# SOLAR RADIATION (Global Irradiance)

# Secondary Standard Pyranometers

- Spectrally flat Class A (Secondary Standard) pyranometer. Compliance with IEC 61724-1: 2017
- RVH technology: Recirculating Ventilation and Heating (DPA953.1)
- Measured sensor tilt angle (DPA953.1)
- Calibration traceability to WRR
- Outputs: irradiance in W/m², instrument body temperature , tilt angle, internal humidity, internal pressure and ventilator speed (DPA953.1)
- Ideal instrument in PV plants performance monitoring and meteorological networks

Radiometer for solar irradiance measurement, according to ISO 9060 and WMO No. 8 (Part I, Chapter 7) standards. These sensors are classified as ISO 9060 Secondary Standard. With a total daily uncertainty of only 2% within 0...180° field of view, fast response time, these sensors are ideal for users requiring high-end accuracy and reliability.

## Technical Specifications

| PN | DPA252 | DPA952 | DPA953.1 |
|---|---|---|---|
| |  |  |  |
| **Output** | µV | RS485-Modbus<br>4...20 mA | RS485-Modbus |
| **Ventilation** | Not included<br>(Yes, using DPA250) | Not included<br>(Yes, using DPA250) | Included |
| **Heater** | | | Yes (5 V) |
| **Tilt measurement** | - | - | YES (Acc± 1°) |
| **Power supply** | - | 7...35 Vdc | 8...30 Vdc |
| **Power consumption** | - | < 75 x $10^{-3}$ W@12 VDC | < 3 W@12 VDC |
| **Thermopile sensitivity** | 7...25 µV/W/m$^2$ | NA | NA |
| **Irradiance range** | 0...4000 W/m$^2$ | RS485: -400...4000 W/m$^2$<br>4...20 mA: 0...1500 W/m$^2$ | -400...4000 W/m$^2$ |
| **Impedance** | 40 ± 3 Ω | - | - |
| **Response time** | 4.5 s | 4.5 s | 3 s |
| **Output values** | Instant value | Running average value over 4 measurements, refreshed every 0.1 s | Running average value over 4 measurements, refreshed every 0.1 s |
| **Cable** | Not included<br>(see Accessories | Not included<br>(see Accessories) | Not included<br>(see Accessories) |

| PN | DPA252 | DPA952 | DPA953.1 |
|---|---|---|---|
| **Output** | Irradiance in W/m$^2$ | • Irradiance in W/m$^2$<br>• Sensor body temperature (digital output only) | • Irradiance in W/m$^2$<br>• Sensor body temperature<br>• Sensor internal RH%<br>• Sensor internal Pressure in Pa<br>• Instrument tilt angle<br>• Ventilator speed in RPM<br>• Ventilator current in A<br>• Heater current in A |
| **Data logger compatibility** | • M-Log (ELO008)<br>• Alpha-Log (using ALIEM module)<br>• E-Log | Using 4...20 mA output:<br>• M-Log (ELO008)<br>• Alpha-Log (using ALIEM module)<br>• E-Log | • M-Log (ELO008) using RS485->232 converter<br>• Alpha-Log<br>• E-Log (using RS485->232 converter) |

## Common Technical Specifications

| | | |
|---|---|---|
| **Secondary Standard Pyranometers** | ISO 9060 2018 classification | Spectrally flat Class A (Secondary Standard) |
| | IEC 61724-1: 2017 classification | Class A (DPA252 e DPA952 only with DPA250) |
| | WMO performance level | High quality pyranometer |
| | WMO estimate on achievable accuracy for daily sums | ±2% |
| | Spectral range | 285...3000 nm |
| | Non-stability | <± 0.5% change per year |
| | Directional response | <±10 W/m$^2$ |
| | Tilt response | <± 0.2% (0...90° at 1000 W/m$^2$) |
| | Temperature response | <0.4% (-30...50°C) |
| | Zero offset a (response to 200 W/m$^2$ net thermal radiation) | <5W/m$^2$ (unventilated)<br>< 2 W/ m$^2$ (DPA953.1) |
| | Zero offset b (response to 5K/h change in ambient temperature) | <±2 W/m$^2$ |
| | Non linearity | <± 0.2 % (100...1000 W/m$^2$) |
| | Stability (% change/year) | <± 0.5 % |
| | Standard built-in temperature sensor | YES (DPA952-953.1 only) |
| | Standard built-in heater | YES (12 Vdc, 1.5 W) (DPA953.1 only) |
| | Standard built-in bubble level | YES, including adjusting leveling screws (on mounting arm) |
| | Data provided with each sensor | • Calibration certificate<br>• Temperature dependence data<br>• Directional response data |

| | | |
|---|---|---|
| | Operative temperature | -40...80°C |
| | Calibration traceability | To WRR |
| **General Information** | Housing | Anodized aluminum |
| | Recalibration | Every 2 years |
| | Mounting (pole Ø 45...65 mm) | Using DYA034 (horizontal) or DYA035 (tilting) arms + DYA049 collar |
| | Weight | 0.5 kg |
| | Protection rate | IP66 |
| | Anti-radiation shield | Included |

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# First Class Pyranometers

- Spectrally flat Class B (First Class) pyranometer. Compliance with IEC 61724-1: 2017
- Electrical insulated (DPA855-980), Galvanic insulated (DPA980)
- Calibration traceability to WRR
- Modbus register for Instant value, Ave/Min/Max values over programmable time base (DPA980)
- 10...30 Vac/dc power supply (DPA855/980)
- Ideal instrument in PV plants performance monitoring and meteorological networks

Radiometer for solar irradiance measurement, according to ISO 9060 and WMO No. 8 (Part I, Chapter 7) standards. These sensors are classified as ISO9060 First Class. With a total daily uncertainty of 5% within 0...180° field of view, flat spectral response (285-3000 nm) and optimal temperature stability, this sensor represents the optimal compromise between cost and quality of irradiance measurement.

## Technical Specifications

| PN | DPA154 | DPA855 | DPA980 |
|---|---|---|---|
| Output | µV | 4...20 mA | RS485-Modbus |
| Protocol | - | - | Modbus RTU®, TTY-ASCII |
| Programmable output | - | - | Inst, max/min/ave (1...3600 s) |
| RS485 protection | - | - | Galvanic insulation (3 kV, UL1577) |
| RS485 speed | - | - | 1200...115 kbps |
| Power supply | - | 10...30 Vac/dc | 10...30 Vac/dc |
| Max. Load | - | 300 Ohm | 300 Ohm |
| Power consumption | - | 0.5 W | 0.5 W |
| EMC | - | EN 61326-1: 2013 | EN 61326-1: 2013 |
| Thermopile sensitivity | 10...15 µV/W/m$^2$ | NA | NA |
| Measuring range | 0...4000 W/m$^2$ | 0...1500 W/m$^2$ | 0...1500 W/m$^2$ |
| Impedance | 40 ± 3 Ω | - | - |
| Calibration certificate | Not included (see Accessories) | | |
| Cable | Not included (see Accessories) | | |
| Data logger compatibility | • M-Log (ELO008)<br>• Alpha-Log (using ALIEM module)<br>• E-Log | • M-Log (ELO008)<br>• Alpha-Log (using ALIEM module)<br>• E-Log | • M-Log (ELO008) using RS485->232 converter<br>• Alpha-Log<br>• E-Log. Using RS485->232 converter |

## Common Technical Specifications

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|---|---|---|
| **First Class pyranometer** | ISO 9060 2018 classification | Spectrally flat Class B (First Class) |
| | IEC 61724-1: 2017 classification | Class B (except for heating) |
| | WMO performance level | Good quality pyranometer |
| | WMO estimate on achievable accuracy for daily sums | ±5% |
| | Spectral range | 285...3000 nm |
| | Non-stability | <± 1% change per year |
| | Response time | 20 s |
| | Non linearity | <± 1% (100...1000 $W/m^2$) |
| | Directional response (0...180°C field of view) | <±20 $W/m^2$ |
| | Tilt response | <± 2% |
| | Temperature response | <2% (-15...35°C) |
| | Zero offset a (response to 200 $W/m^2$ net thermal radiation) | <12W/ $m^2$ |
| | Zero offset b (response to 5K/h change in ambient temperature) | <±3 $W/m^2$ |
| | Built-in bubble level | YES |
| | Operative temperature | -40...80°C |
| | Calibration traceability | To WRR |
| **General Information** | Housing | Anodized aluminum |
| | Recalibration | Every 2 years |
| | Mounting (pole Ø 45...65 mm) | Using DYA034 (horizontal) or DYA035 (tilting) arms + DYA049 collar |
| | Protection rate | IP66 |
| | Anti-radiation shield | Included |

# Second Class Pyranometers

- Spectrally flat Class C (Second Class) pyranometer. Compliance with IEC 61724-1: 2017
- Electrical insulated (DPA863-873), Galvanic insulated (DPA983)
- Calibration traceability to WRR
- Modbus register for Instant value, Ave/Min/Max values over programmable time base (DPA983)
- Ideal instrument in PV plants performance monitoring and meteorological networks

Radiometer for solar irradiance measurement, according to Second class as ISO 9060 and WMO No. 8 standards.
This sensor is a good compromise for basic meteorological, agrometeorological and solar energy applications.

## Technical Specifications

| PN | DPA053A | DPA863 | DPA983 |
|---|---|---|---|
| |  |  |  |
| **Output** | µV | 4...20 mA | RS485-Modbus |
| **Protocol** | - | - | Modbus RTU®, TTY-ASCII |
| **Programmable output** | - | - | Ist., max/min/ave. (1...3600 s) |
| **RS485 protection** | - | - | Galvanic insulation (3 kV, UL1577) |
| **RS485 speed** | - | - | 1200...115 kbps |
| **Power supply** | - | 10...30 Vac/dc | 10...30 Vac/dc |
| **Power consumption** | - | 0.5 W | 0.5 W |
| **EMC** | - | EN 61326-1: 2013 | EN 61326-1: 2013 |
| **Thermopile ensitivity** | 10...15 µV/W/m$^2$ | NA | NA |
| **Measuring range** | See Irradiance range | 0...1500 W/m$^2$ | 0...1500 W/m$^2$ |
| **Impedance** | 40 ± 3 Ω | - | - |
| **Calibration certificate** | Included | Not included (see Accessory) | Not included (see Accessory) |
| **Cable** | L= 5 m included | Not included (see Accessories) | Not included (see Accessories) |
| **Built-in bubble level** | NO (Yes, using DYA048 plate) | YES | YES |

| PN | DPA053A | DPA863 | DPA983 |
|---|---|---|---|
| **Mounting** | • DYA032 arm + DYA049 collar (horizontal)<br>• DYA048 plate + DYA035 arm + DYA049 collar (tilting) | DYA034 (horizontal) or DYA035 (tilting) arms + DYA049 collar | |
| **Data logger compatibility** | • M-Log (ELO008)<br>• Alpha-Log (usingALIEM module)<br>• E-Log | • M-Log (ELO008)<br>• Alpha-Log (using ALIEM module)<br>• E-Log | • M-Log (ELO008) using RS485->232 converter<br>• Alpha-Log<br>• E-Log (using RS485->232 converter) |

| | | |
|---|---|---|
| **Second Class pyranometer** | ISO 9060 2018 classification | Class C (Second Class) |
| | IEC 61724-1: 2017 classification | Class C |
| | WMO performance level | Moderate Quality |
| | WMO estimate on achievable accuracy for daily sums | ±10% |
| | Spectral range | 285...3000 nm |
| | Non linearity | ± 1% (100...1000 W/m$^2$) |
| | Temperature response | <7% (-10...40°C) |
| | Irradiance range | 0...2000 W/m$^2$ |
| | Recommended recalibration | Every 2 years |
| | Operative temperature | -40...80°C |
| | Calibration traceability | To WRR |
| **General Information** | Housing | Anodized aluminum |
| | Protection rate | IP66 |
| | Anti-radiation shield | Included |

## Accessories

| | | |
|---|---|---|
|  | **DYA030** | Tilting arm for two pyranometers |
|  | **DYA032** | Horizontal arm for fixing DPA053A to DYA049 collar |
|  | **DYA034** | Horizontal arm for fixing DPA252-952-953-154-855-980-863-983 pyranometers to DYA049 collar<br>Length 440 mm |
|  | **DYA034.1** | Horizontal arm for fixing DPA252-952-953-154-855-980-863-983 pyranometers to DYA049 collar<br>Length 650 mm |
|  | **DYA035** | Tilting arm for fixing DPA252-952-953-154-855-980-863-983 pyranometers to DYA049 collar |
| | **DYA060** | Lateral fixing arm for pyranometer installation on PV module |
|  | **DPA245** | Occultation Shadow band for diffuse radiation |
| | **DPA250** | External module for heating and ventilation for DPA252 and DPA952. Weight: 1 kg |
|  | **DEA420.1**<br>**DEA420.2** | Signal amplifier for Pyranometers. Output: 4...20 mA<br>Programmable pyranometer sensitivity (μV/Wm$^2$)<br>Power supply 10...30 Vac/dc<br>For more technical information, see MW9008 catalogue |
| | **MDMMA1010.1** | Same features as DEA420.1 but:<br>Output: RS-485 Modbus-RTU |

## Accessories

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|---|---|---|
| | **SVICA4001** | Calibration certificate. Under the sun. ISO9001 (Global radiation) |
| | **SVICA4701** | Calibration certificate. Under the lamp. ISO9001 (Global radiation) |
| | **DYA049** | Collar for fixing DYA032-034-035 to Ø 45...65 mm pole |
|  | **DWA205** | Cable for DPA252-952. L=5 m |
| | **DWA210** | Cable for DPA252-952. L=10 m |
| | **DWA225** | Cable for DPA252-952. L=20 m |
| | **DWA250** | Cable for DPA252-952. L=50 m |
| | **DWA205.1** | Cable for DPA953.1 L=5 m |
| | **DWA210.1** | Cable for DPA953.1 L=10 m |
| | **DWA220.1** | Cable for DPA953.1 L=20 m |
| | **DWA605A** | Cable for DPA154. L=5 m |
| | **DWA610A** | Cable for DPA154. L=10 m |
| | **DWA625A** | Cable for DPA154. L=25 m |
| | **DWA626A** | Cable for DPA154. L=50 m |
| | **DWA410A** | Cable for DPA855-980-863-983. L=10 m |
| | **DWA425A** | Cable for DPA855-980-863-983. L=25 m |
| | **DWA426A** | Cable for DPA855-980-863-983. L=50 m |
| | **DWA427A** | Cable for DPA855-980-863-983. L=100 m |
|  | **DYA048** | Plate for levelling DPA053A on DYA034 or DYA035 arm. Including bubble level |
|  | **DYA120** | Spare anti-radiant shield for DPA053A |
| | **MC1177.R** | Spare anti-radiant shield for DPA863-983 and DPA154-855-980 |
| | **DPA294** | Hygroscopic salts cartridge for radiometers DPA154-855-980-053A-863-983 |

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