



Ordering Guide for Soiling Products

Document Number 880100 Rev. A, June 2023



www.atonometrics.com

Copyright © 2023 Atonometrics, Inc. All rights reserved.

1 Table of Contents

1	Table of Contents.....	2	5.2	Bifacial Systems.....	10
2	Overview.....	2	6	Module-Cell-Optical	12
3	Soiling Measurement Product Overview.....	3	6.1	Monofacial Systems	12
4	Module-Module	4	6.2	Bifacial Systems.....	14
	4.1 Dual Module	4	7	Cell-Cell.....	16
	4.2 Three or More Modules.....	6	8	Optical	18
5	Module-Cell.....	8			
	5.1 Monofacial Systems.....	8			

2 Overview

This document will guide you through the available configuration and ordering options for soiling measurements using Atonometrics products. Each configuration has different advantages with respect to maintenance requirements, data quality, and cost.

Maintenance requirements are dependent on what you choose for your clean reference device. You may select from washing a module, washing a reference cell, or no washing at all.

Data quality is a crucial factor to consider when selecting a system. Non-uniform soiling and rear-side irradiance are the primary factors that affect data quality in these systems.

Non-uniform soiling, or soiling concentrated on one area of a PV module, can often cause greater power loss than if the same particles were spread evenly across the module. Using a module as your soiled reference device accounts for this phenomenon, but using a cell does not.

Several factors can affect rear-side irradiance. Variance in rear-side irradiance from one location to another can lead to measurement uncertainty in your clean reference device. RC22 serves as a point measurement whereas RDE300i captures total effective irradiance.

To learn more about our soiling measurement configurations, and soiling applications, visit our Applications Page on our website at <https://www.atonometrics.com/applications/>.

3 Soiling Measurement Product Overview

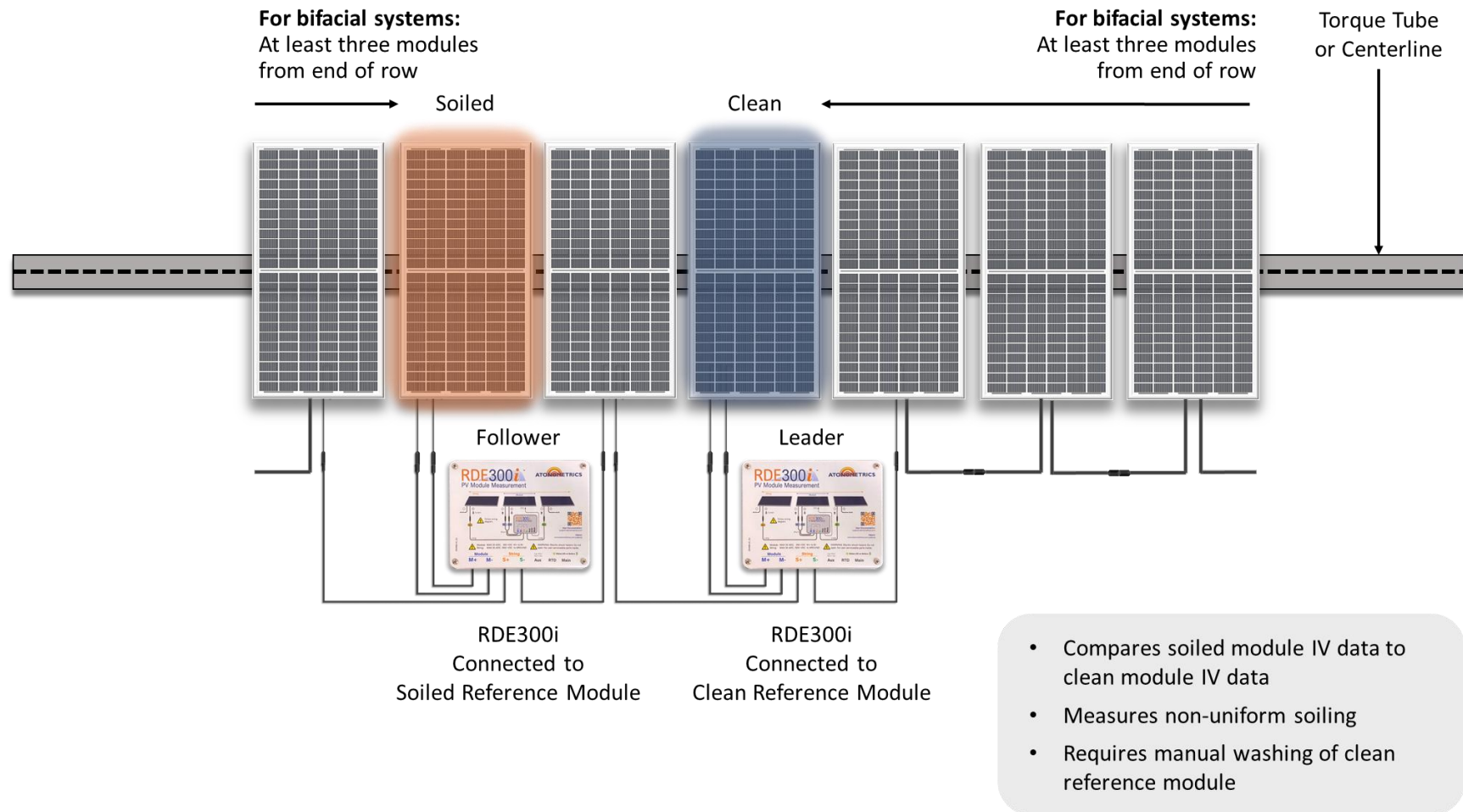
System Description					Washing Required?	Measures Non- Uniform Soiling?	
Module-Module: compares soiled module power to manually-cleaned module		RDE300i Soiled		RDE300i Clean	Yes, Module	Yes	
*Module-Cell: compares soiled module power to clean cell		RDE300i Soiled		RC22 Clean	Yes, Cell	Yes	
*Module-Cell-Optical: compares soiled module power to soiling-corrected cell		RDE300i Soiled		Mars Soiled	RC22 Soiled	No	Yes
Cell-Cell: compares soiled cell to clean cell		RC22 Soiled		RC22 Clean	Yes, Cell	No	
Optical: measures dust on collection window		Mars Soiled			No	No	

***For bifacial systems, add two RC22s to your system for rear-side irradiance measurement**

4 Module-Module

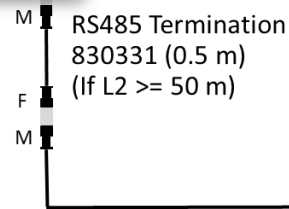
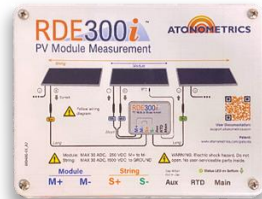
4.1 Dual Module

System Layout



Cabling Diagram

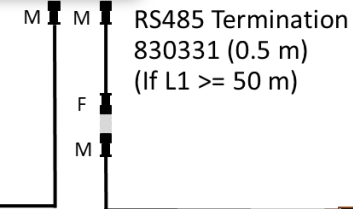
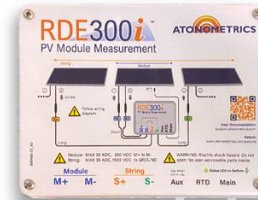
RDE300i Follower
810275- ("V2")
-01 (Inline)
-02 (Standalone)



Power and Comm
830284- ("L2")
-100 (100 m)
-050 (50 m)
-025 (25 m)
-010 (10 m)
-004 (4 m)
-002 (2 m)
-001 (1 m)

System Part Number: 910315
Select Configurable Parts V1, V2, L1, L2
Recommended: V1, V2, L1, L2 = 01, 01, 025, 010

RDE300i Leader
810275- ("V1")
-01 (Inline)
-02 (Standalone)



To Pigtail Wires
830303- ("L1")
-100 (100 m) @ 24-30 VDC
-050 (50 m)
-025 (25 m) @ 12-30 VDC
-010 (10 m)
-004 (4 m)
-002 (2 m)
-001 (1 m)

Voltage:
See Cable Length
Spec L1

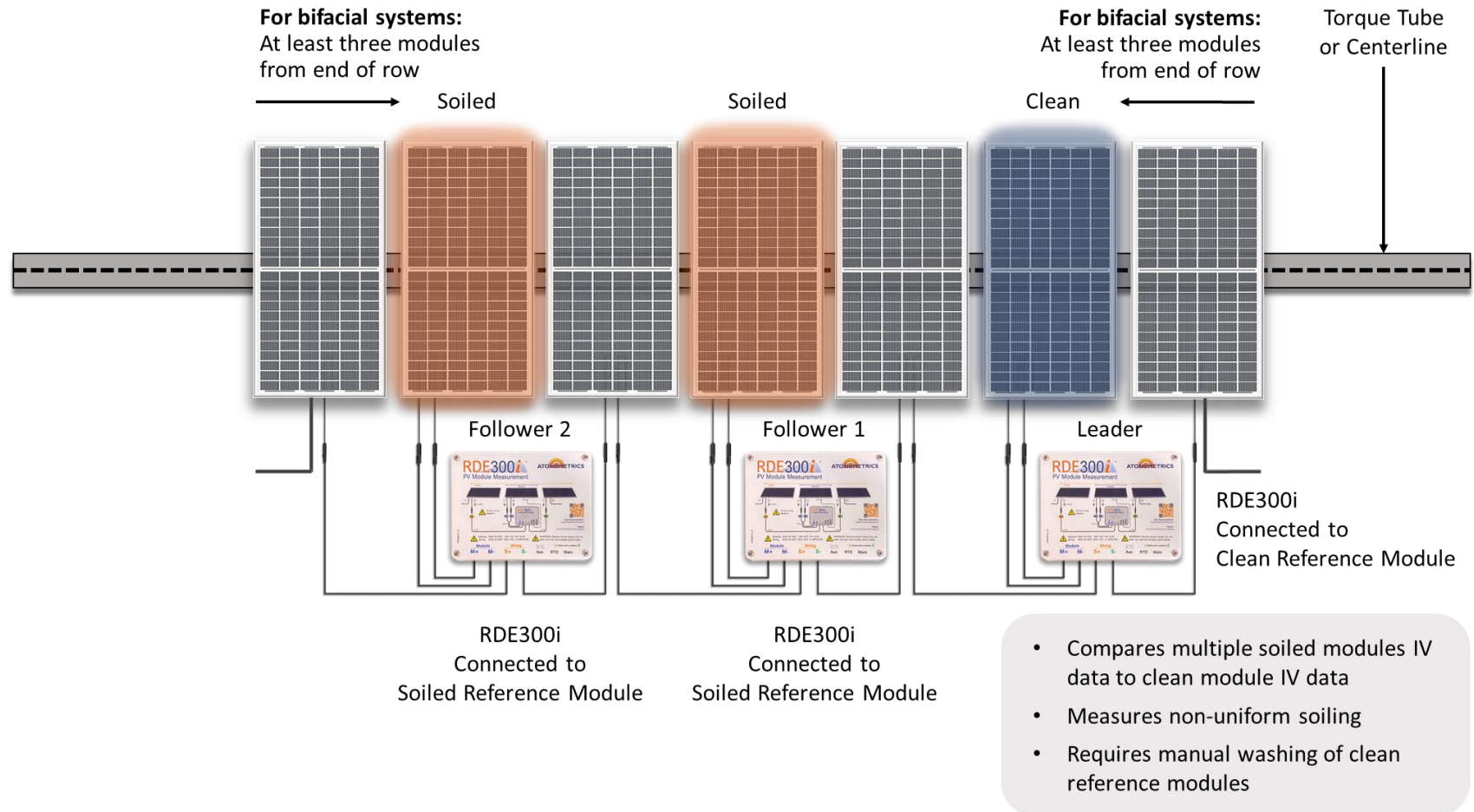
Steady State Power:
2.5 +/- 0.2 W

Use 2X Power
Supply for Inrush
and Transients

Comm (RS485):
1 Brown V+
2 White RS485B
4 Black V-
5 Gray RS485A

4.2 Three or More Modules

System Layout

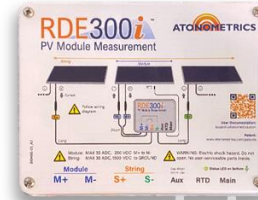
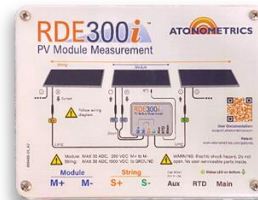
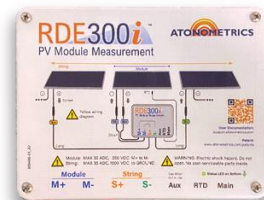


Cable Diagram

RDE300i Follower
810275- ("V3")
-01 (Inline)
-02 (Standalone)

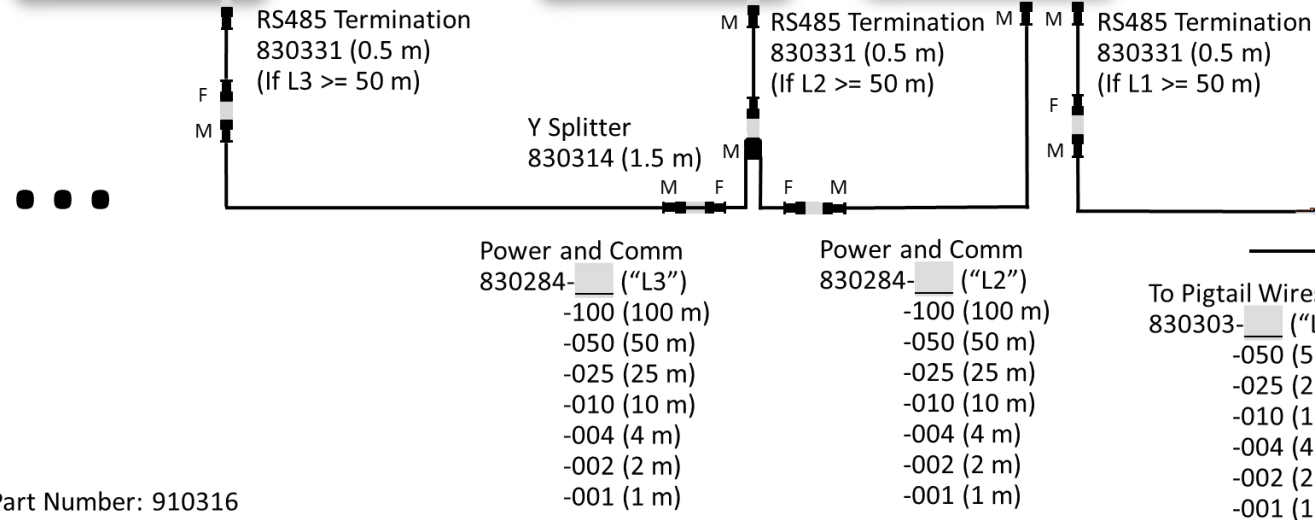
RDE300i Follower
810275- ("V2")
-01 (Inline)
-02 (Standalone)

RDE300i Leader
810275- ("V1")
-01 (Inline)
-02 (Standalone)



Voltage:
See Cable Length
Spec L1

Steady State Power:
3.8 +/- 0.3 W



Use 2X Power
Supply for Inrush
and Transients

Comm (RS485)
1 Brown V+
2 White RS485B
4 Black V-
5 Gray RS485A

System Part Number: 910316

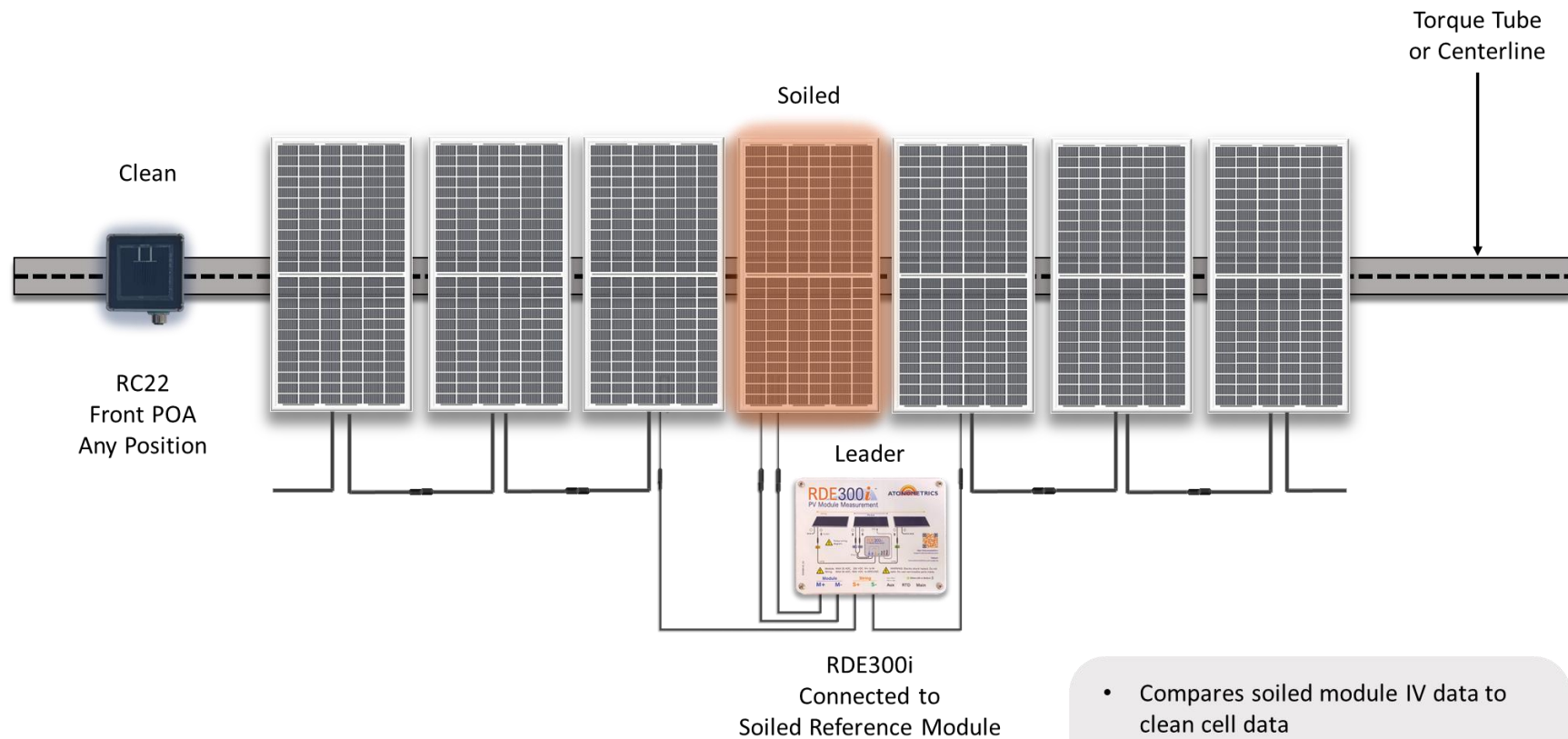
Select Configurable Parts V1, V2, V3, L1, L2, L3

Recommended: V1, V2, V3, L1, L2, L3 = 01, 01, 01, 025, 010, 100

5 Module-Cell

5.1 Monofacial Systems

System Layout



- Compares soiled module IV data to clean cell data
- Measures non-uniform soiling
- Requires washing of clean reference cell

Cable Diagram

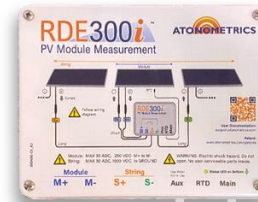
RC22
Front
810290-01



M
F
M

RS485 Termination
830331 (0.5 m)
(If L2 >= 50 m)

RDE300i Leader
810275- ("V1")
-01 (Inline)
-02 (Standalone)



M
F
M

RS485 Termination
830331 (0.5 m)
(If L1 >= 50 m)

Voltage:
See Cable Length
Spec L1

Steady State Power:
1.7 +/- 0.2 W

Use 2X Power
Supply for Inrush
and Transients

Comm (RS485)
1 Brown V+
2 White RS485B
4 Black V-
5 Gray RS485A

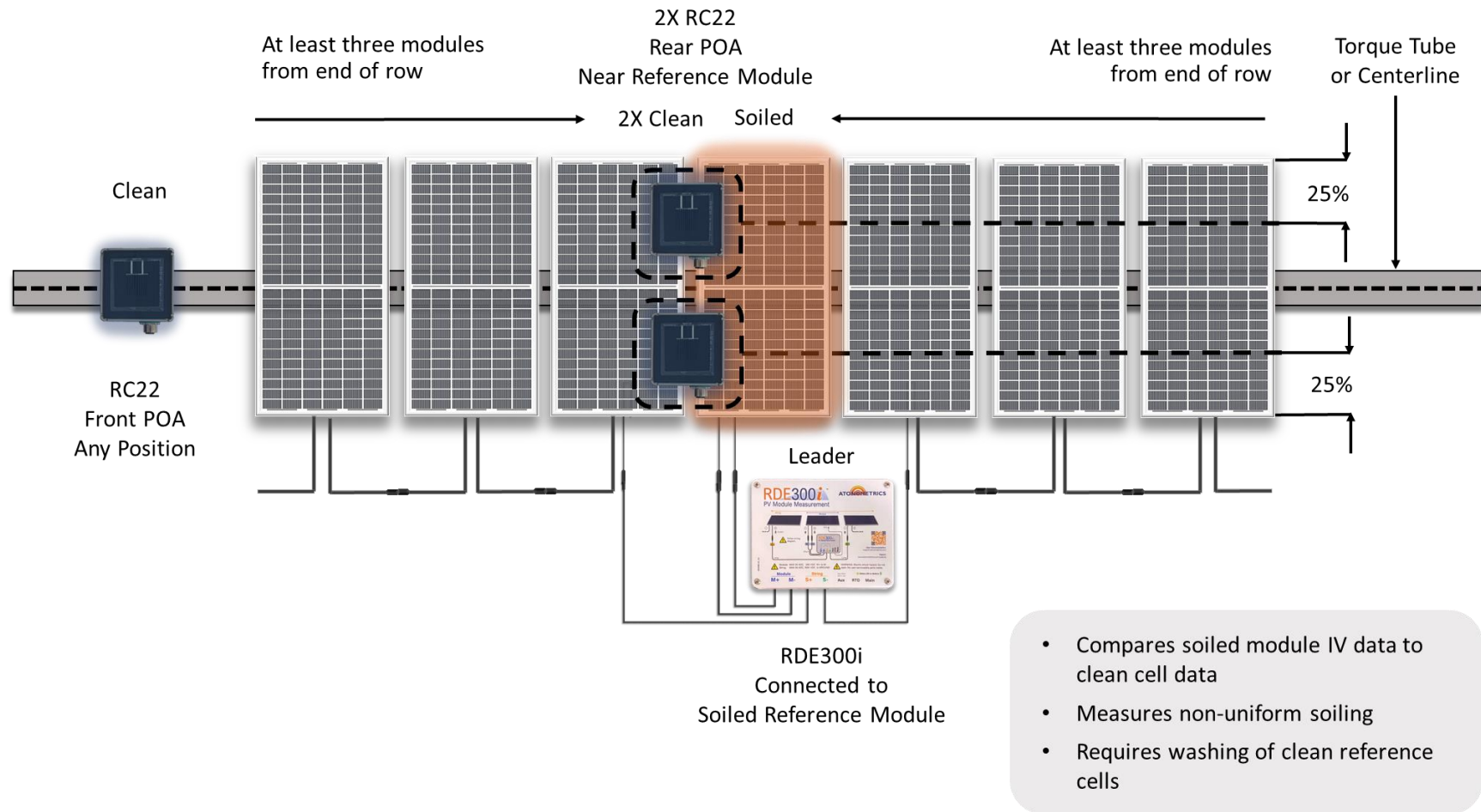
Power and Comm
830284- ("L2")
-100 (100 m)
-050 (50 m)
-025 (25 m)
-010 (10 m)
-004 (4 m)
-002 (2 m)
-001 (1 m)

→ To Pigtail Wires
830303- ("L1")
-100 (100 m) @ 24-30 VDC
-050 (50 m)
-025 (25 m) @ 12-30 VDC
-010 (10 m)
-004 (4 m)
-002 (2 m)
-001 (1 m)

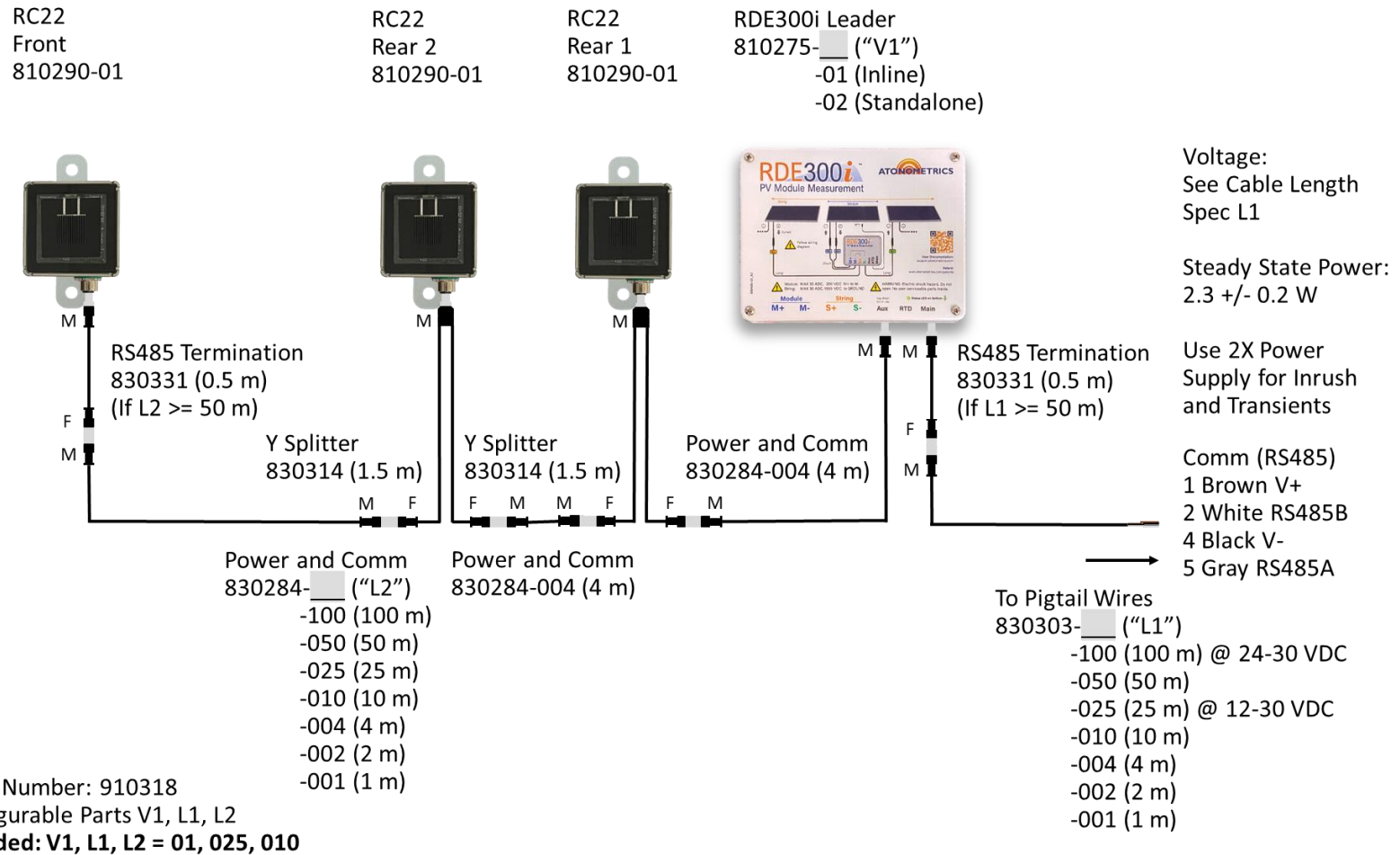
System Part Number: 910317
Select Configurable Parts V1, L1, L2
Recommended: V1, L1, L2 = 01, 025, 010

5.2 Bifacial Systems

System Layout



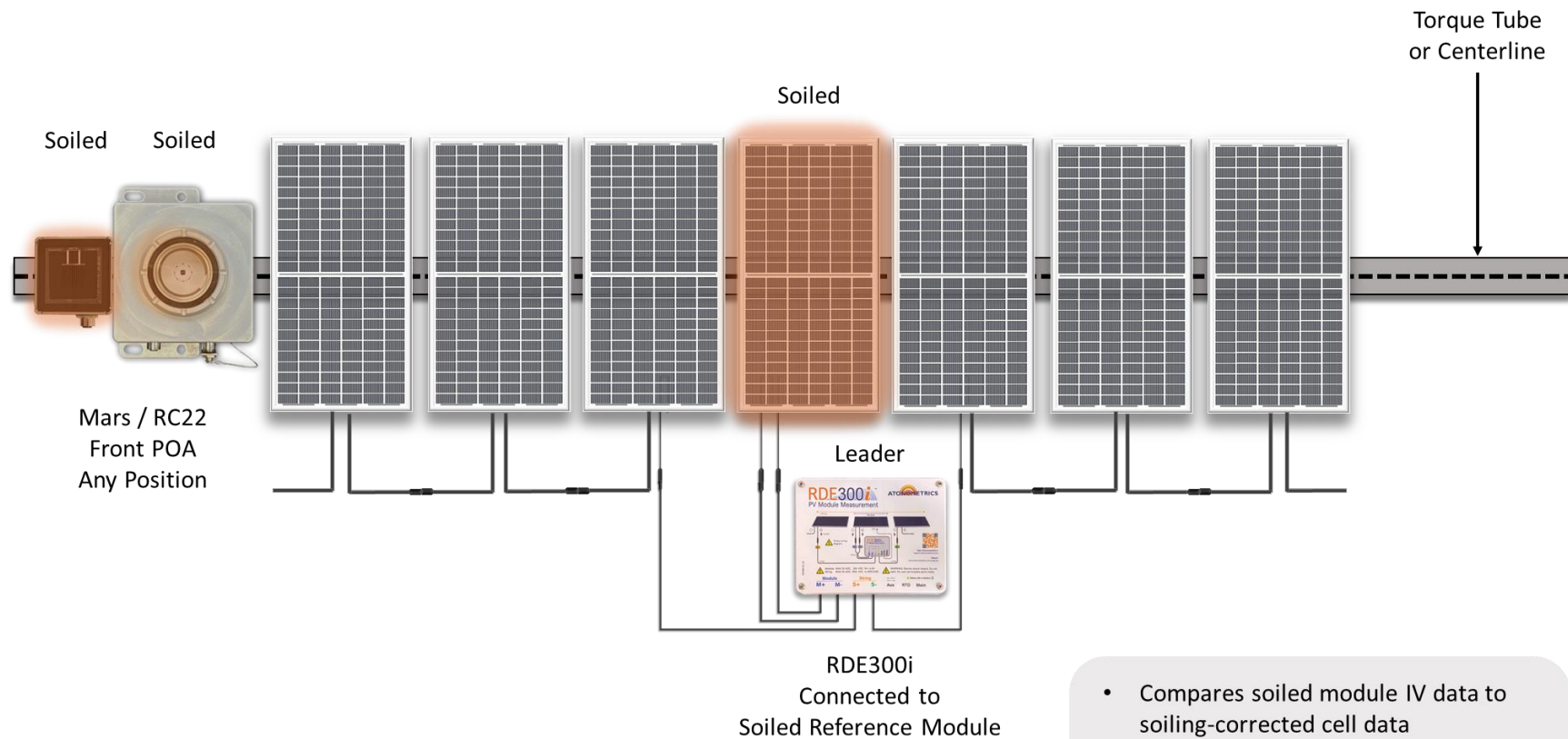
Cable Diagram



6 Module-Cell-Optical

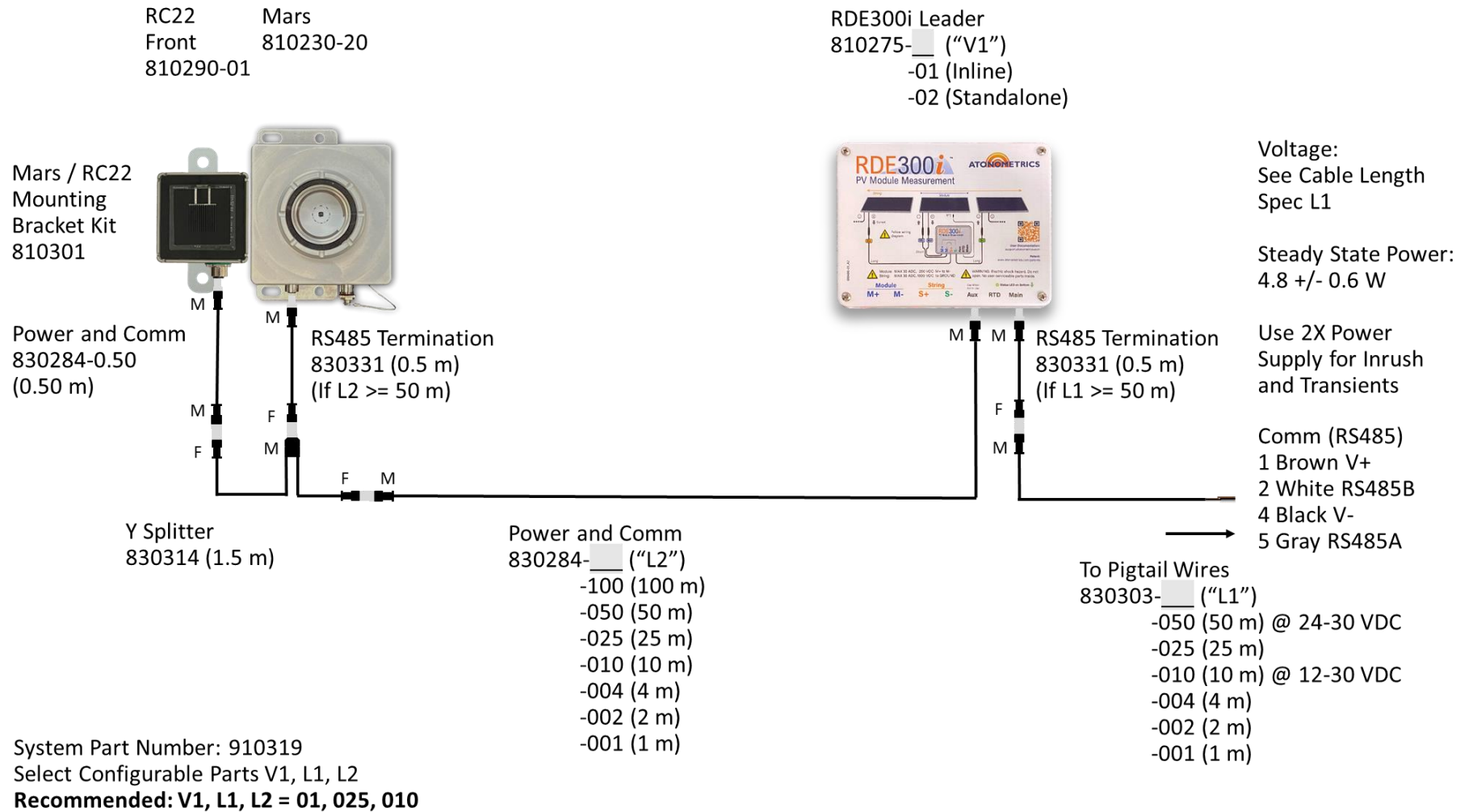
6.1 Monofacial Systems

System Layout



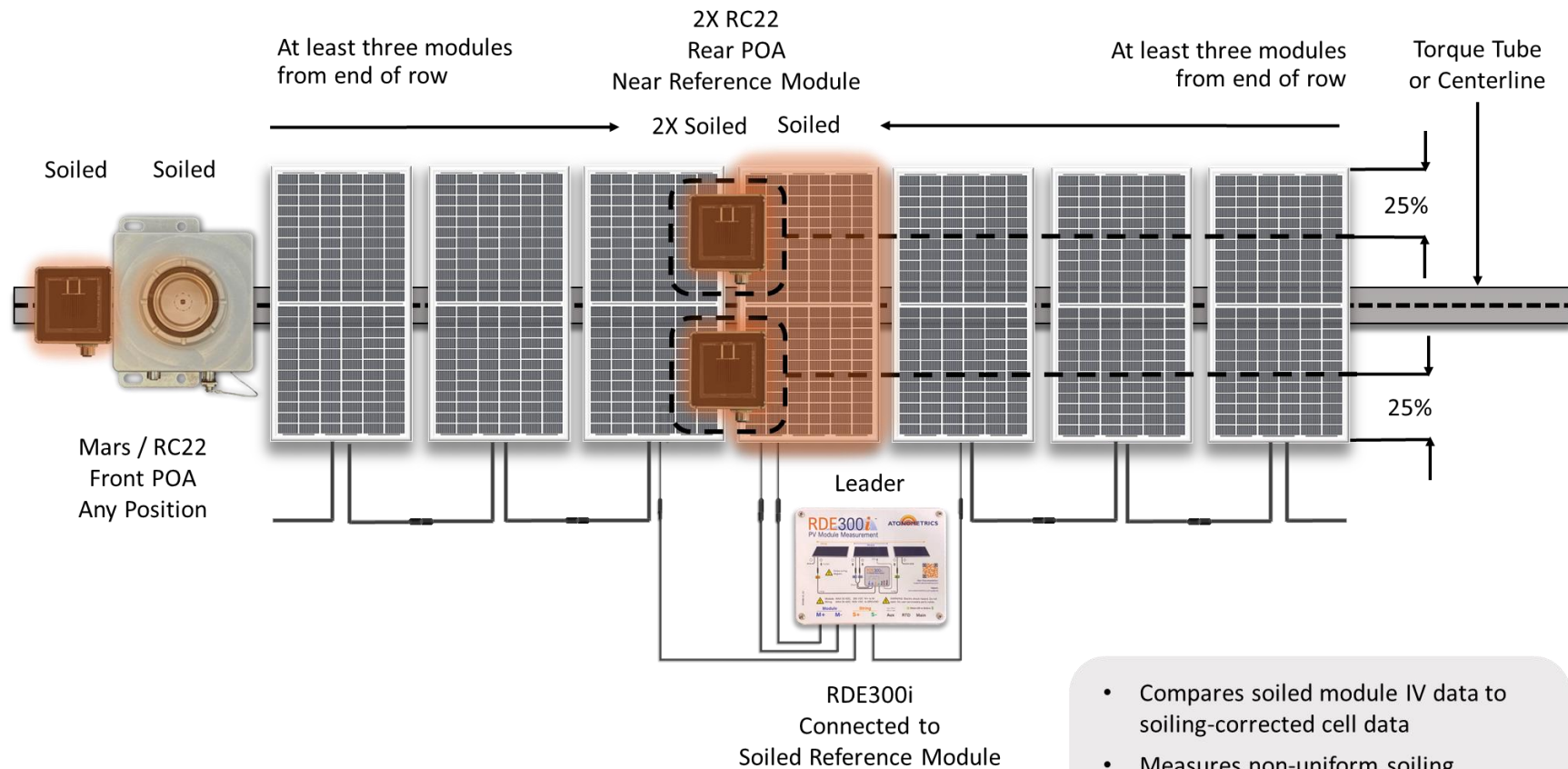
- Compares soiled module IV data to soiling-corrected cell data
- Measures non-uniform soiling
- Recommended manual washing of Mars and cell every 6 months

Cable Diagram



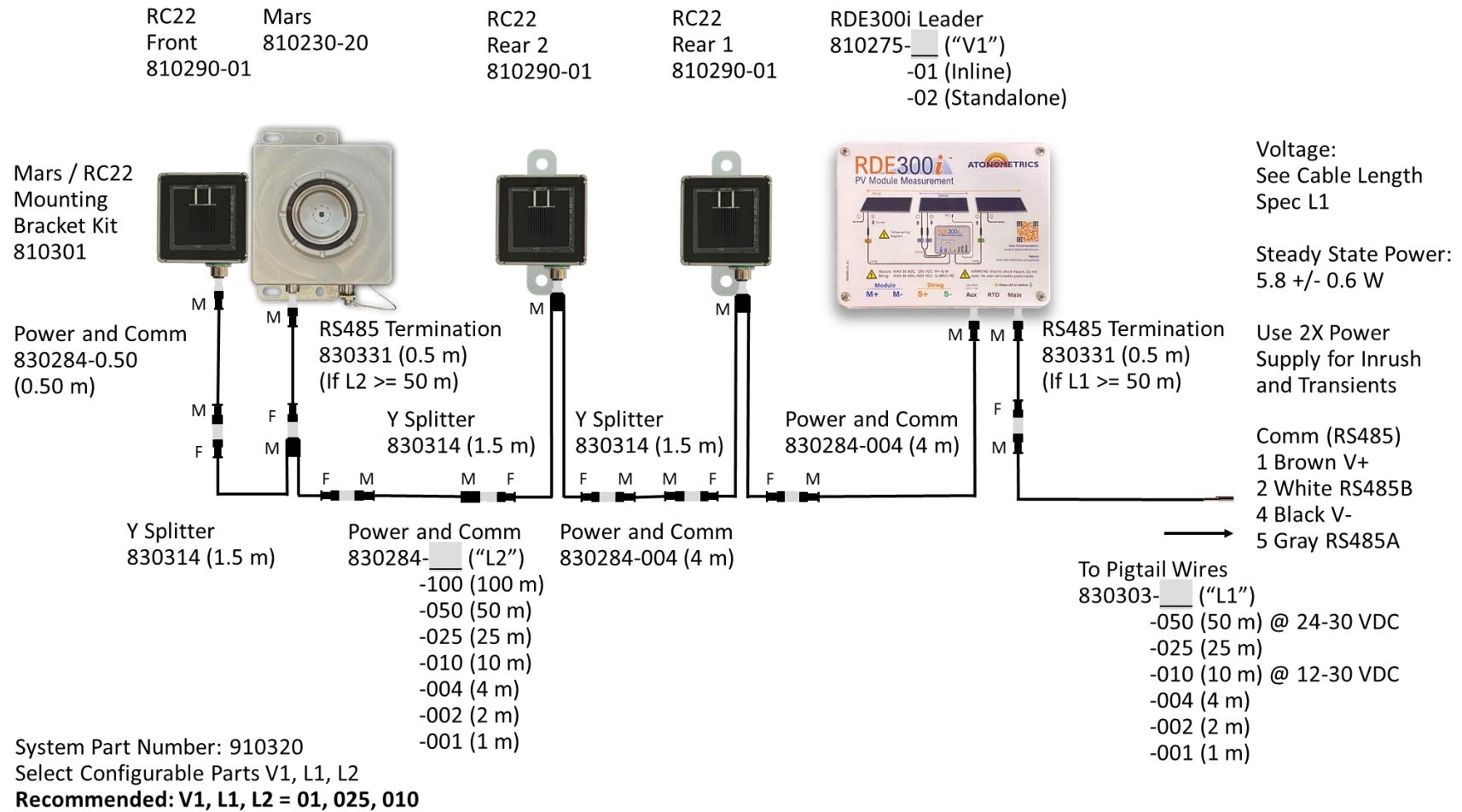
6.2 Bifacial Systems

System Layout



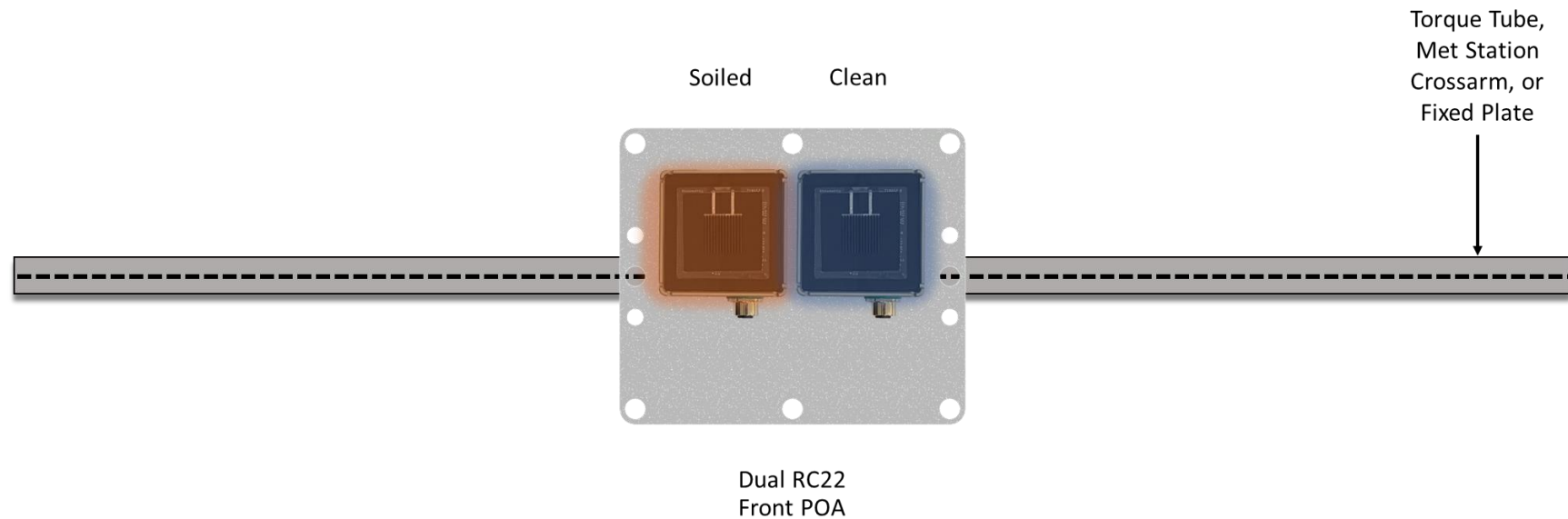
- Compares soiled module IV data to soiling-corrected cell data
- Measures non-uniform soiling
- Recommended manual washing of Mars and cells every 6 months

Cable Diagram



7 Cell-Cell

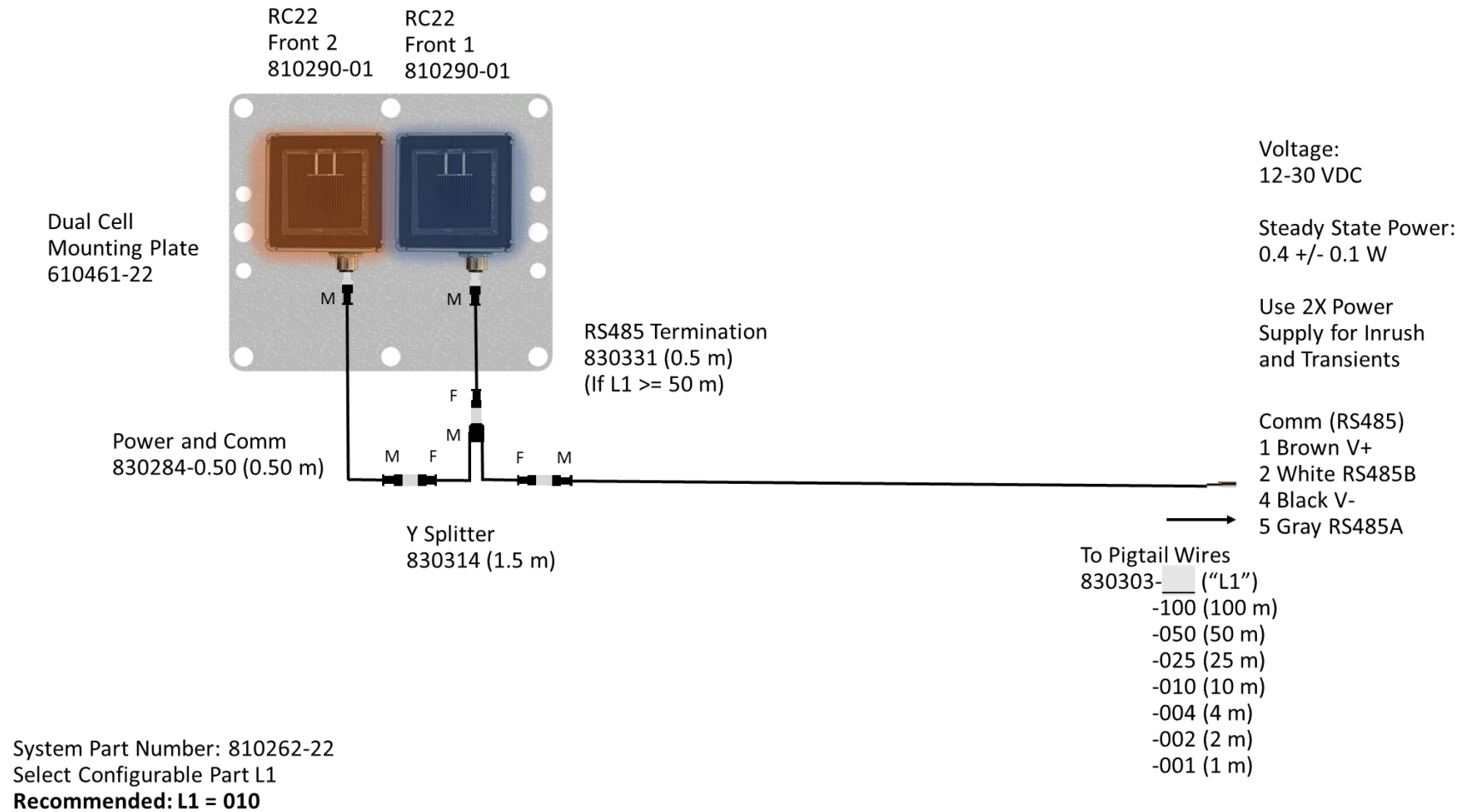
System Layout



NOTE: Calculate soiling ratio externally in SCADA system or datalogger

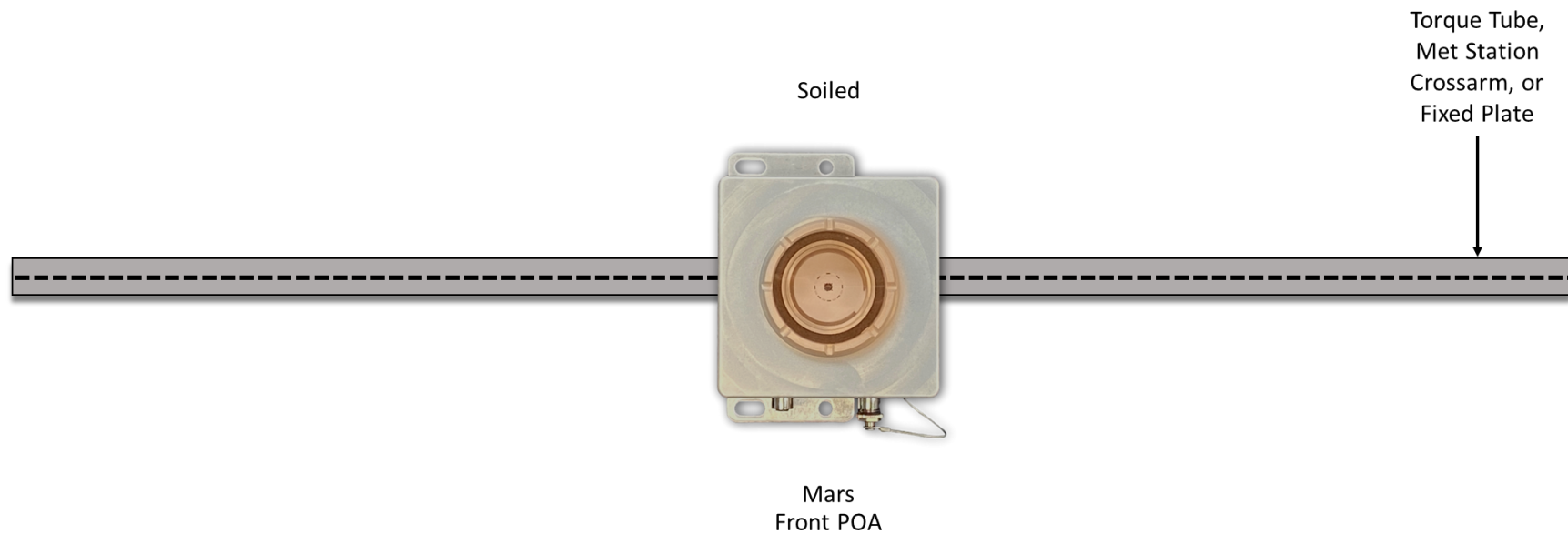
- Compares soiled cell irradiance data to clean cell irradiance data
- Requires washing of clean reference cell

Cable Diagram



8 Optical

System Layout



- Measures dust on collection window
- Requires no washing
- No local calibration required

Cable Diagram

Mars
Front
810230-20



M
F
M

RS485 Termination
830331 (0.5 m)
(If L1 $\geq$ 50 m)

Voltage:
See Cable Length
Spec L1

Steady State Power:
3.0 +/- 0.4 W

Use 2X Power
Supply for Inrush
and Transients

Comm (RS485)
1 Brown V+
2 White RS485B
4 Black V-
5 Gray RS485A

→
To Pigtail Wires
830303- ("L1")
-100 (100 m) @ 24-30 VDC
-050 (50 m)
-025 (25 m)
-010 (10 m) @ 12-30 VDC
-004 (4 m)
-002 (2 m)
-001 (1 m)

System Part Number: 810230-20
Select Configurable Part L1
Recommended: L1 = 010