

Utility-Interconnected Photovoltaic Systems:

Evaluating the Rationale for the Utility-Accessible External Disconnect Switch

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External Disconnect Switch Discussion

- Utility-Accessible, Visible-Break, Lockable Switch (AC-Side, Inverter-Based Systems)
- Typically Required by Utilities
- Considered Unnecessary by System Integrators and Customers
- The EDS is Rarely Used By Utilities



Why Utilities Ask for EDS

- To Protect Line Workers
- To Protect Line Equipment
- In the Event of a Feeder Outage
- Isolation of All Power Sources
- Isolation of Customer Problems

Prime Focal Points for Utilities

- **Safety (NESC, OSHA)**
 - National Electrical Safety Code
 - Occupational Safety and Health Administration
- **Reliability (S.A.I.D.I. - S.A.I.F.I. etc.)**
 - System Average Interruption Duration Index
 - System Average Interruption Frequency Index
- **Cost (Capital and Expense)**
 - Capital Investments (Return On Investment)
 - Expenses (Some Expense Not Recoverable)

Utility Line Work Practices

- New Construction
 - Test and Ground – Work “Cold”
- Electric System Trouble
 - Assume Energized – Work “Hot”
- Timely Restoration of Outages
 - Safe and Fast Outage Restoration Critical



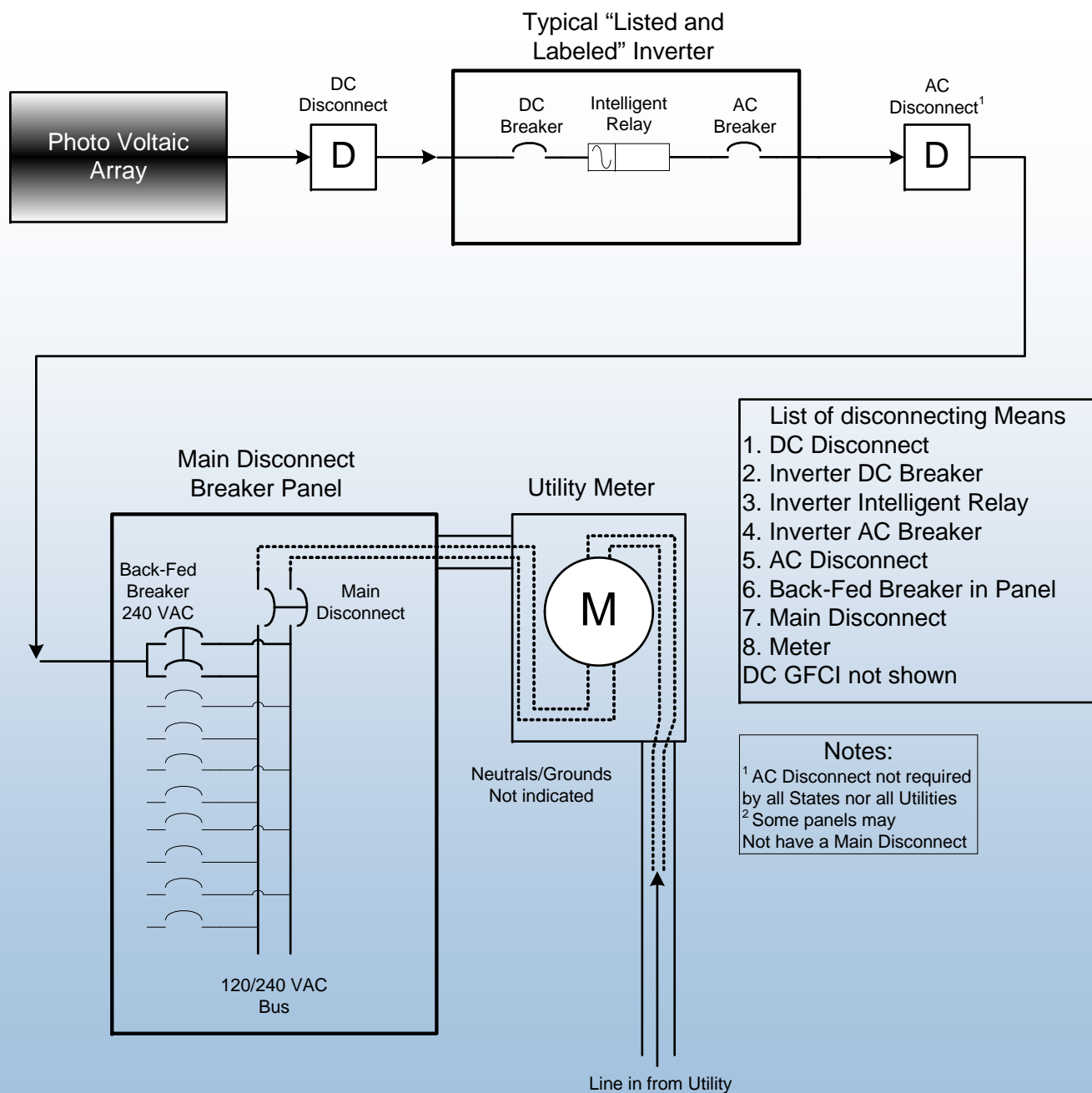
Critical PV Application Standards

- **IEEE 1547-2003** (Interconnection Requirements)
 - Cornerstone Standard Interconnection
 - Addresses Point of Common Coupling
- **UL 1741** (Equipment Requirements)
 - Sets Standards for Grid-Connected Equipment
 - Units Disconnect from Grid with Voltage/Frequency Variations
- **National Electrical Code** (Facilities)
 - The adopted “Law” in Most Jurisdictions for Customer Installations



Utility Accessible EDS - Redundant

- PV Systems Have Many Disconnects
- Utilities Tend to Ignore Using EDS
- PG&E and SMUD Don't Require EDS (Considered Best Practice)
- Some PUCs Have Eliminated EDS Requirements or Defer to Utilities



Who Has Eliminated the EDS Requirement?

- SMUD
- PG&E
- Arkansas, Florida, New Jersey, others

Report Recommendations

- The EDS is Redundant for Tier 1, Inverter-Based Systems
- Utilities Will Require EDS if Given the Choice, but Will Not Use the EDS
- Recommend SD Rule that EDS is a Customer Choice/Option



Discussion