Ordering Guide for Soiling Products

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ATONOMETRICS

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1 Table of Contents

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/.

For an interactive and simplified version of this document, visit our Soiling Measurement Product Configurator Page on our website at https://www.atonometrics.com/applications/soiling-measurement-product-configurator/

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		RC22 Soiled  Mars Soiled	No	Yes

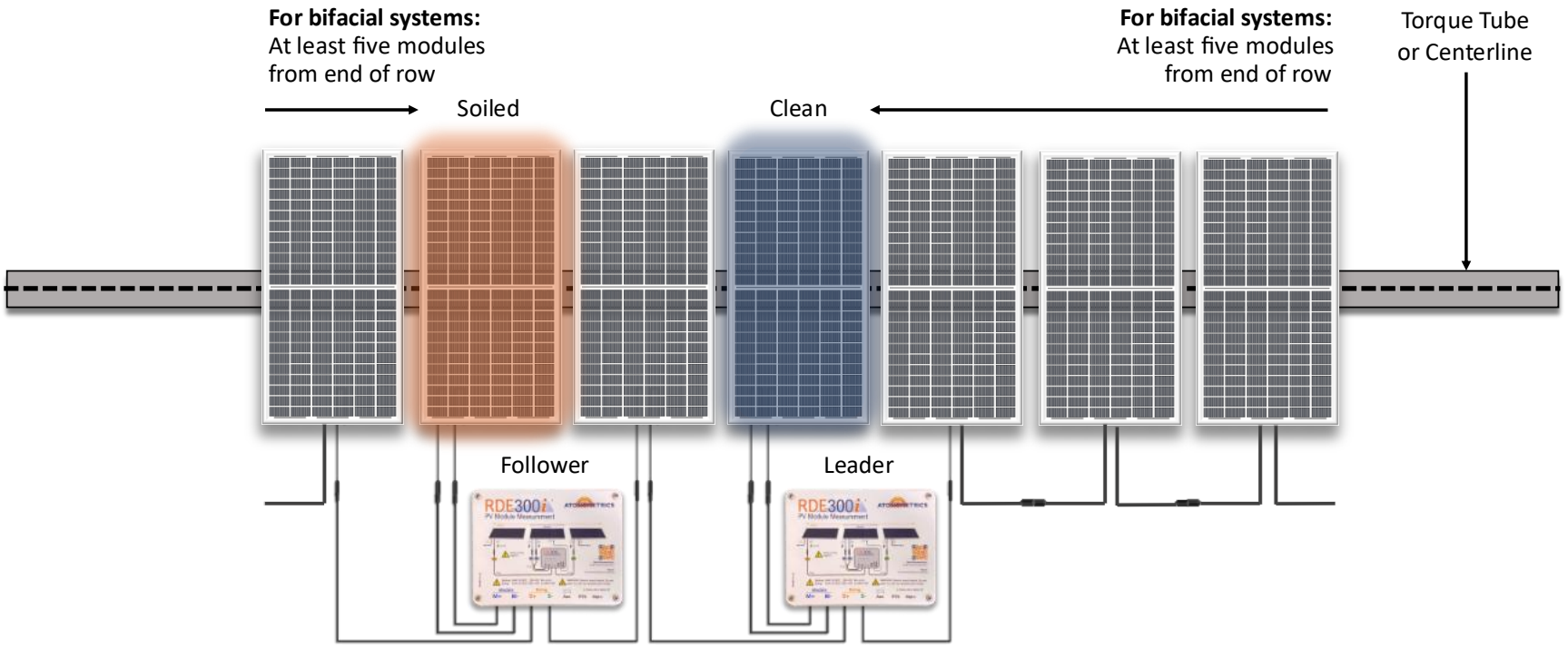
Cell-Cell: compares soiled cell to clean cell		RC22 Soiled		RC22 Clean		Yes, Cell	No
Optical: measures dust on collection window		Mars Soiled				No	No
Cell-Cell-Washer: compares soiled cell to automatically washed clean cell		RC22 Soiled		RC22 Clean	Washer 	No	No
***Module-Cell-Washer:** compares soiled module power to automatically washed clean cell		RDE300i Soiled		RC22 Clean	Washer 	No	Yes

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

4 Module-Module

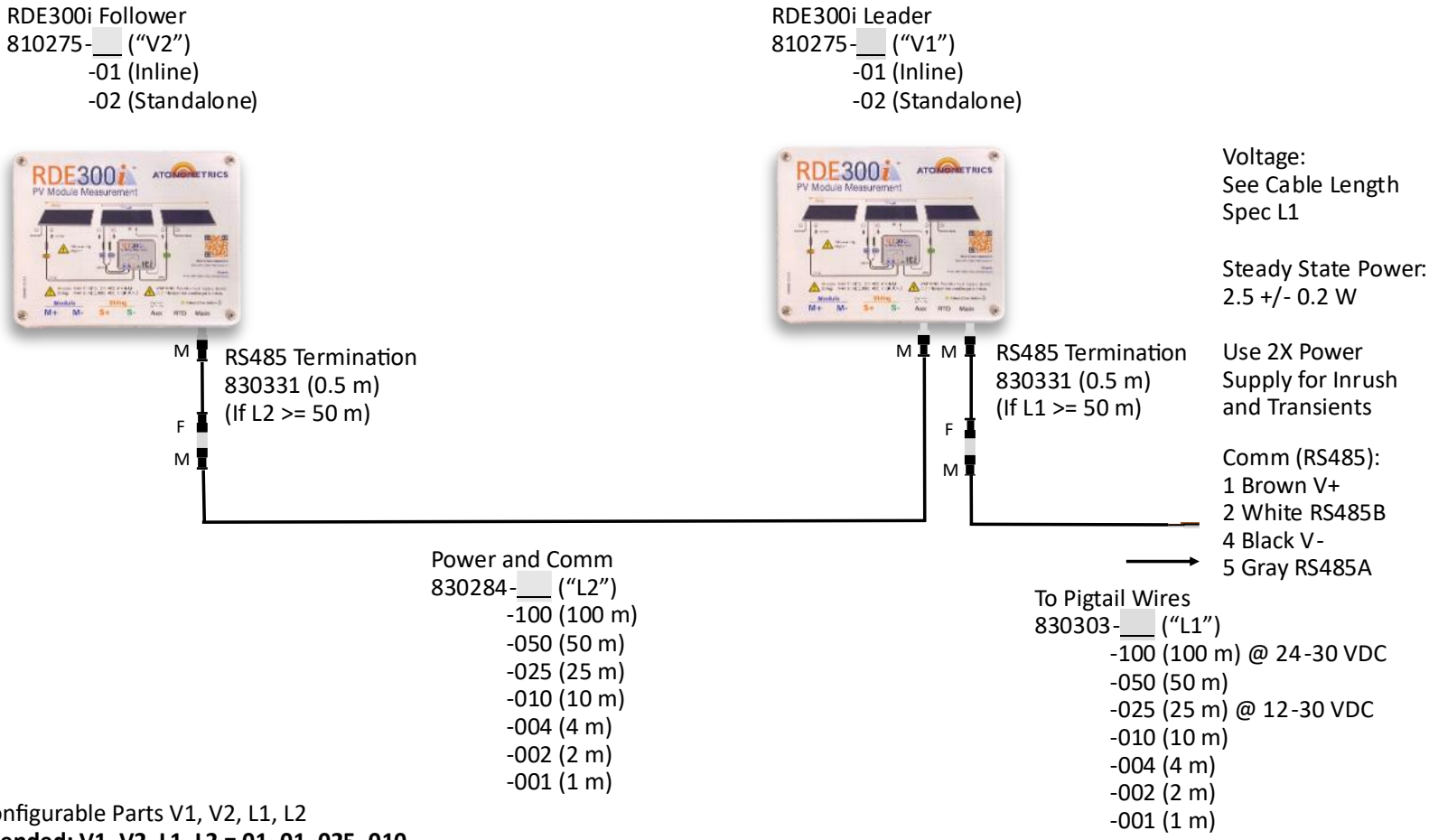
4.1 Dual Module

System Layout



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

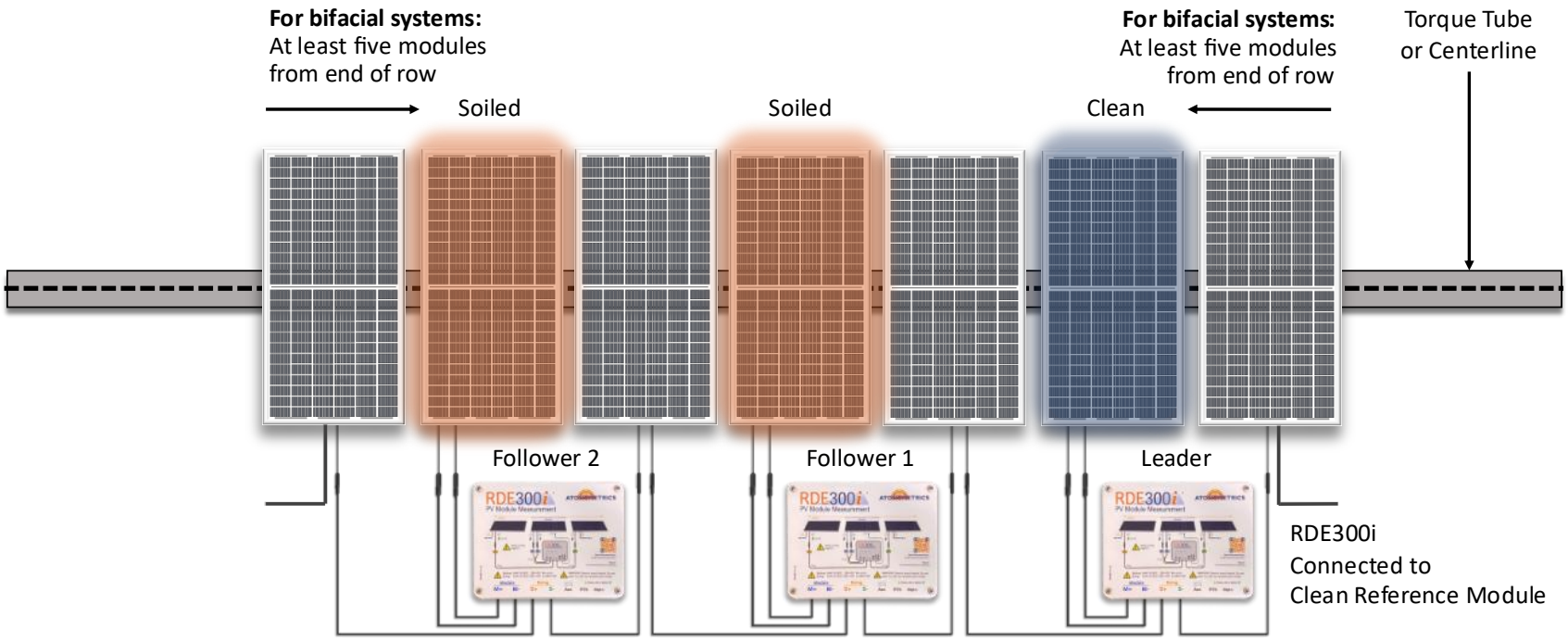
Cabling Diagram



Select Configurable Parts V1, V2, L1, L2
Recommended: V1, V2, L1, L2 = 01, 01, 025, 010

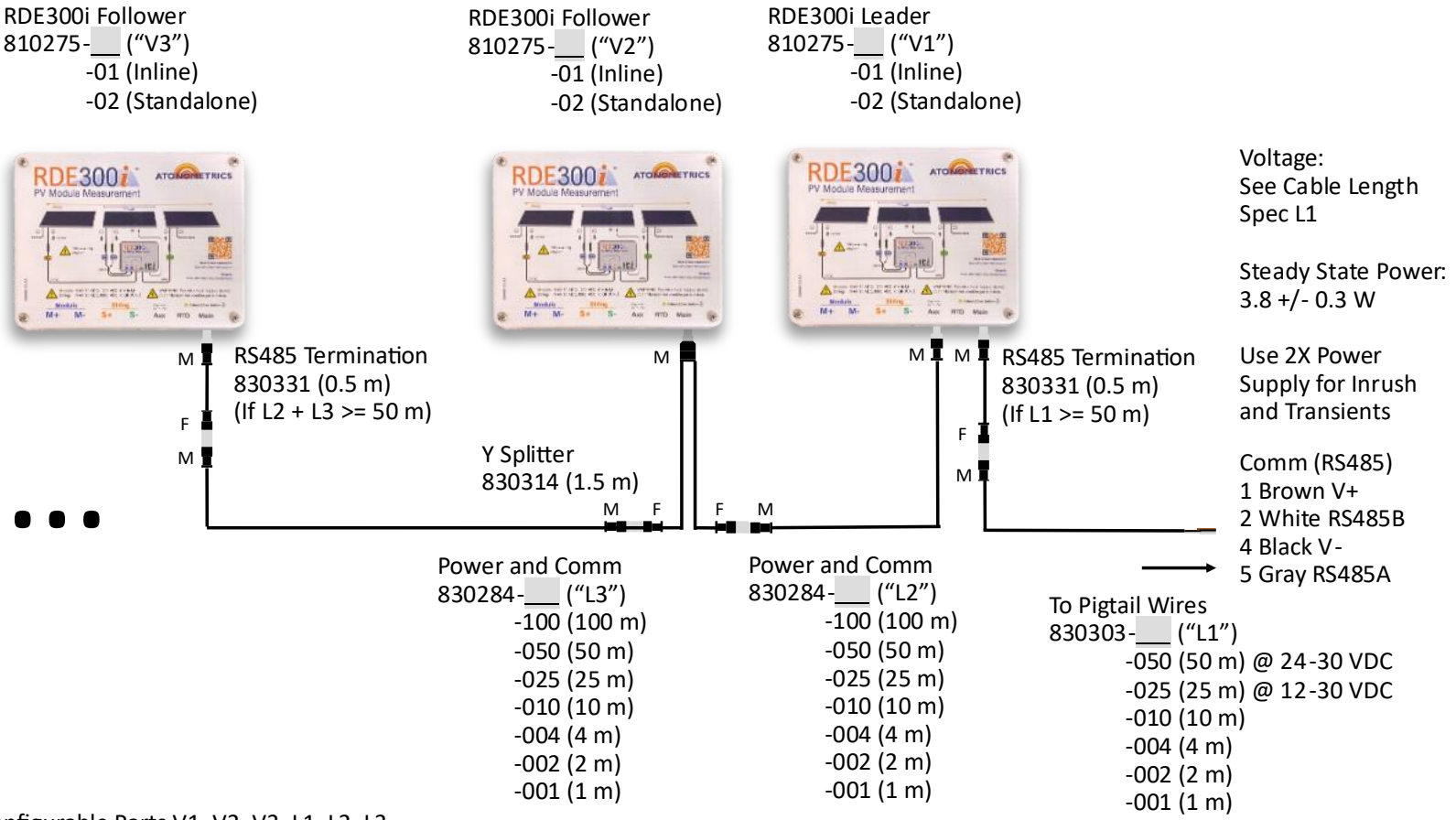
4.2 Three or More Modules

System Layout



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

Cable Diagram

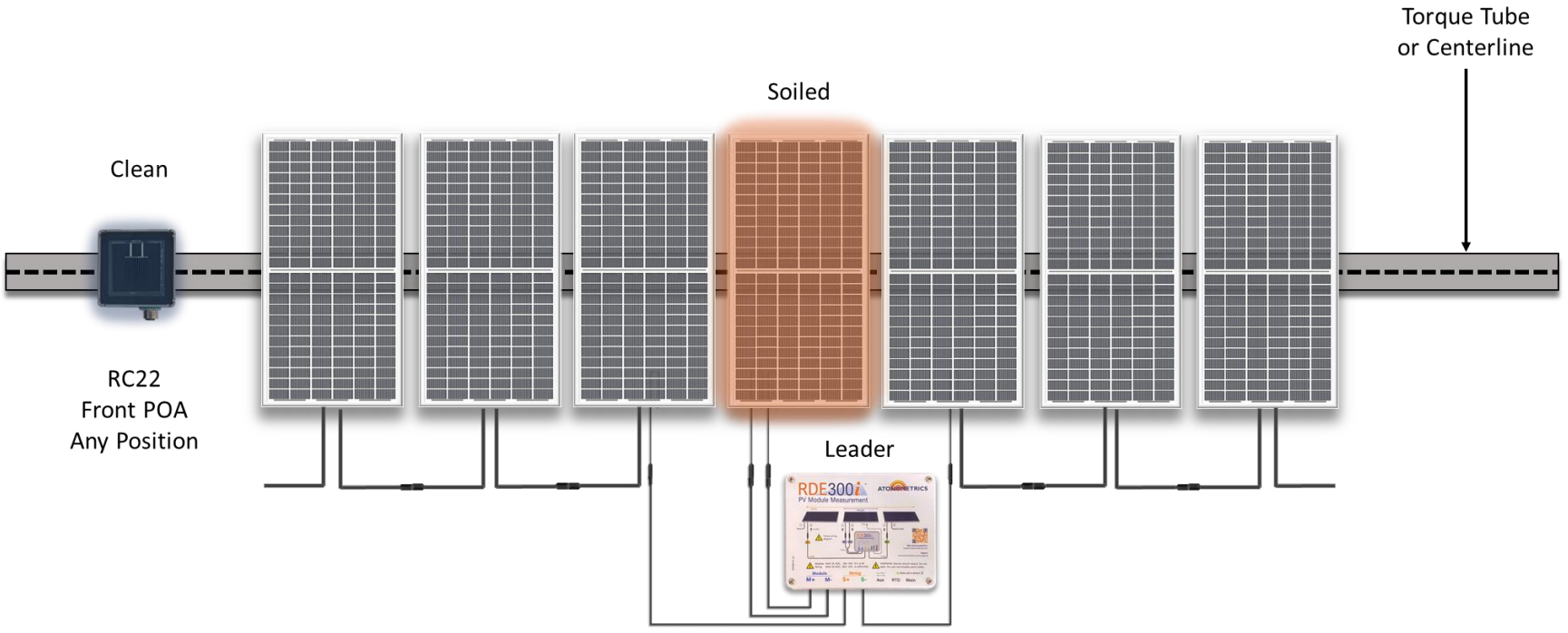


Select Configurable Parts V1, V2, V3, L1, L2, L3
Recommended: V1, V2, V3, L1, L2, L3 = 01, 01, 01, 025, 010, 100

5 Module-Cell

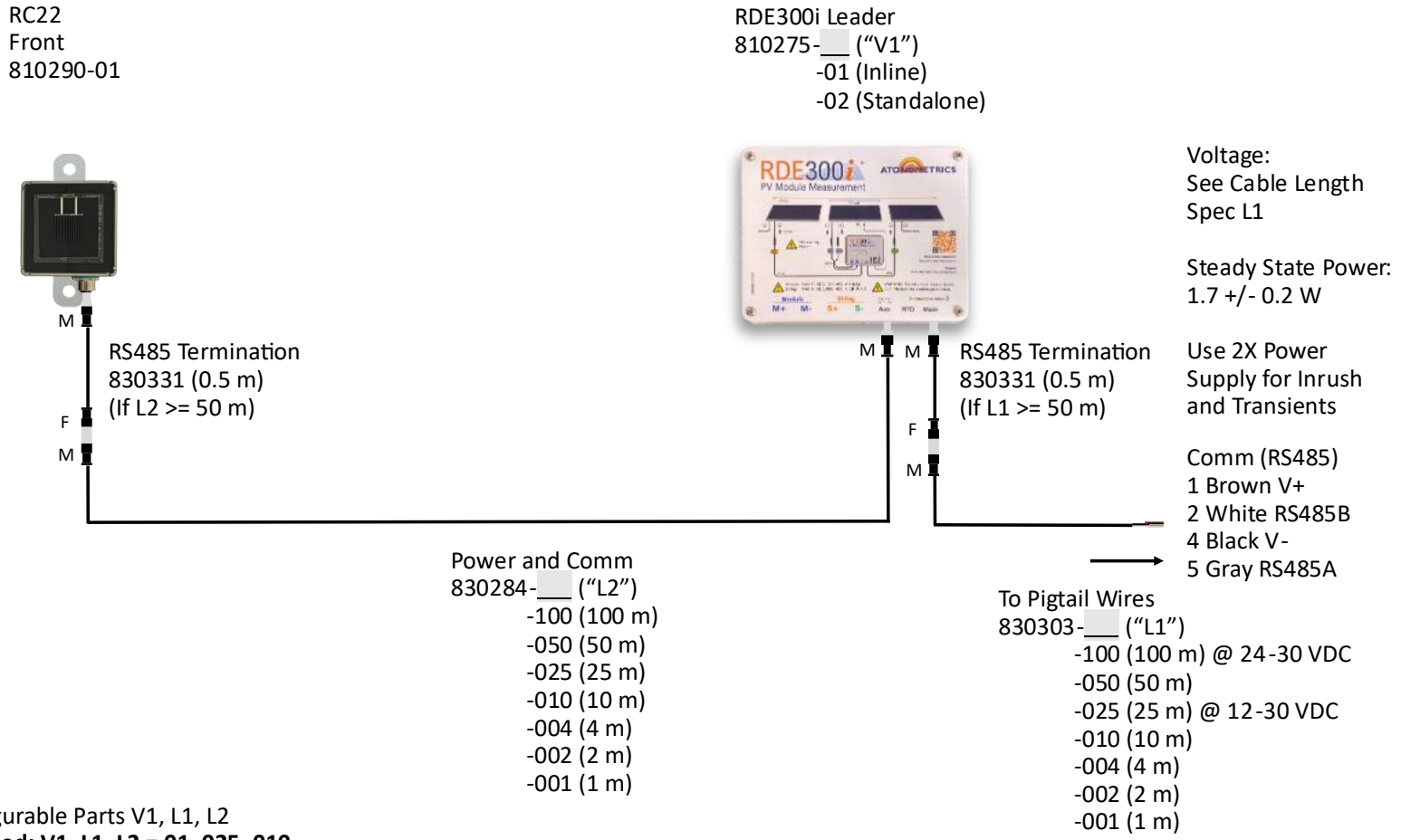
5.1 Monofacial Systems

System Layout



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

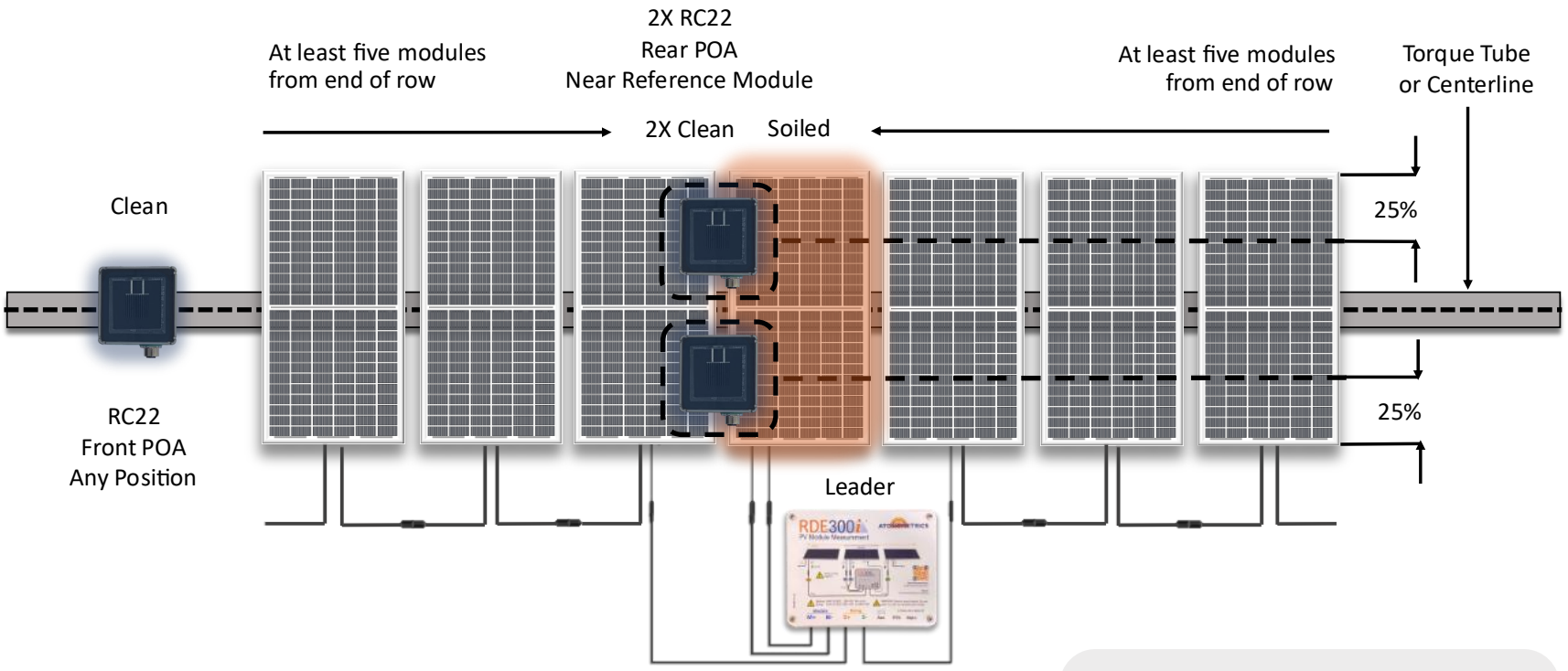
Cable Diagram



Select Configurable Parts V1, L1, L2
Recommended: V1, L1, L2 = 01, 025, 010

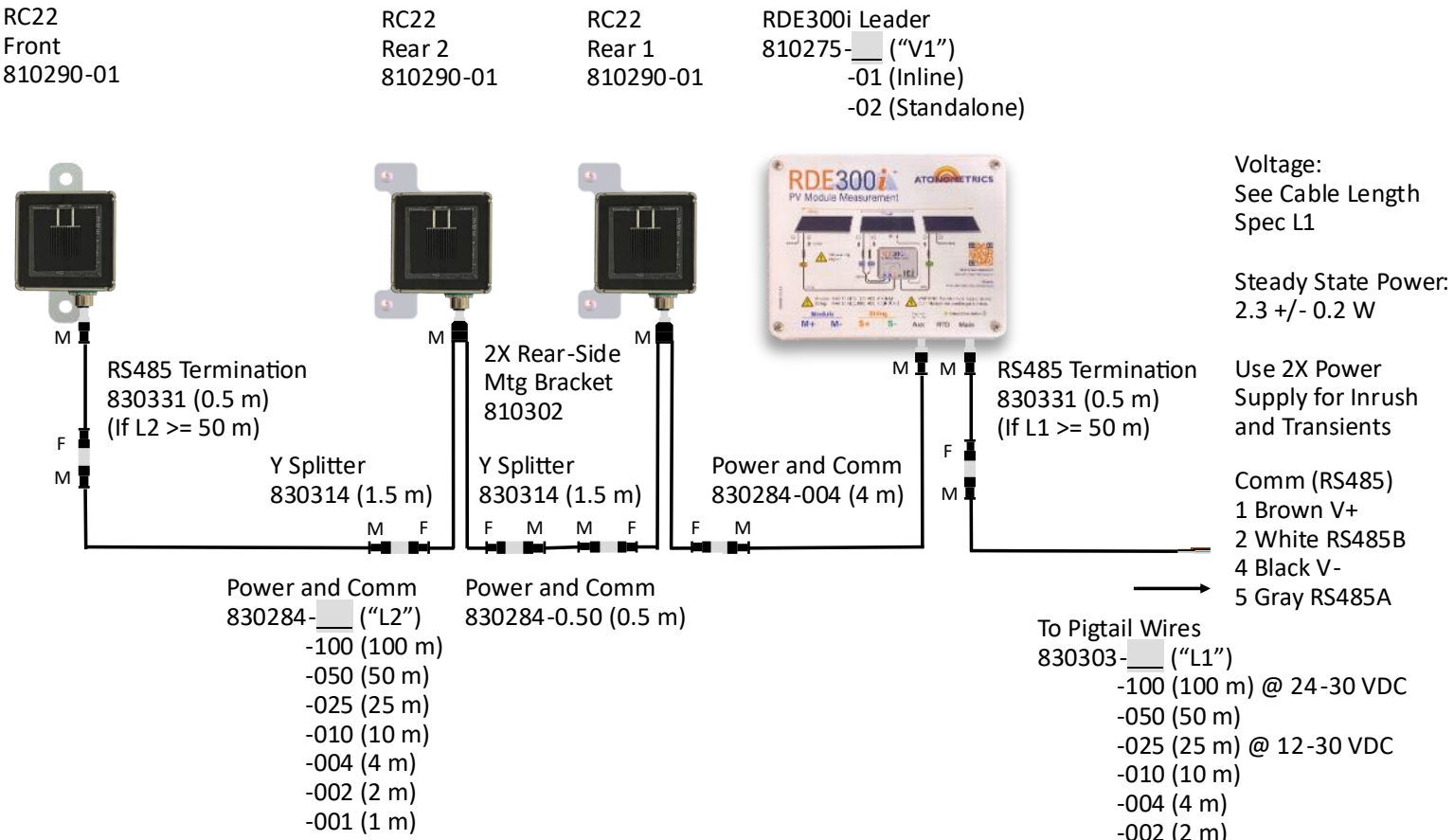
5.2 Bifacial Systems

System Layout



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

Cable Diagram

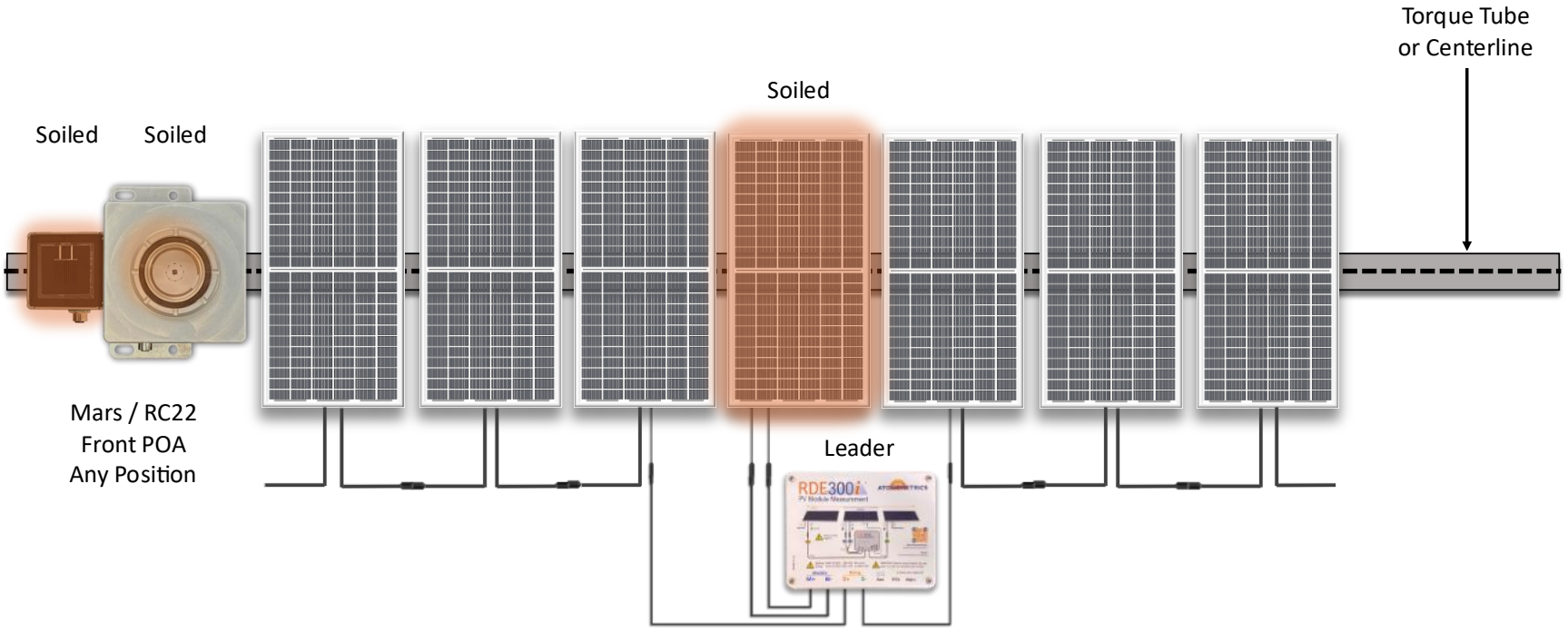


Select Configurable Parts V1, L1, L2
Recommended: V1, L1, L2 = 01, 025, 010

6 Module-Cell-Optical

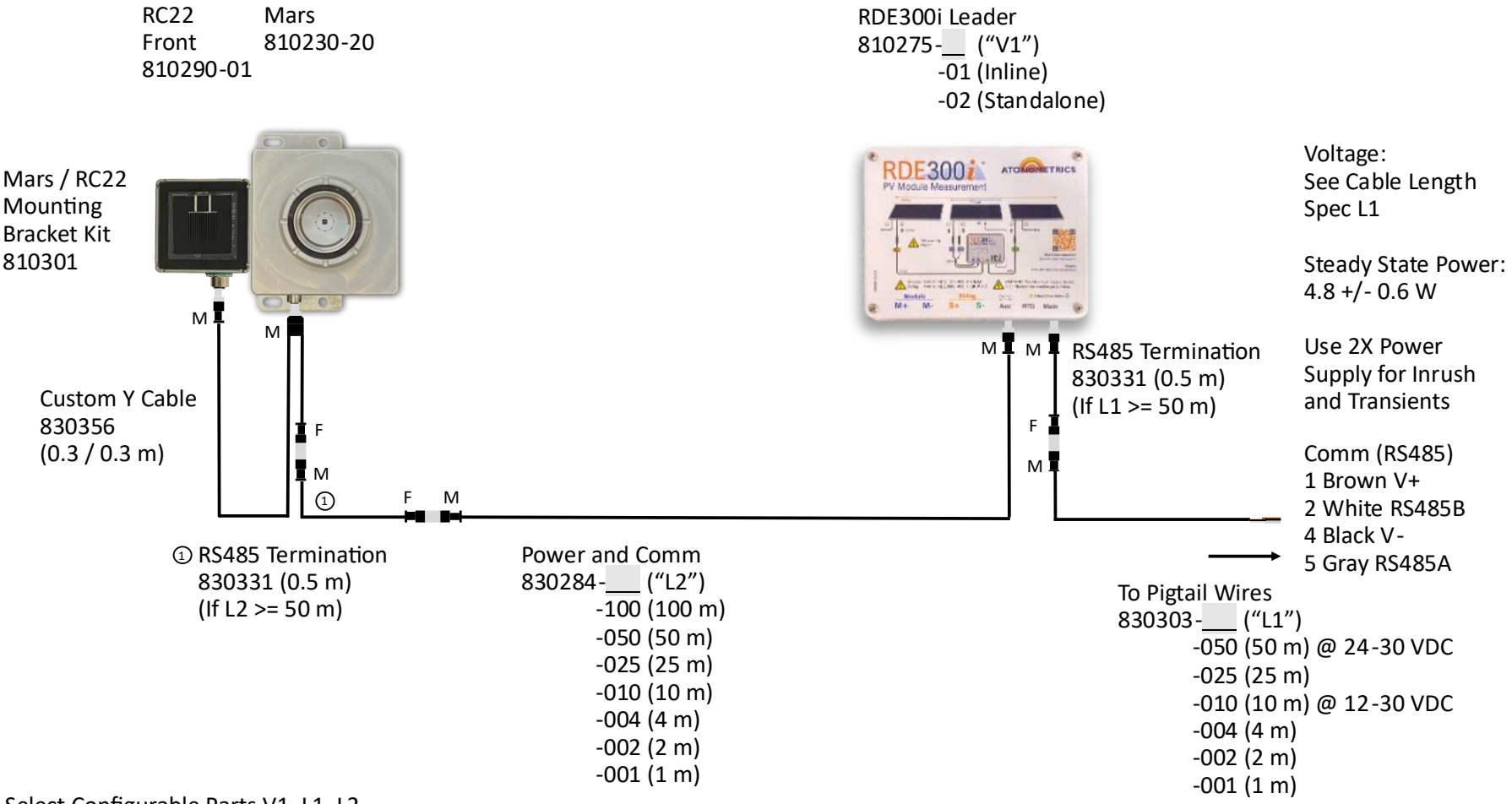
6.1 Monofacial Systems

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

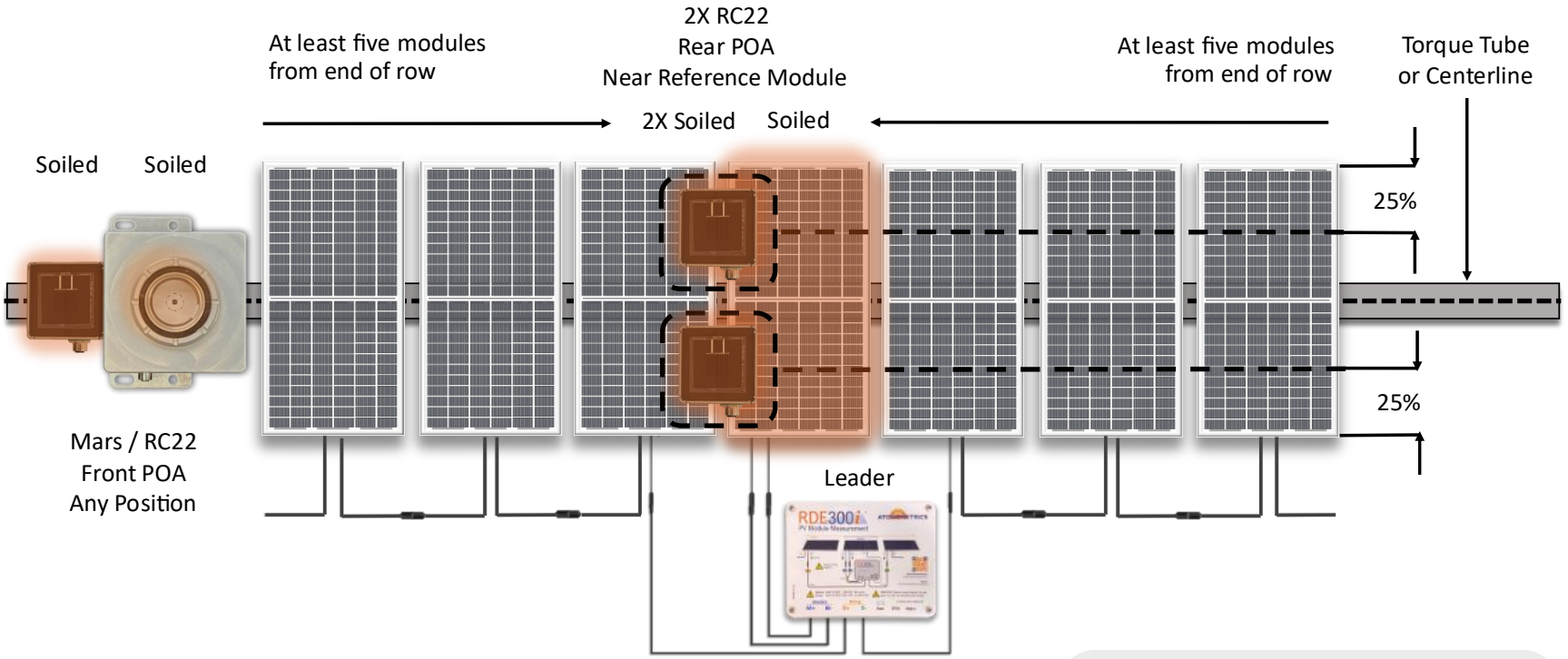
Cable Diagram



Select Configurable Parts V1, L1, L2
Recommended: V1, L1, L2 = 01, 025, 010

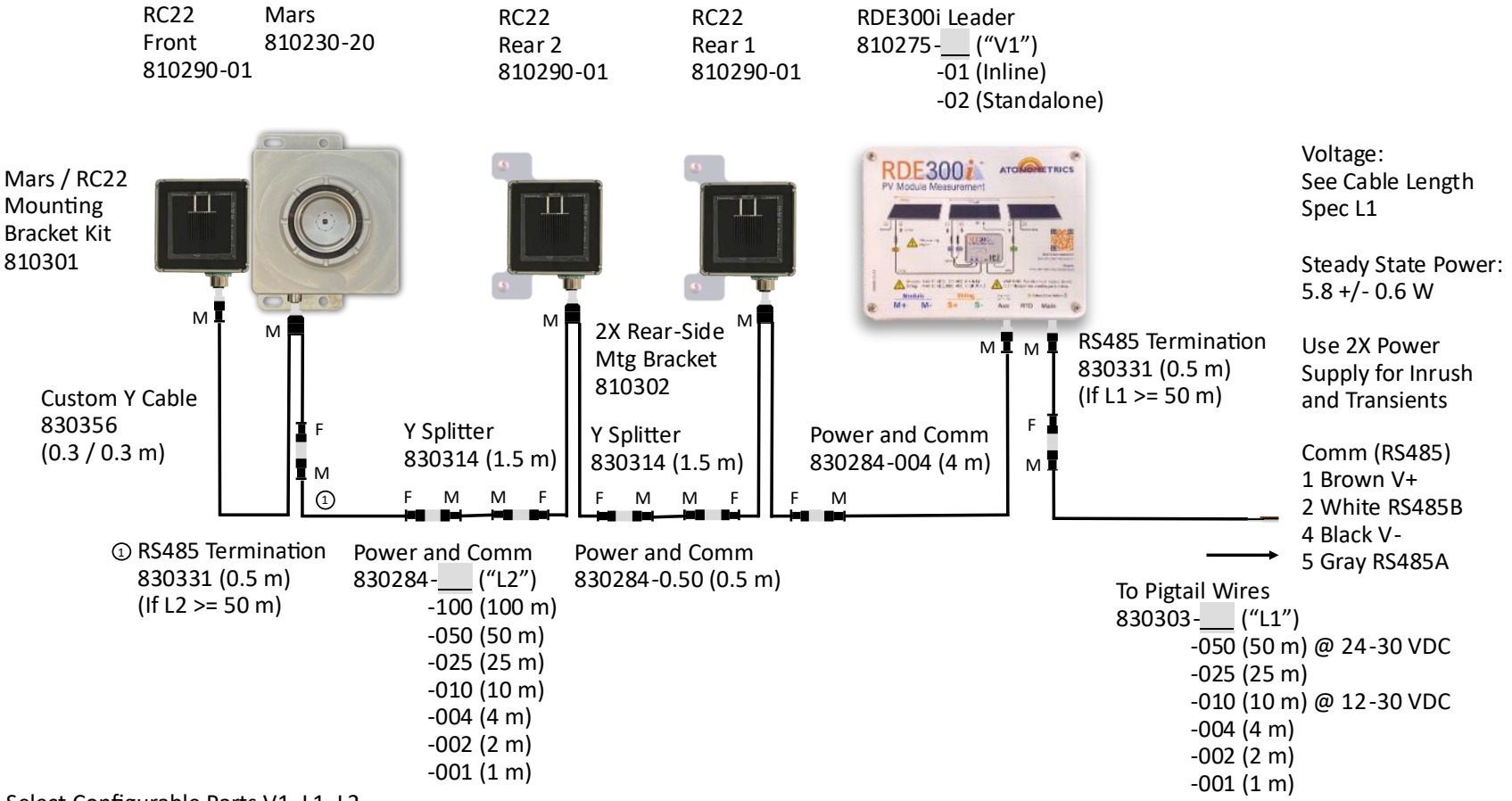
6.2 Bifacial Systems

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

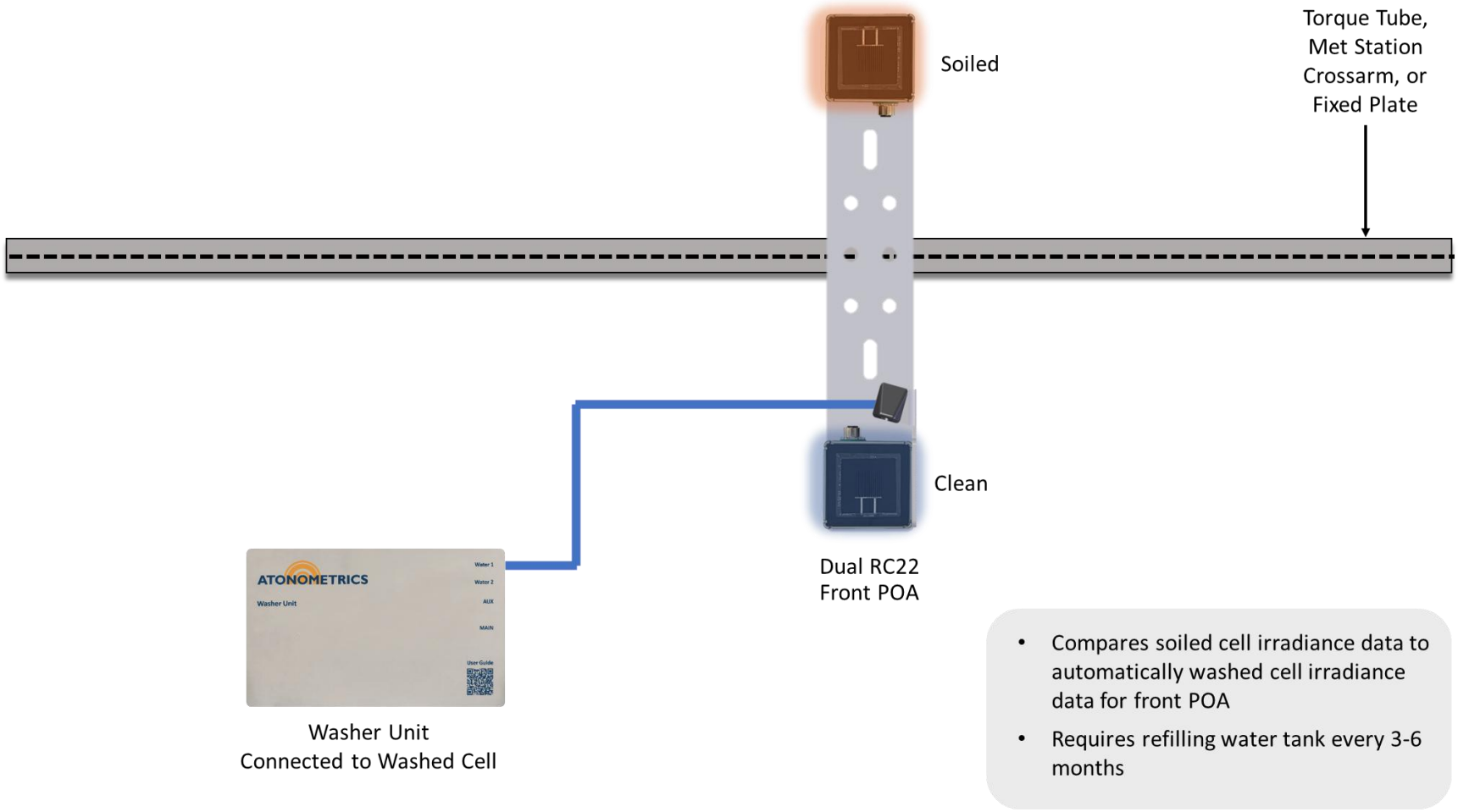


Select Configurable Parts V1, L1, L2
Recommended: V1, L1, L2 = 01, 025, 010

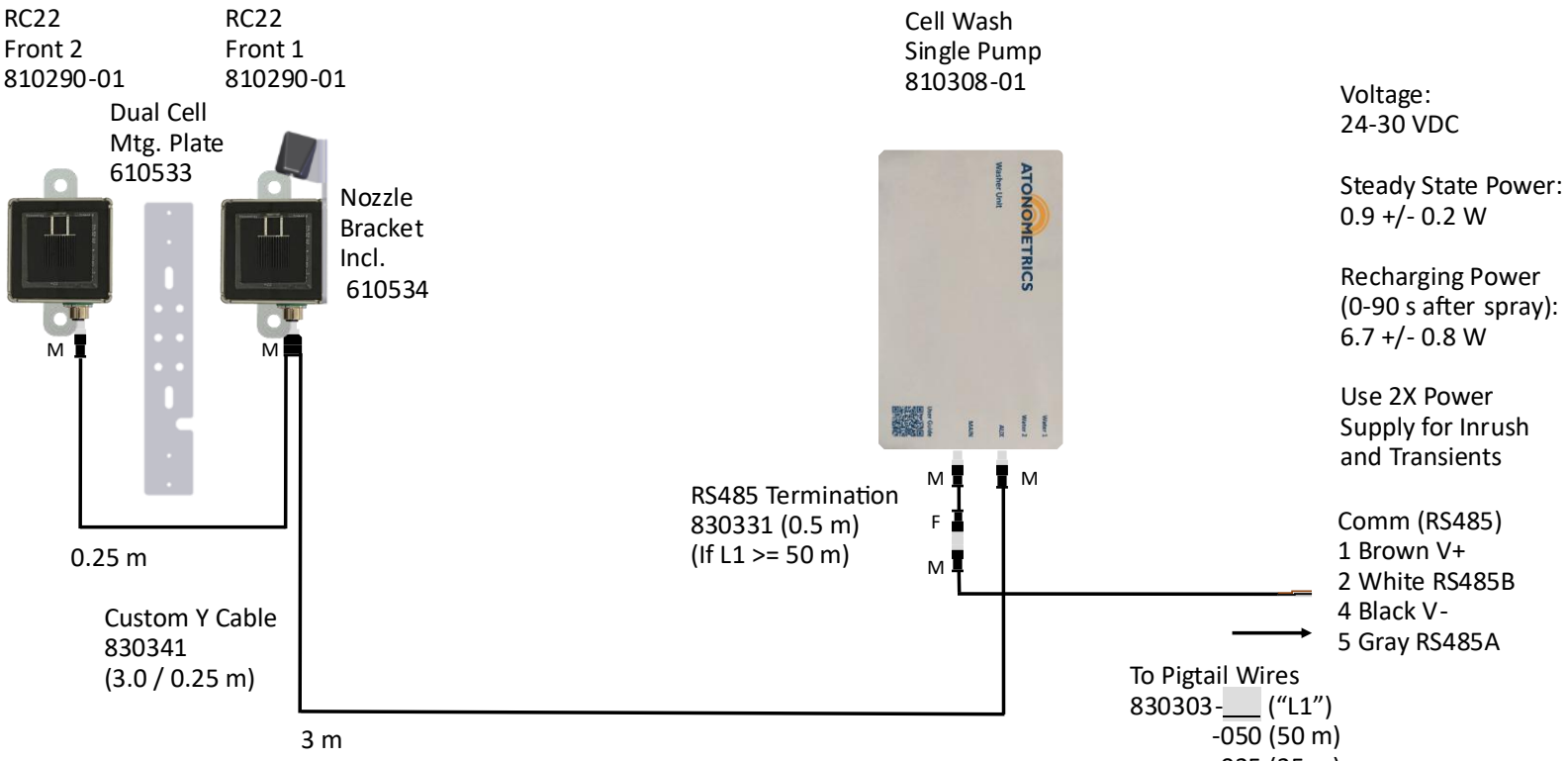
7 Cell-Cell-Washer

7.1 Single POA

System Layout



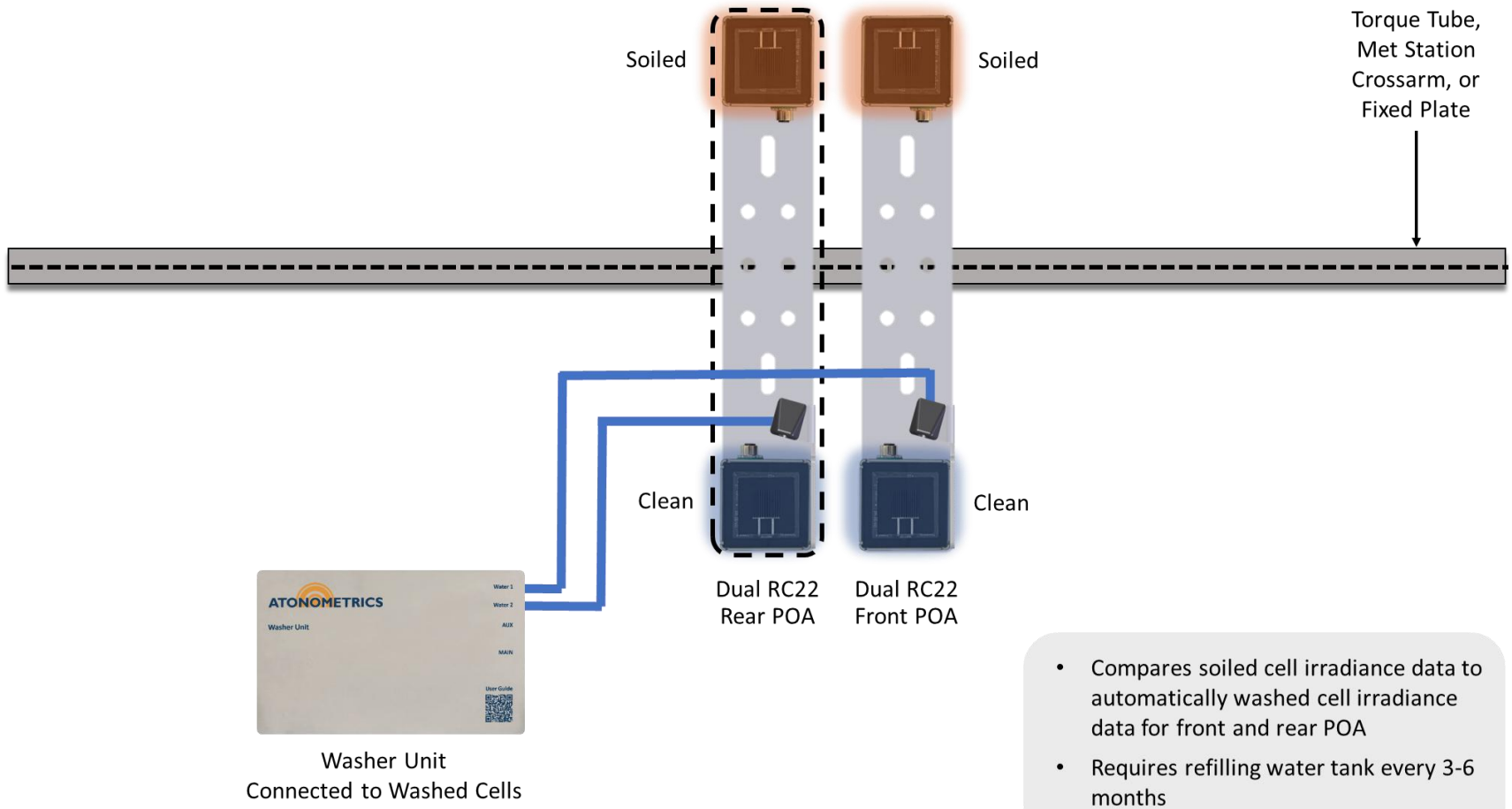
Cable Diagram



Select Configurable Parts L1
Recommended: L1 = 025

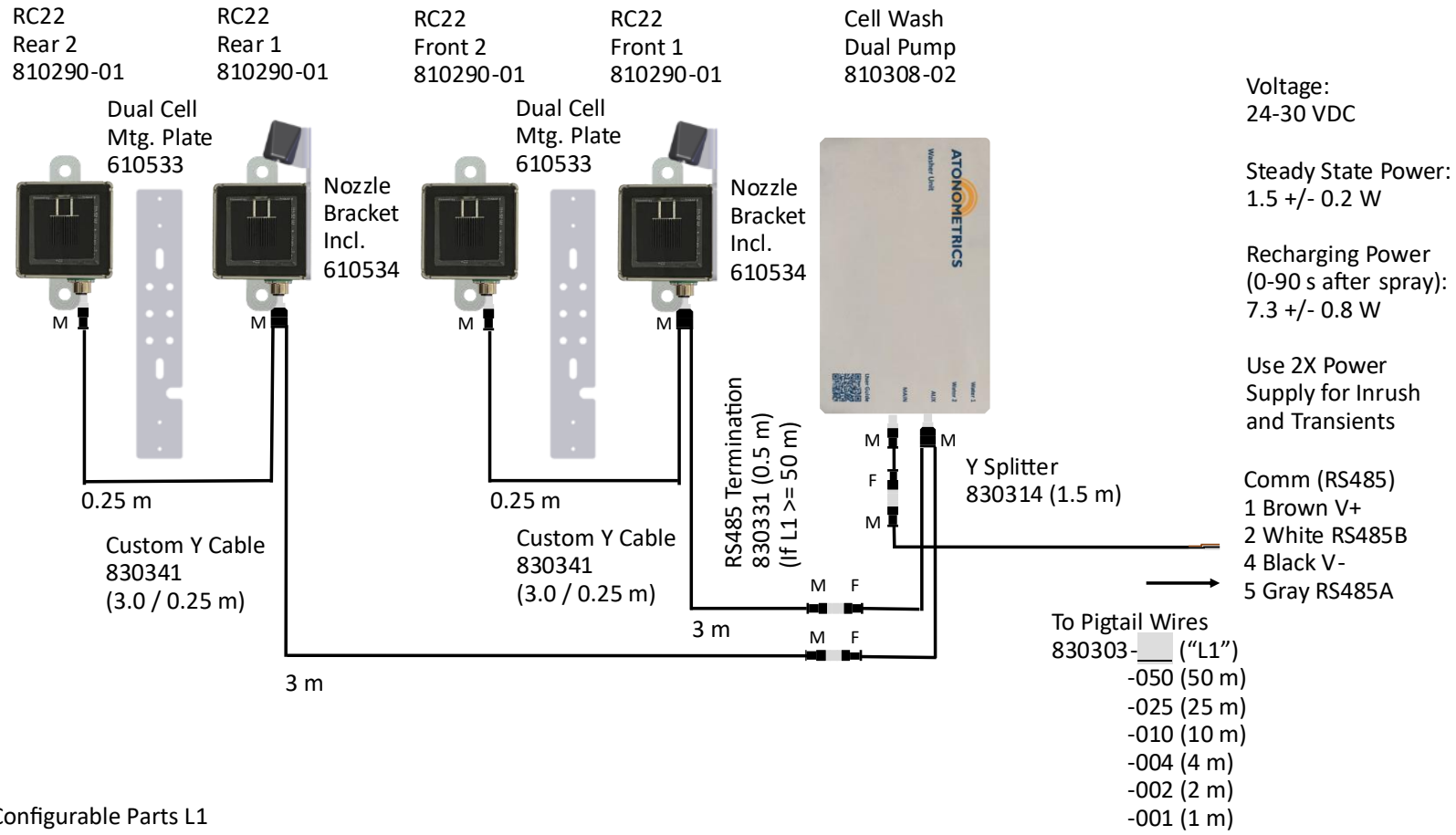
7.2 Dual POA

System Layout



- Compares soiled cell irradiance data to automatically washed cell irradiance data for front and rear POA
- Requires refilling water tank every 3-6 months

Cable Diagram

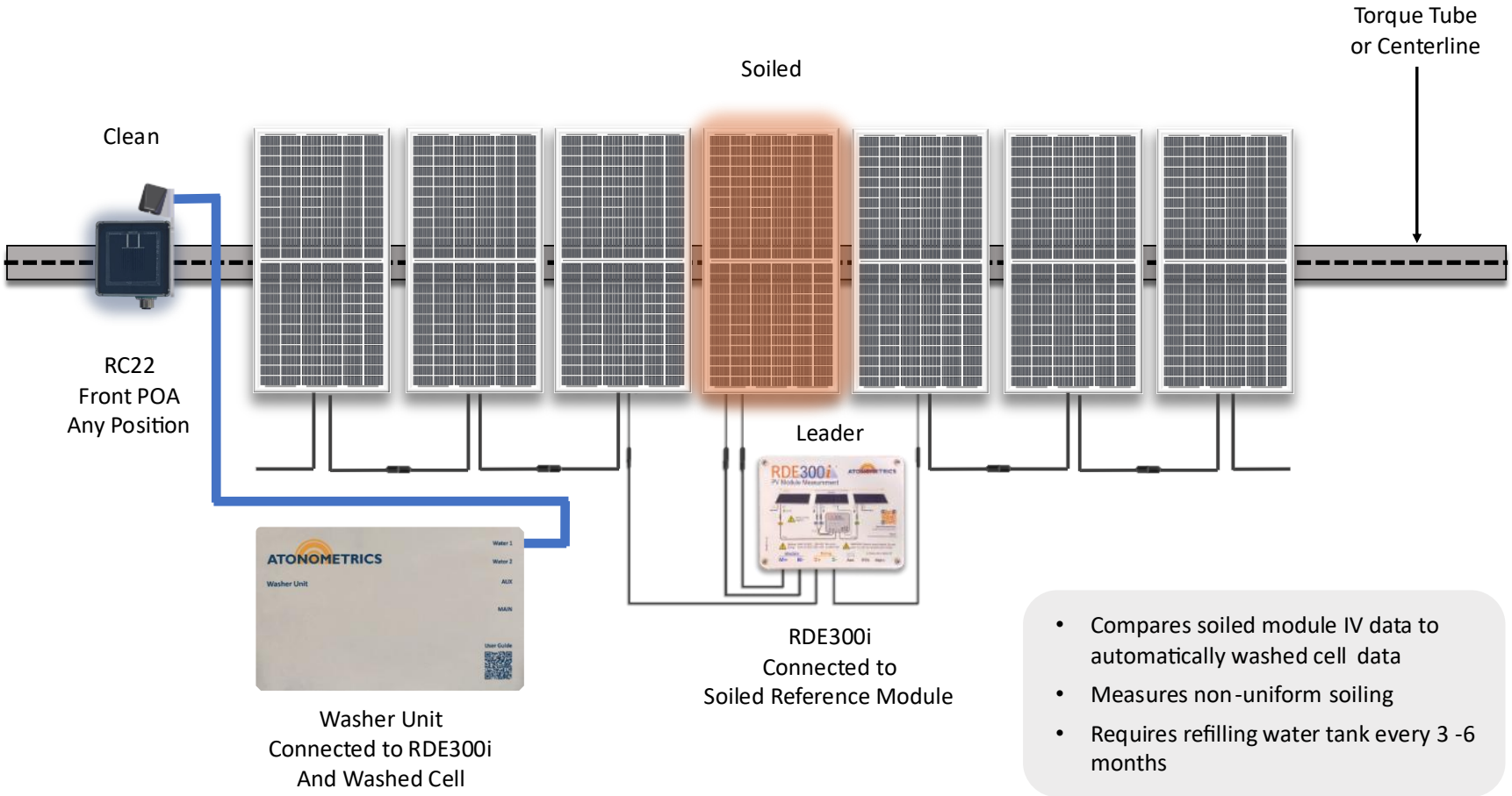


Select Configurable Parts L1
Recommended: L1 = 025

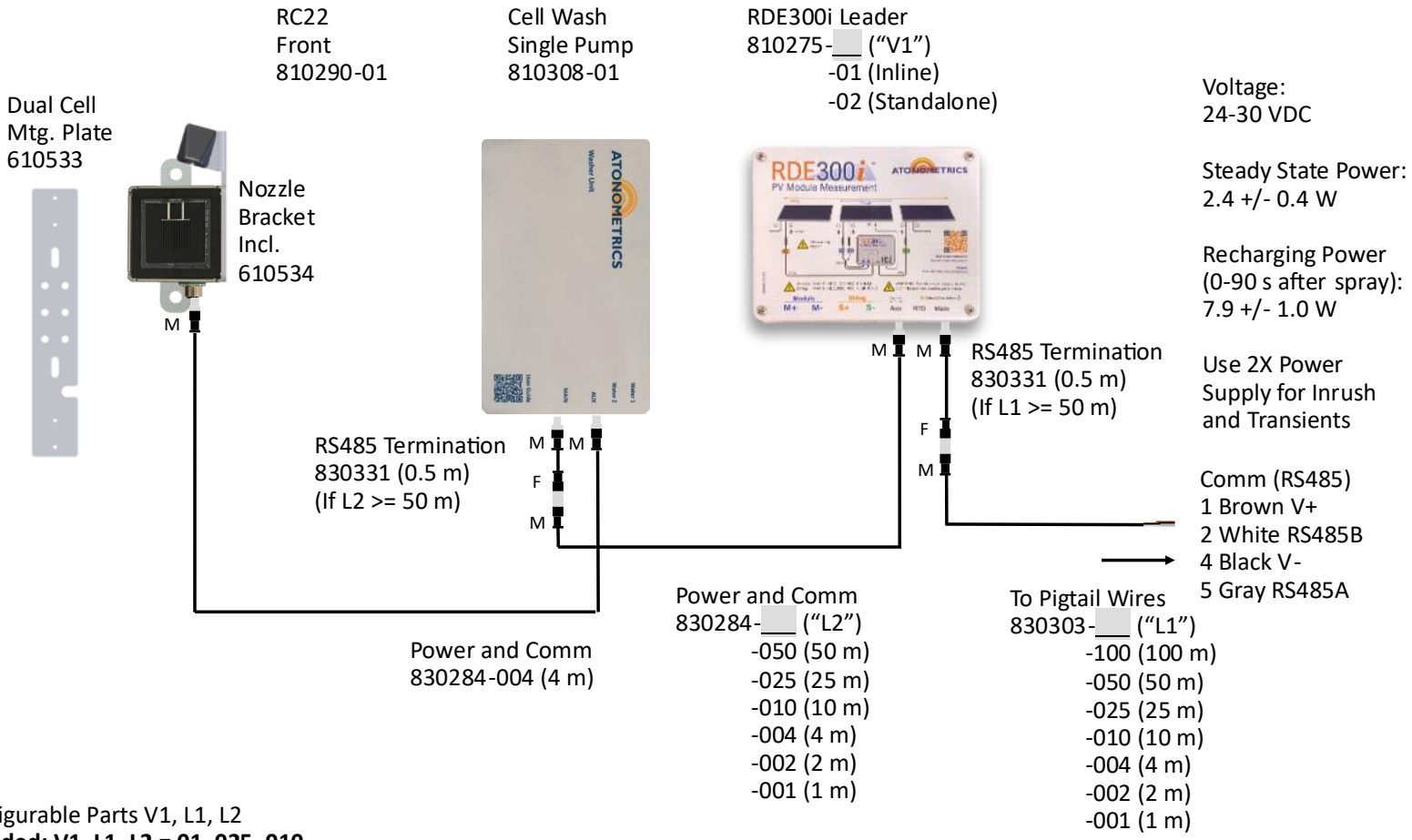
8 Module-Cell-Washer

8.1 Monofacial

System Layout



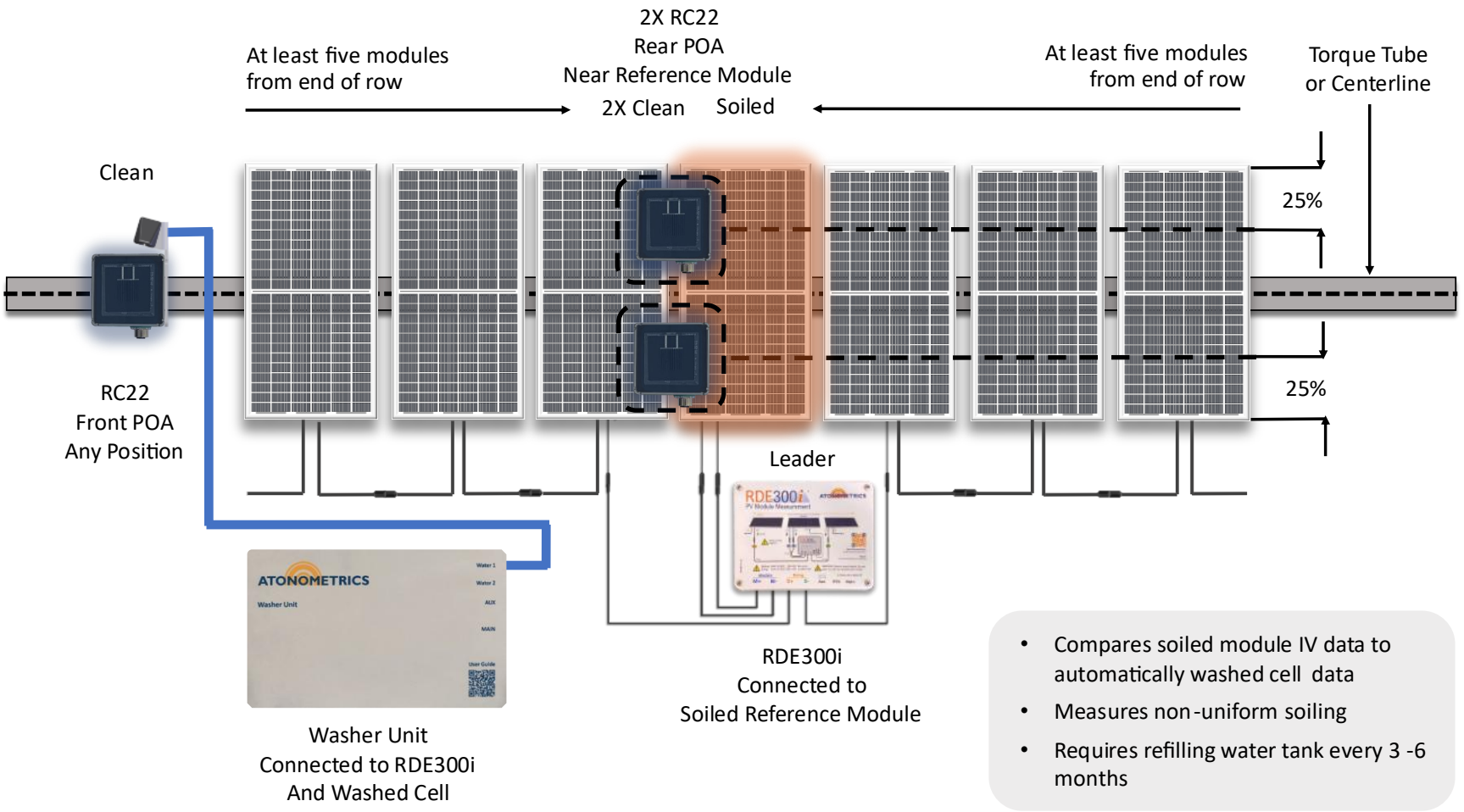
Cabling Diagram



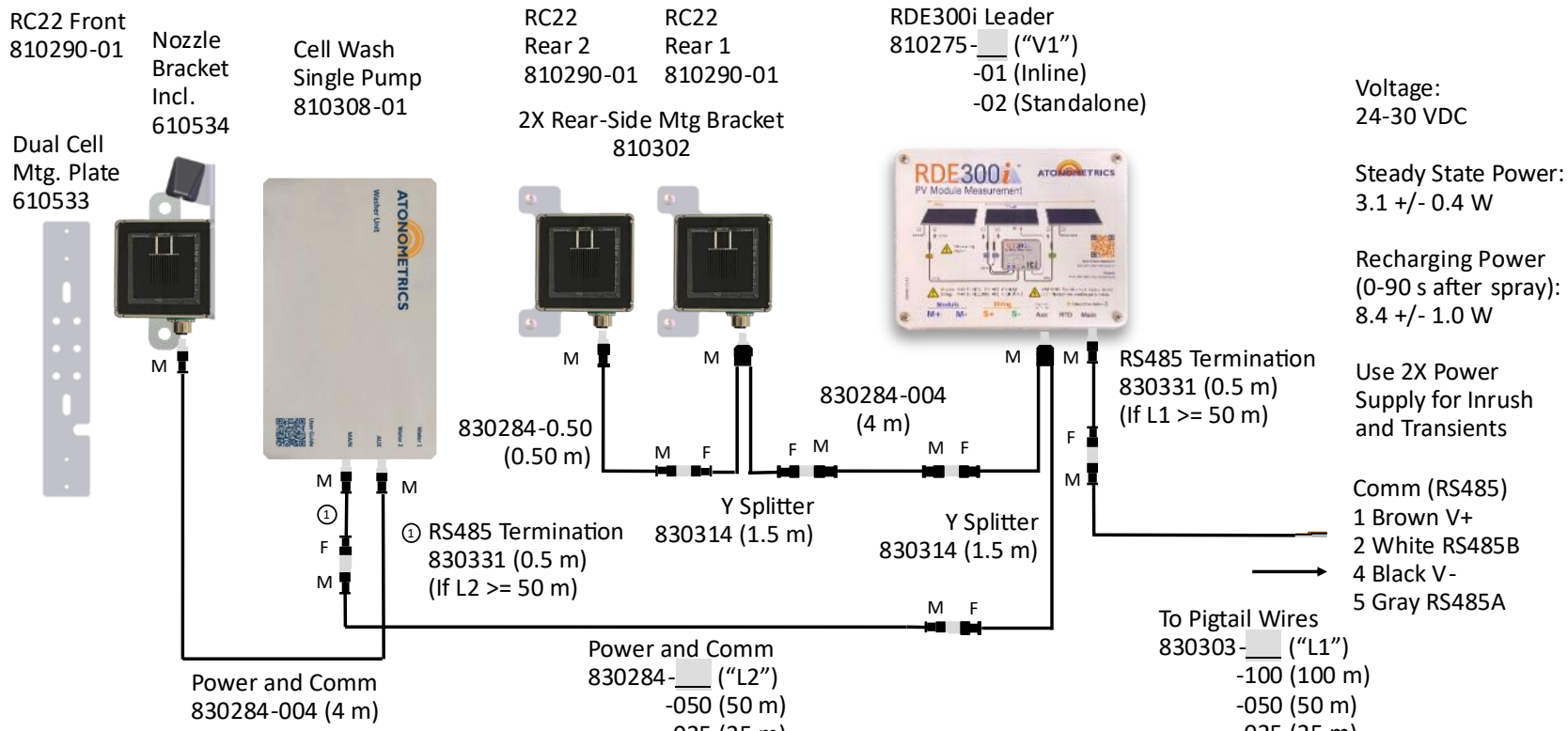
Select Configurable Parts V1, L1, L2
Recommended: V1, L1, L2 = 01, 025, 010

8.2 Bifacial

System Layout

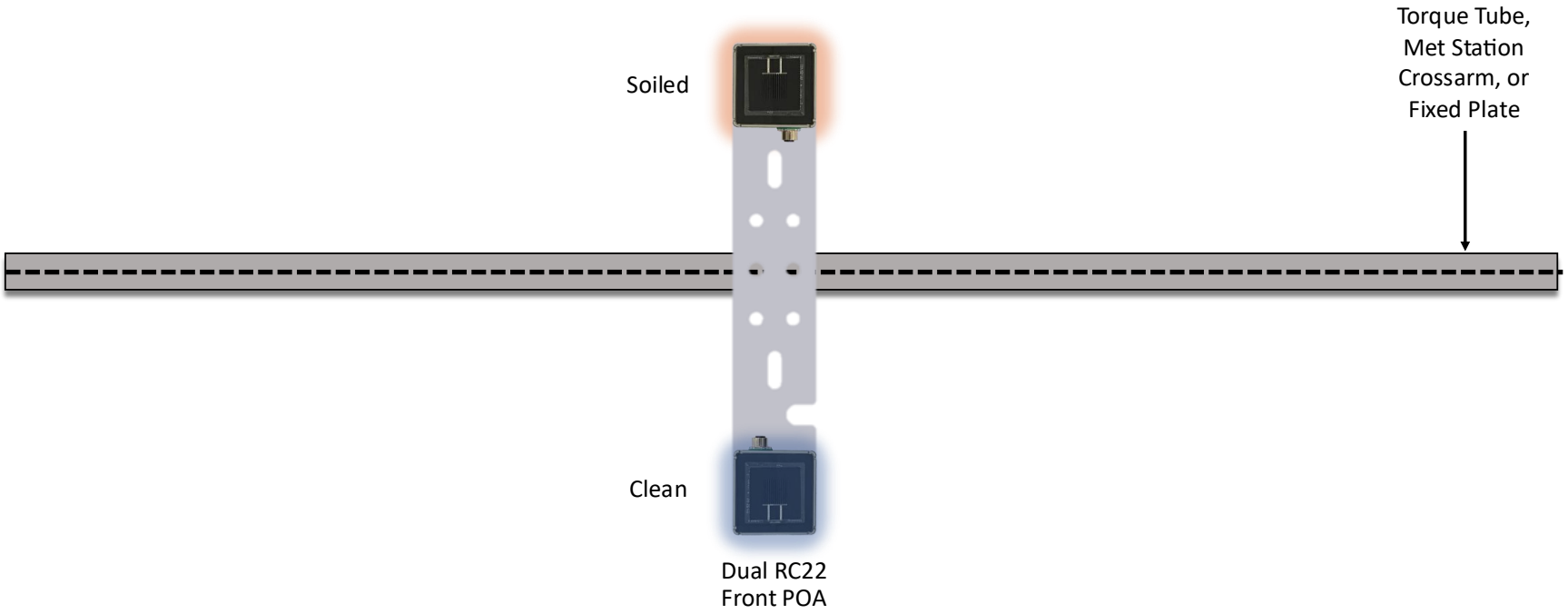


Cabling Diagram



9 Cell-Cell

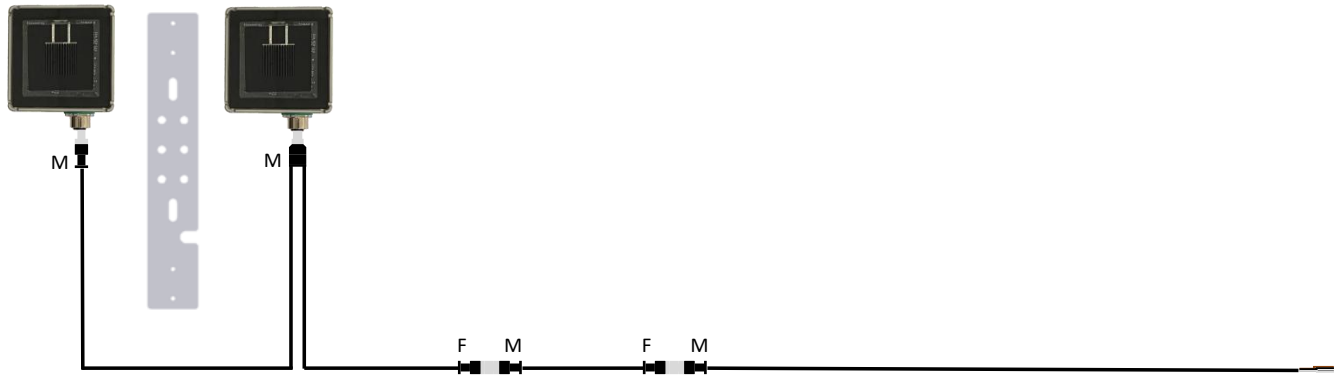
System Layout



NOTE: Calculate soiling ratio externally in SCADA system or datalogger

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

Cable Diagram



Voltage:
12-30 VDC

Steady State Power:
0.4 +/- 0.1 W

Use 2X Power
Supply for Inrush
and Transients

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

Custom Y Cable
830356
(0.3 / 0.3 m)

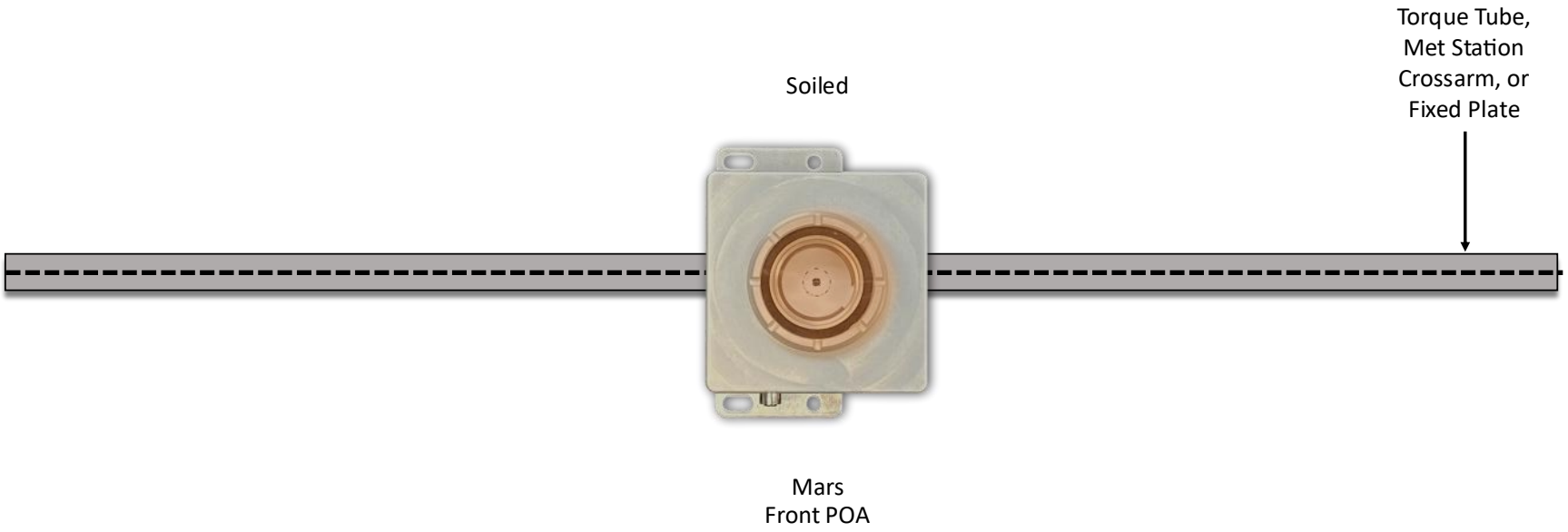
RS485 Termination
830331 (0.5 m)
(If L1 >= 50 m)

To Pigtail Wires
830303-___ ("L1")
-100 (100 m)
-050 (50 m)
-025 (25 m)
-010 (10 m)
-004 (4 m)
-002 (2 m)
-001 (1 m)

Select Configurable Part L1
Recommended: L1 = 025

10 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 >= 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)

Select Configurable Part L1
Recommended: L1 = 010