

*a passion for precision · passion pour la précision · pasión por la precisión · passione per la precisione · a passion for*

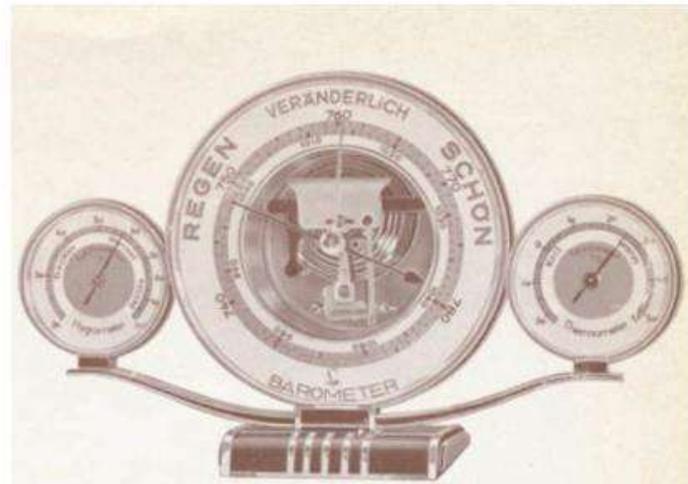
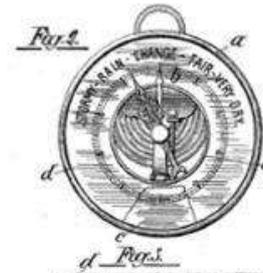
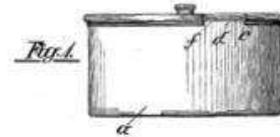
# Lufft

## A Passion for Precision



# Lufft History

founded 1881 in Stuttgart Germany

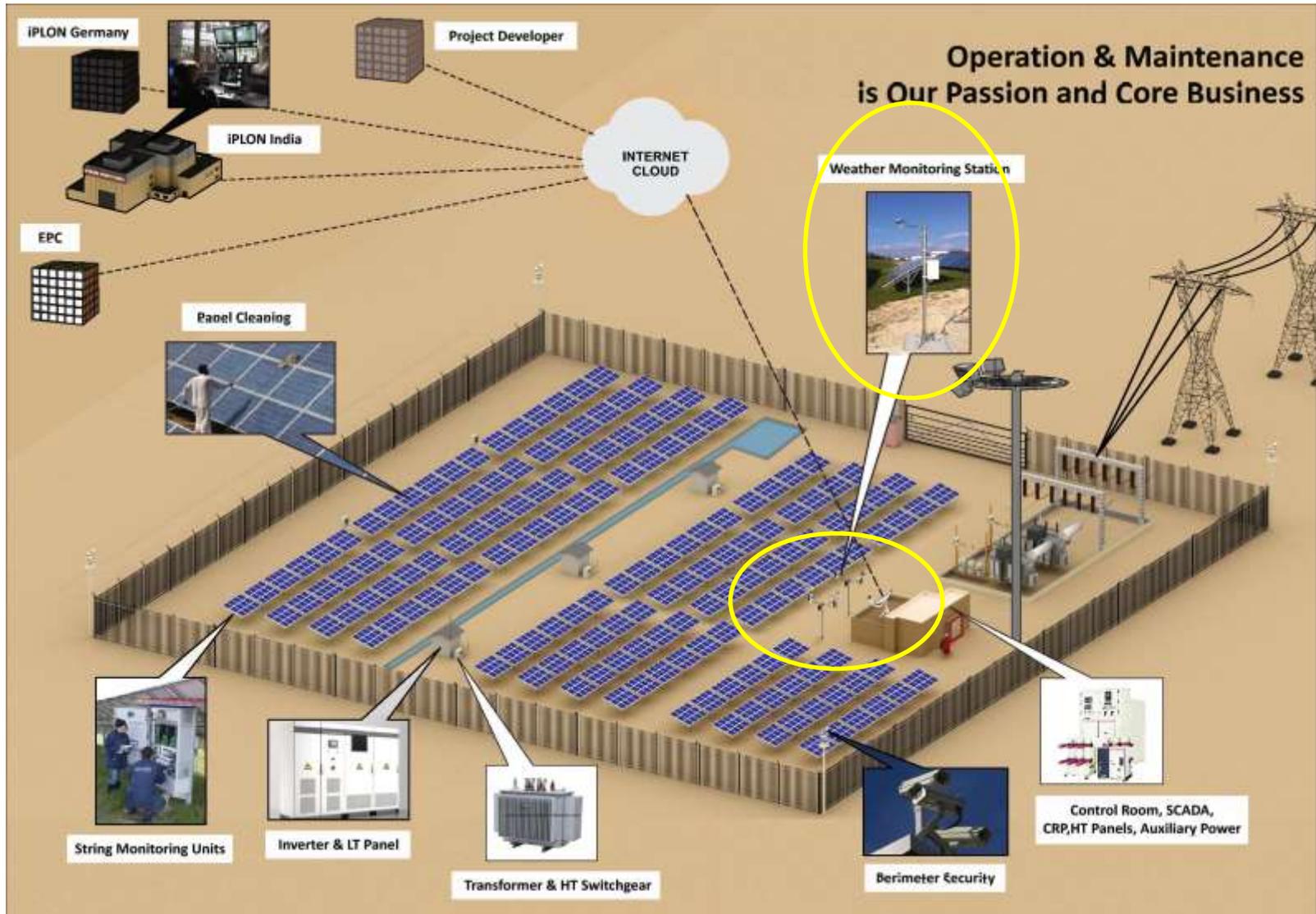


# Lufft Today

- » Headquarter in Fellbach (near Stuttgart)
- » Subsidiaries in USA & China
- » Turnover 2015: 25 Mio. €
- » Employees: 105 (dated 03/2016)



# Scheme of a PV utility



## Former Weather Stations:



# Today: Lufft WS Smart Weather Station

All-in-One

Integrated Sensors

Maintenance-free

One Cable

One Interface



# PV-Monitoring

**NOTE:** the performance of a solar module is decreasing with rising temperature!!!

## most important measurements ...



... to evaluate the performance ratio (PR) of solar devices:

- **global radiation** (horizontal or tilted)
- **air temperature** (ventilated according to WMO standard)
- **module temperature** (rear surface) with external temperature probe WT1
- **wind** (to evaluate cooling effects caused by air flow, storm damages, installations with trackers)

# PV-Monitoring

most important measurements ...

... to evaluate the performance ratio (PR) of solar devices:

- **precipitation** (to evaluate necessary cleaning or snow coverage on the solar modules)
- **lightning detection** (to evaluate possible damages caused by overvoltage)



# PV-Monitoring

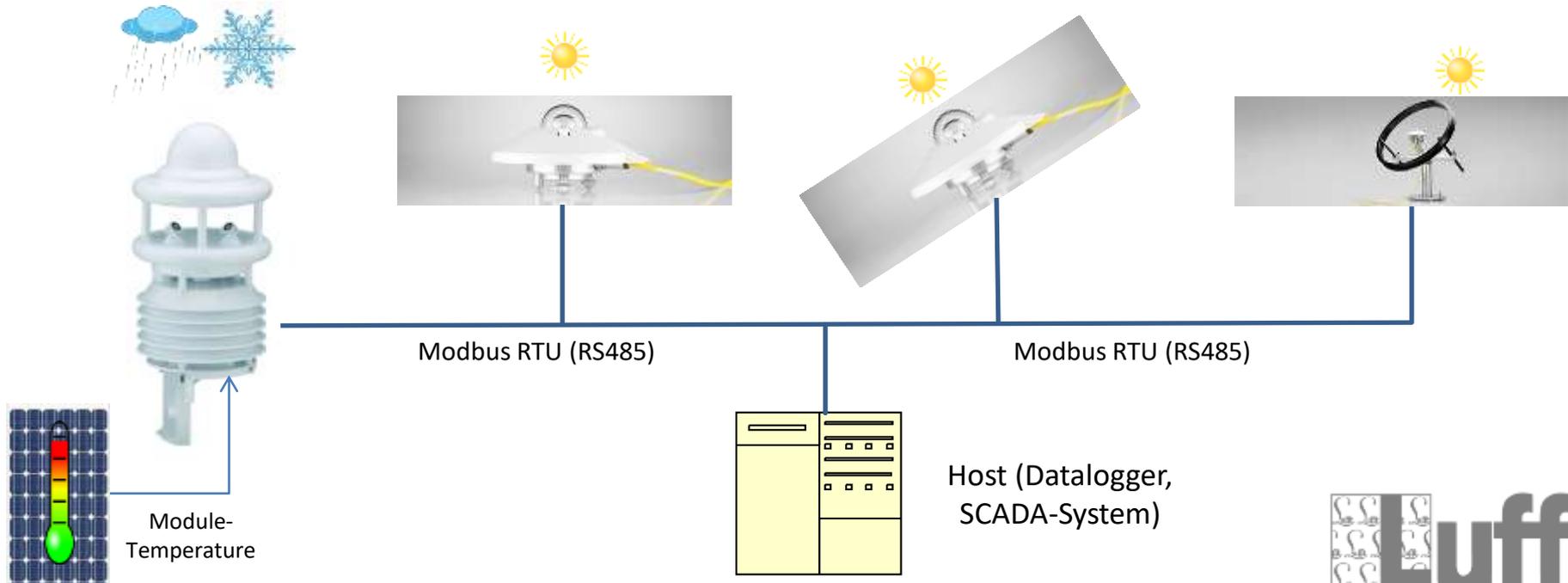
## multiple sensor network using Modbus ...

Meteosensor WS600 with  
rain/snow detection

Global Horizontal  
Irradiance (GHI)

Global Tilted  
Irradiance (GTI),  
Plane of Array (POA)

Diffuse Horizontal  
Irradiance (DHI)



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# references ...



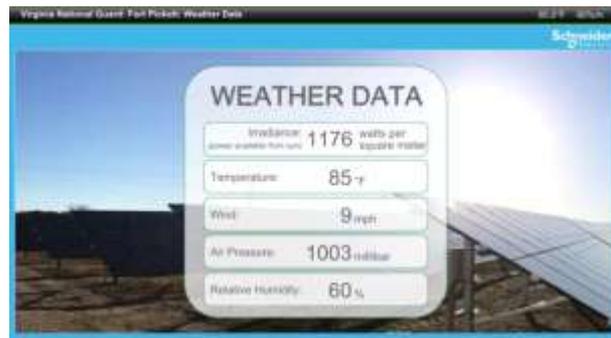
Bayerisches Zentrum für Angewandte Energieforschung

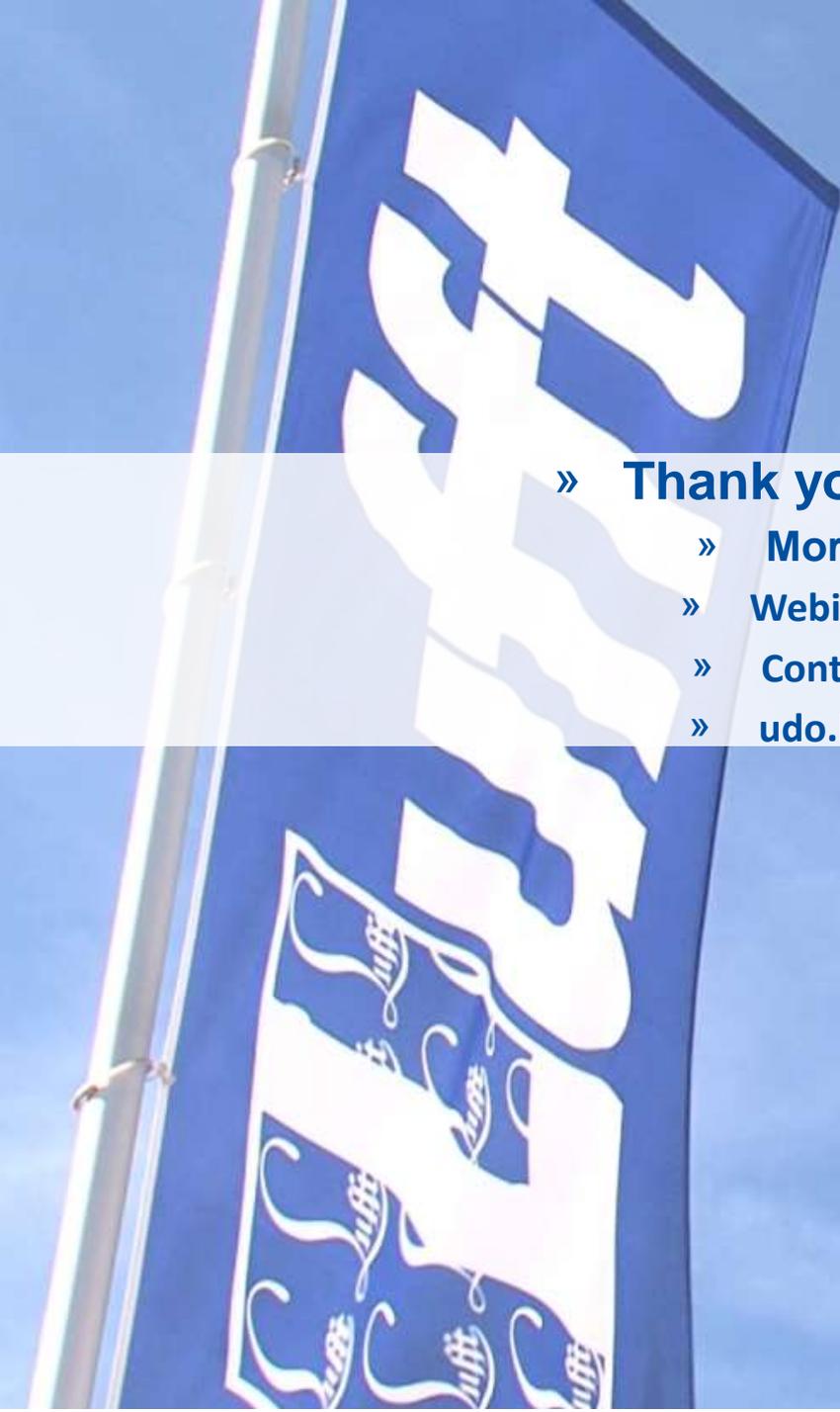




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# on site ...





» **Thank you for your attention!**

- » **More on [www.Lufft.com](http://www.Lufft.com)**
- » **Webinar to be downloaded**
- » **Contact: Udo Kronmueller**
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