	32,0	3,5	1020,0	37,7	1002,6	55,6	17,4	1,7%
12:58:48	31,9	2,8	1020,0	37,7	1004,4	55,6	15,6	1,5%
12:58:51	31,9	2,8	1019,7	37,7	1003,4	55,6	16,3	1,6%
12:58:54	31,9	3,2	1019,0	37,7	1001,0	55,6	18,0	1,8%
12:58:57	31,9	3,7	1019,0	37,7	1001,6	55,6	17,4	1,7%
12:59:00	31,9	3,5	1017,3	37,7	999,7	55,6	16,4	1,6%
12:59:03	31,9	2,9	1015,7	37,7	997,9	55,6	16,1	1,6%
12:59:06	31,9	2,8	1014,0	37,7	995,7	55,6	16,3	1,6%
12:59:09	31,9	3,2	1013,0	37,7	994,5	55,5	16,2	1,6%
12:59:12	31,9	3,1	1010,7	37,7	993,3	55,5	16,3	1,6%
12:59:15	31,9	2,7	1009,7	37,7	992,8	55,5	17,1	1,7%
12:59:18	32,0	2,5	1009,3	37,7	992,6	55,5	17,4	1,7%
12:59:21	32,0	2,9	1010,0	37,7	994,4	55,5	16,2	1,6%
12:59:24	32,0	3,2	1011,3	37,7	995,3	55,5	17,4	1,7%
12:59:27	32,0	2,8	1012,7	37,7	996,0	55,5	18,0	1,8%
12:59:30	32,0	2,8	1014,0	37,7	997,5	55,5	17,2	1,7%
12:59:33	31,9	2,7	1014,7	37,7	997,5	55,4	17,5	1,7%
12:59:36	31,8	2,3	1015,0	37,7	997,2	55,4	17,8	1,8%
12:59:39	31,8	2,1	1015,0	37,7	997,5	55,4	17,9	1,8%
12:59:42	31,8	2,0	1015,0	37,7	997,1	55,4	17,9	1,8%
12:59:45	31,9	2,5	1016,0	37,7	998,1	55,3	17,9	1,8%
12:59:48	31,9	2,5	1016,0	37,7	1000,3	55,4	15,7	1,5%
12:59:51	31,9	2,4	1017,0	37,7	998,4	55,3	18,6	1,8%
12:59:54	31,9	2,4	1017,0	37,7	998,4	55,3	16,6	1,6%
12:59:57	31,9	2,3	1017,0	37,7	998,4	55,3	16,6	1,6%
Ortalama Değerler	32,0	2,1	1027,2	38,0	1010,6	55,5	16,6	1,6%



Test Date:30.06.2021

TEST RESULTS

- 1- In order to conformity assessment tests, TÜV SÜD authorized inspector Niyazi Altun is visited the company of Argesim Machine on 30.06.2021 .
- Tests were carried out between the hours of 12:45 and 13:00
  - Serial Number 21061 Seven Irradiance Sensor tested together with SMP11 Pyranometer of Kipp&Zonen and Calibrated Reference Cell of Fraunhofer
  - That values are registered and then registered values are compared.

2- End of the Test;

- Average of Relative Deviations with Calibrated Reference Cell of Fraunhofer : -0,1
  - Average of Relative Deviations with SMP11 Pyranometer of Kipp&Zonen: 1,6
- as results are analyzed.



TGK IS 003