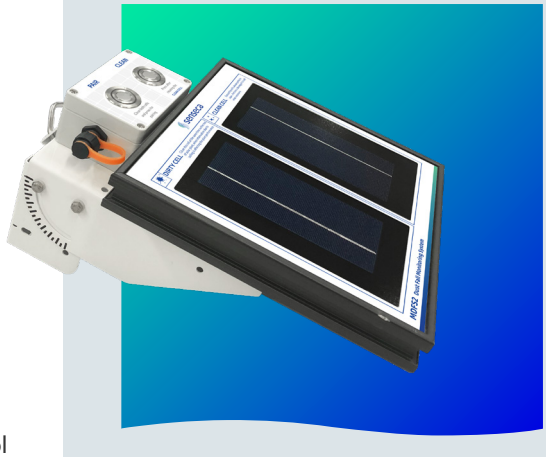
Dust Fall Monitoring System

MDFS2 / MDFS2-S (SMART)



INTRODUCTION

The Dust Fall Monitoring System (MDFS) is designed to help operators decide when the PV panels of a solar plant should be cleaned.

The system compares the radiation collected by two temperature-compensated reference cells, with outputs either in voltage (model MDFS2) or Modbus protocol (model MDFS2-S). One cell (Clean Cell) must always be kept clean, while the other (Dirty Cell) is cleaned at the same time as the PV panels.

The MDFS can be used in two ways:
Basic mode – By manually comparing the Clean and Dirty cell readings, the operator can decide when cleaning is needed. In this mode, the control box is not required.

Advanced mode – With the optional control box, the system automatically calculates the soiling attenuation rate (%) of the PV panels. This value can be used directly to decide if cleaning is necessary, and it also provides confirmation that cleaning and other maintenance tasks have actually been performed.

Data channels:

The MDFS system provides 5 data channels:

CHANNEL	UNIT	DESCRIPTION
Sun elevation	°	Sun elevation angle calculated by the DAS in real time.
Clean Solar Cell Rad.	W/m²	Solar radiation collected by the reference cell labelled as 'Clean Cell'. This cell must be always clean
Dirty Solar Cell Rad.	W/m²	Solar radiation collected by the reference cell labelled as 'Dirty Cell'. This cell must be cleaned at the same time as the PV panels of the solar plant.
MDFS Status	Code	Binary code with 9 flag bits of information including the system diagnosis and cleaning / operation alarms.
Attenuation	%	Percentage of solar radiation loss due to soiling.

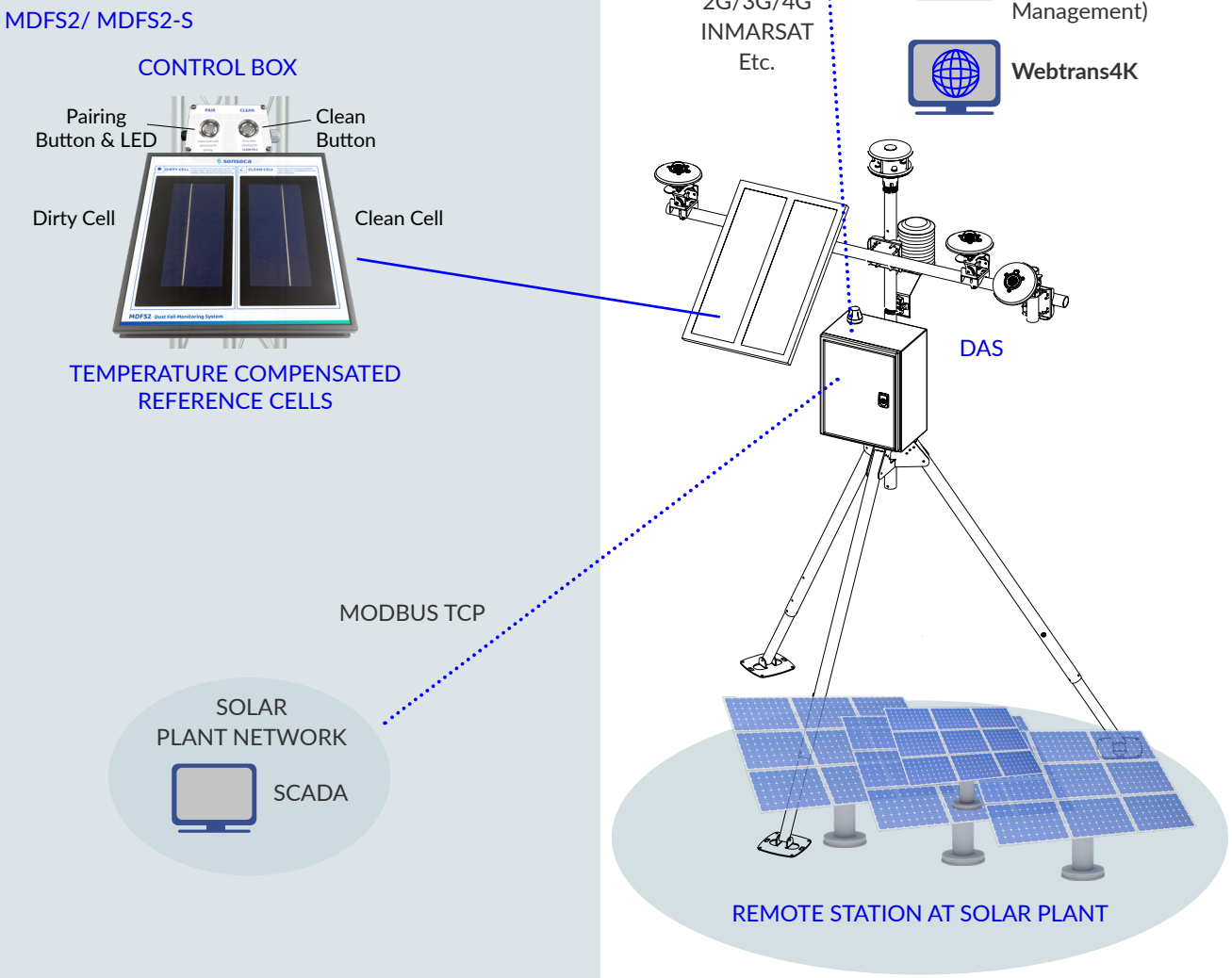
Technical Specifications

	MDFS2	MDFS2-S
Radiation measurement (*)		
Measurement range	0 to 1400 W/m²	
Compensated by temperature	Yes	
Measurement error	±2.1%	±2.2%
Output	65 mV analog signal per output 1000 W/m²	RS485 half-duplex Modbus RTU
(*) Soiling ratio calculated at MTD-4000		
Control Box (**)		
Digital outputs (buttons)	2: Clean warning, Pairing instruction	2: Clean warning, Pairing instruction
(**) Controlled by datalogger model MTD-4000		
General		
Power supply	Not applicable	12 to 33 VDC
Power consumption	Not relevant	Average: 20 mW Maximum: 80 mA
Operating temperature	-20 °C to +60 °C	
Protection	IP-65	

- **DUAL REFERENCE CELLS (CLEAN / DIRTY) FOR DIRECT SOILING COMPARISON**
- **TEMPERATURE-COMPENSATED MEASUREMENTS TO ENSURE STABLE AND RELIABLE VALUES**
- **TWO OUTPUT OPTIONS: VOLTAGE (MDFS2) OR MODBUS (MDFS2-S)**
- **BASIC MODE: MANUAL EVALUATION OF CLEANING NEED FROM CELL READINGS**
- **ADVANCED MODE: AUTOMATIC CALCULATION OF ATTENUATION RATE (%) DUE TO SOILING**
- **SUPPORTS OPTIMISATION OF PV PANEL CLEANING SCHEDULES AND PLANT PERFORMANCE**
- **PROVIDES CONFIRMATION THAT CLEANING AND MAINTENANCE TASKS HAVE ACTUALLY BEEN CARRIED OUT**

MDFS ELEMENTS

The DAS (Data Acquisition System) model METEODATA-4000 collects the solar radiation gathered by the 'Clean Reference Cell' and the 'Dirty Reference Cell' and additional information about tasks performed at the field sensed by the Control Box. All of this information is used to calculate the attenuation due to soiling.

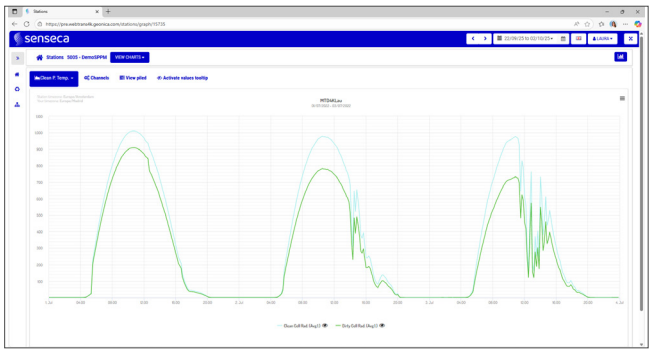


Data Collection

The data collected by the DAS is recorded in an SQL Server installed in a Data Collection Centre where it is accessible to be displayed and exported to Excel files.

Ordering Code

GEO-MDF2	Soiling Measurement System including: calibrated dual cell, control box, 25 m cable and SP-101 mounting support.
GEO-MDF2-S	Soiling Measurement System with Modbus RTU output including: calibrated dual cell, control box, 25 m cable and SP-101 mounting support.



Solar radiation signals from 'clean cell' and 'dirty cell' collected by MDFS (displayed using webtrans-w4k application)

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Senseca Spain, S.A.U
Calle Electrónica 51
28923 Alcorcón - Madrid - Spain
www.senseca.com - info.madrid@senseca.com