

# Measuring the Sun



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## The Digital Age



SMP12

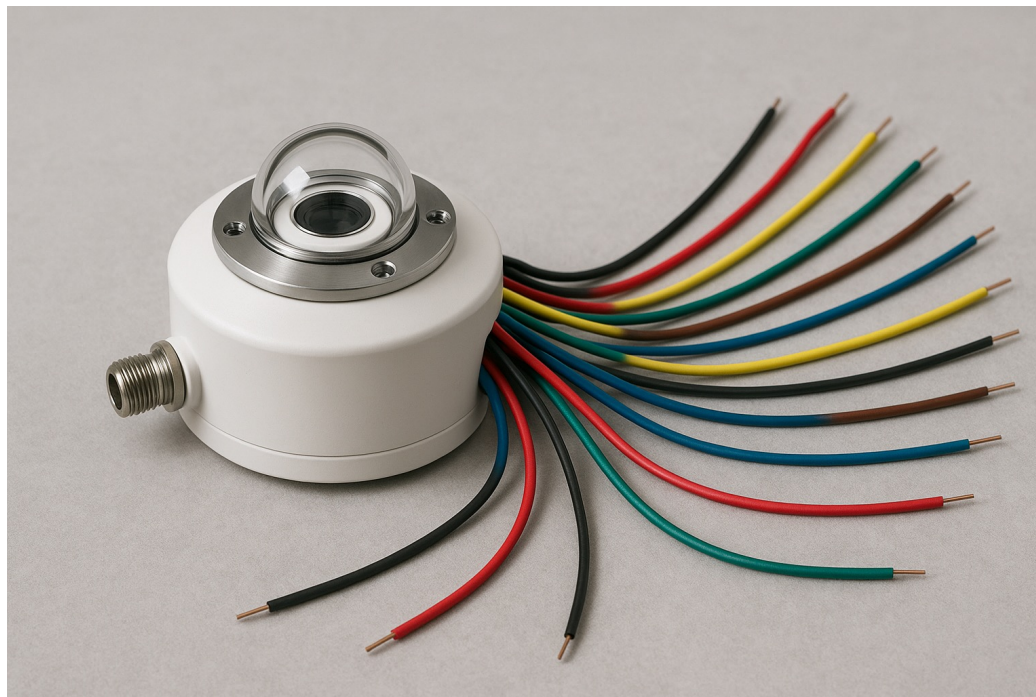


SR300



MS80SH

# The Digital Age



# Connectors



**Binder 712**



**M12 5-pin**

1	V+
2	V-
3	Data +
4	Data -
5	

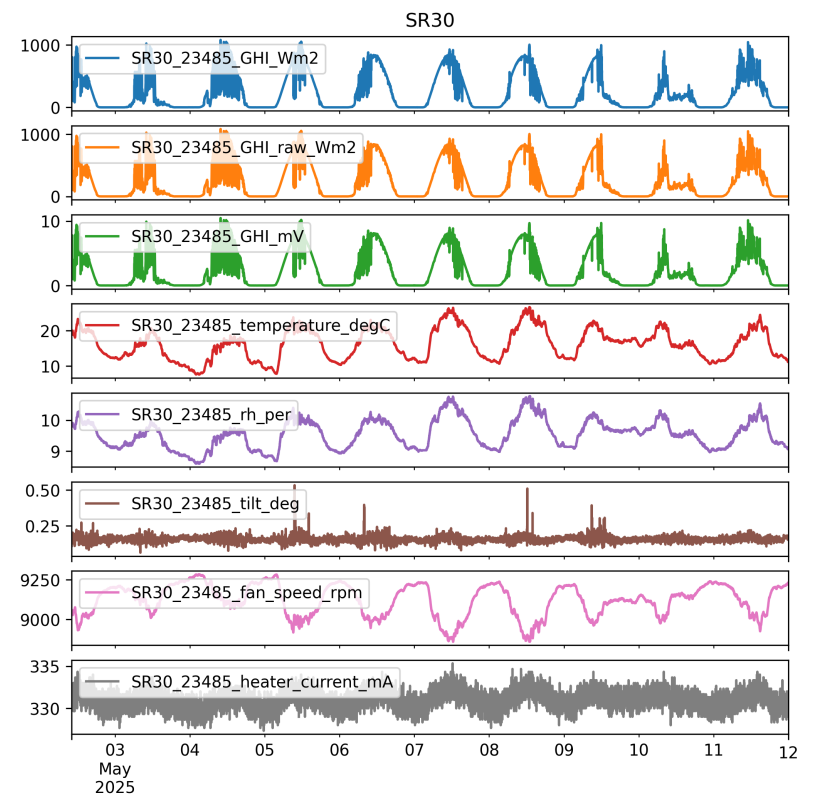


**M12 5-pin**

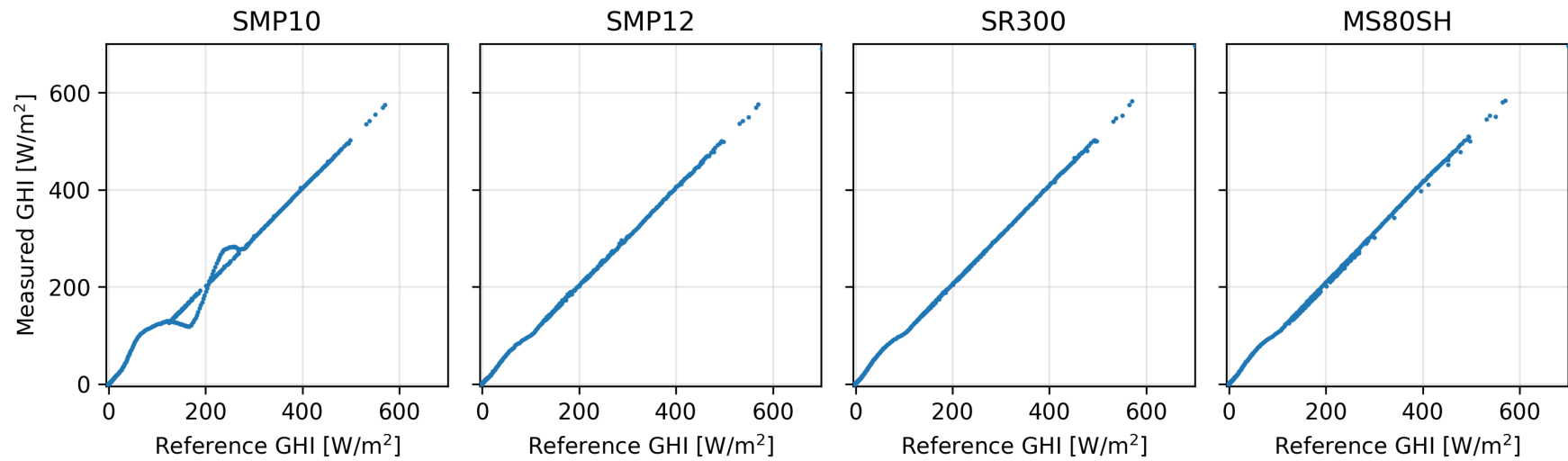
1	V+
2	Data +
3	Data -
4	V-
5	

## The Digital Age – Ancillary measurements

- Instrument temperature
- Internal humidity
- Heating state/current
- Fan speed (*some models*)
- Tilt sensor



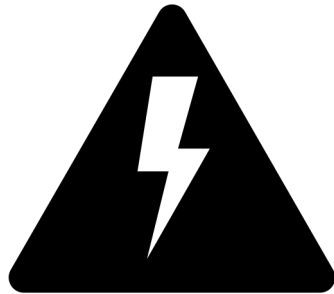
## Built-in heating





# Empower your analysts

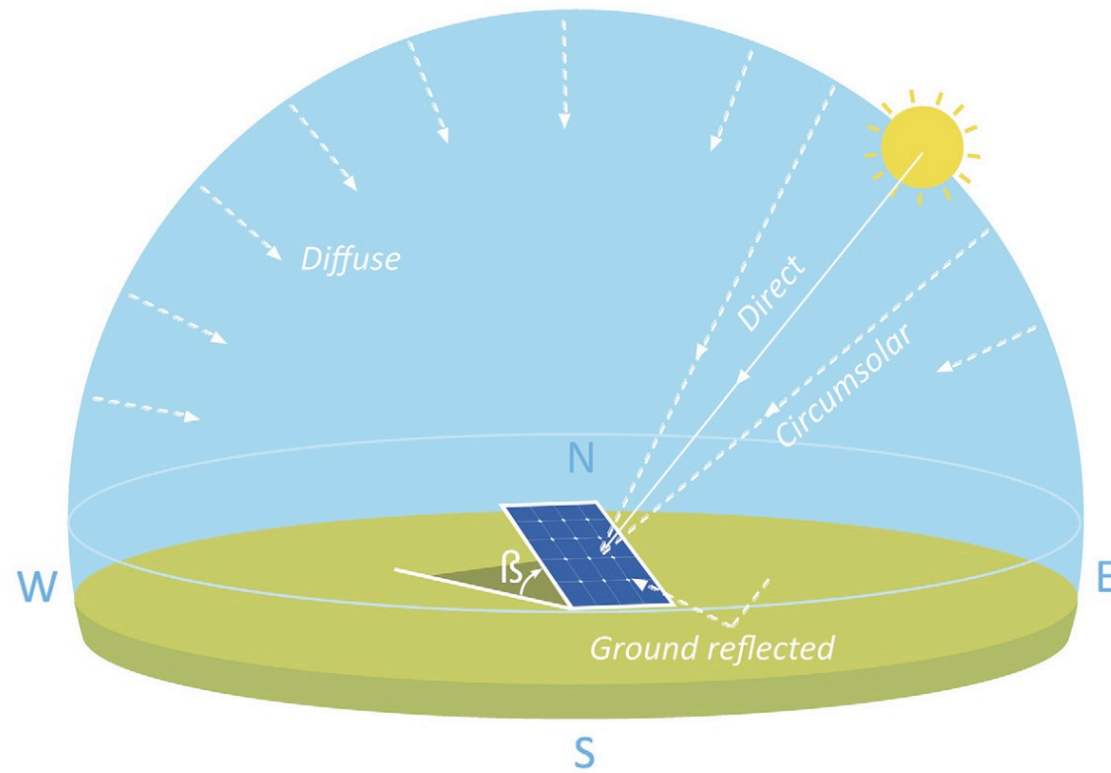
## The Digital Age - Drawbacks



**Requires power**

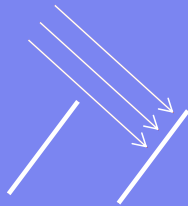


**NO ACCESS**



## Diffuse & direct irradiance

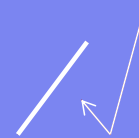
Self-shading

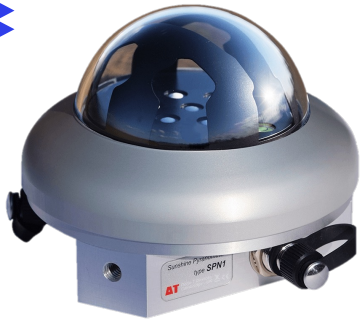


Diffuse tracking



Rear-side irradiance





## DIFFUSE SENSORS



## Hukseflux SRD100

**Type:** shadow mask

**Measurands:** DHI

**Sensors:** 9 photodiodes

**Ancillary:** humidity, heating



## Spectrafy SolarBand C3

**Type:** internal shadowband

**Measurands:** GHI, DHI, DNI

**Sensors:** 4 photodiodes

**Ancillary:** tilt, GPS, heating, humidity



**But how  
good is my  
radiometer?**



# Instruments comparison

## Pyranometers

Global horizontal irradiance

- K&Z SMP22
- K&Z SMP10
- K&Z CMP11
- K&Z SMP10
- K&Z SMP12
- EKO MS-80SH
- Hukseflux SR30M2D1
- Hukseflux SR300
- Apogee SP-522-SS
- Apogee SP-422-SS
- Licor LI-200R
- Schenk Star

## Pyrheliometers

Direct normal irradiance

- K&Z SHP1
- K&Z CHP1
- K&Z PH1
- Hukseflux DR30-D1

## Pyrgeometers

Low-wave downwelling irradiance

- K&Z SGR3
- K&Z CGR4

## Diffuse radiometers

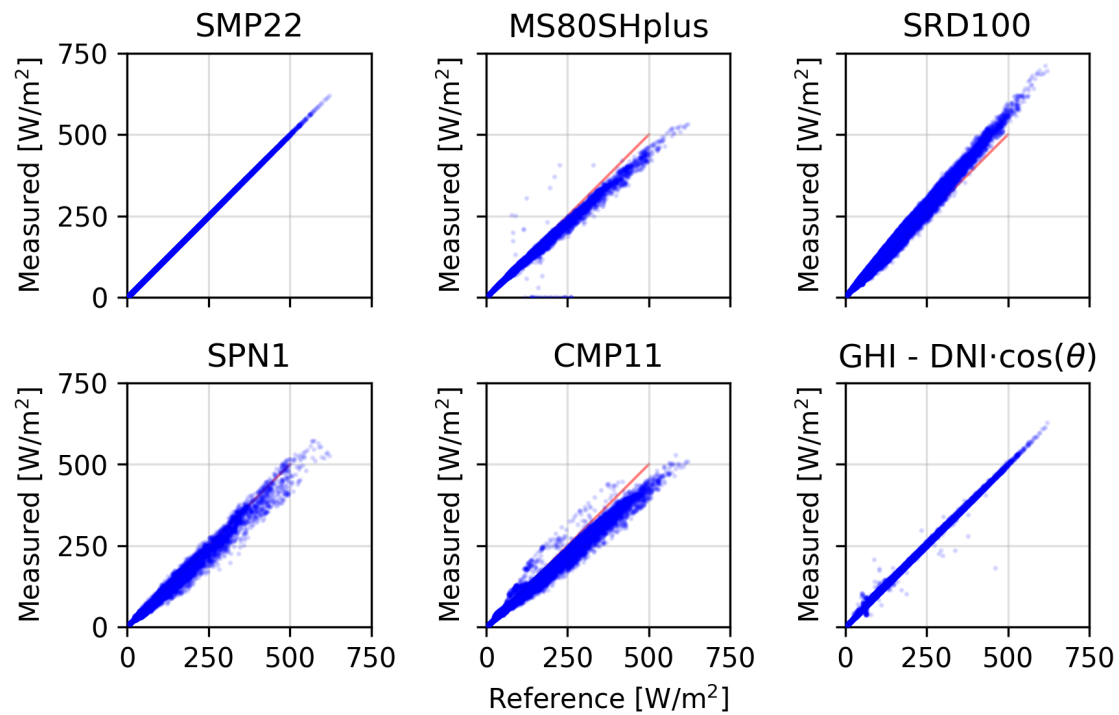
Diffuse horizontal irradiance + global horizontal irradiance

- K&Z SMP22 Pyranometer shaded by shadow ball
- DeltaT SPN1 Pyranometer w/ shading mask
- K&Z PR1 Pyranometer shaded by shading disk
- EKO MS-80SH Plus Rotating shadow band
- Spectrafy SolarBand-C3 Rotating shadow band
- K&Z CMP11 Pyranometer with shadow ring
- DLR Pyranocam All-sky imager & pyranometer
- CSP Ser. RSI Rotating shadow band

**27 different radiometers**  
**+150 parameters every second**



## Diffuse horizontal irradiance



## Take aways!

- Take advantage of digital instruments
- Numerous diffuse radiometer options
- Look for independent verifications
- Clean your instruments!

For full report ↓



**Thank you!**

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